

INDIANA  
LIBRARY  
SERIALS DEPARTMENT  
BLOOMINGTON IN 47401

# BROADCAST **engineering**®

May, 1976/75 cents



**NAB**  
Convention  
Wrap-up

Page 24

Small Market  
Workshop

Equipment  
Roundup

Station-  
To-Station

Updating  
Phase Monitors

# 460

SERIES



*Unmistakably  
Ward-Beck*



Tomorrow's Technology Today.

Ward-Beck Systems Ltd., 841 Progress Avenue, Scarborough, Ontario M1H 4  
Telephone (416) 438-6550. Telex 06-23469

Ward-Beck Systems Inc., 290 Larkin Street, Buffalo, N.Y. 14210

For More Details Circle (1) on Reply Card

[www.americanradiohistory.com](http://www.americanradiohistory.com)



# We've lightened your load.

# Here and here.

new portable video  
recorder/player  
is easier  
to use than ever before.

As done two  
to improve  
and NG capa-  
we've made  
lighter and we've lowered  
cost.  
brand-new CR-4400U Color  
Capstan-Servo 3/4" U-VCR  
only 24.5 pounds, complete  
chargeable battery and  
20-minute videocassette  
And it sits as lightly on your  
back as it does on your shoulder.  
the CR-4400U at your side,  
set to record top-quality color  
with a S/N ratio of better than  
There's a full-function key-  
including pause/still and audio  
Other JVC features include audio  
and multi-purpose meter to  
audio, battery, video and servo  
Our exclusive auto assemble  
function enables you to get  
glitch-free edits between  
and can be operated by  
trigger or remote switch. With  
time to full speed at less than  
and, you're always ready to  
And you can shoot 50% longer,  
since the CR-4400U requires 50%  
power than most other decks.



JVC

AA-P44U Power Adap-  
tor, which also functions  
as a battery charger.

But the best way for you to find  
out how this light-weight, low cost  
portable video-cassette system can  
add to your newsgathering ability is to  
get yourself a hands-on demonstra-  
tion. Call your JVC dealer, or send us  
the coupon below.

JVC's unique patented dubbing  
switch is provided to facilitate quality  
tape transfers. For playback through  
regular TV sets, an optional RF  
converter can be plugged right into  
the deck. The CR-4400U operates on  
AC as well with its companion

**New JVC CR-4400U Color  
Portable Recorder, shown with  
new CR-8300U Full-Editing  
Cassette Recorder, GC-4800U  
Color Camera, CC-4800U  
Camera Control Unit and  
Dual-Machine Remote  
Controller.**



**JVC Industries, Inc.  
58-75 Queens Midtown Expwy.  
Maspeth, N.Y. 11378**

- Please send information on:
- CR-4400U Portable Color 3/4" Video Cassette Recorder/Player
  - GC-4800U Portable Color Camera
  - CR-8300U Full Editing 3/4" Video Cassette Recorder/Player
  - I'd like a demonstration

Name \_\_\_\_\_ Title \_\_\_\_\_

Organization/Company \_\_\_\_\_

Address \_\_\_\_\_

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

Telephone \_\_\_\_\_

# JVC

JVC INDUSTRIES, INC.

For More Details Circle (92) on Reply Card

- 20 **NAB Video Review.** BE's Video Editor walks the aisles of the NAB exhibit area in search of new products. **Joe Roizen.**
- 32 **NAB Sessions Update Engineers.** A report of the highlights of technical sessions held during the convention.
- 38 **NAB Radio Review.** A description of what it was like to visit most of the booths featuring radio and audio equipment. Further descriptions of equipment are covered in the NAB Product Review starting on page 46. **Dennis Ciapura.**
- 50 **The VTR Revolution.** Part 2 of a 2-part series on the history of video tape recording, a subject of major emphasis at the NAB convention this year. **Joe Roizen.**
- 54 **Radio Workshop.** Our Small Market Workshop has been enlarged and given a new name. In this edition of a continuing series, our Workshop Editor continues his coverage of transmitter maintenance. **Peter Burk.**
- 58 **An Update On The New Phase Monitor Rules.** It's all in Docket 19692. Our Facilities Editor explains the new Rules. **Robert Jones.**
- 64 **Station Special.** Station-To-Station gets a facelift. The new version will include letters, pleas for hard to find parts or manuals, and maintenance and operating tips.

## About The Cover

The NAB Convention coverage is the theme of our May issue. It's the creative effort of our Art Director, Dud Rose. Special NAB coverage begins in the news on page 8.

## Departments

- Direct Current .....
- Industry News .....
- SBE Journal .....
- New Products .....
- Station-To-Station .....
- People In The News .....
- Book Reviews .....
- Ad Index .....
- Classified Ads .....

### EDITORIAL

Ronald N. Merrell, *Director*  
Carl Babcoke, *Technical*  
Pat Finnegan, *Maintenance*  
Howard T. Head, *FCC Rules*  
Robert A. Jones, *Facilities*  
Walter Jung, *Solid State*

Rainelle Harris, *Editorial Assistant*  
H. G. Roesler, *Cartoonist*  
Dudley Rose, *Graphic Designer*  
Joe Roizen, *Video*  
Peter Burk, *Radio Workshop*  
Dennis Ciapura, *Audio Editor*

### CIRCULATION

Evelyn Rogers, *Manager*

### ADVERTISING

Mike Kreiter, *Director*  
Gloria Parmenter, *Production*  
*Regional Advertising Sales Offices on Advertisers' Index page.*



**Broadcast Engineering** is published monthly by Intertec Publishing Corp., 1014 Wyandotte, Kansas City, Missouri 64105. Telephone: (913) 888-4664.

**Broadcast Engineering** is mailed free to persons engaged in commercial and educational radio and television broadcasting. Non-subscriptions in the U.S. are \$6.00 a year, \$10.00 two years, \$13.00 three years. Outside USA add \$1.00 per year to cover postage. Copy rate 75 cents. Back issues rate \$1.00. Adjustments necessitated by subscription changes at single copy rate.

Controlled Circulation postage paid at Indianapolis, Indiana.



Robert E. Hertel,

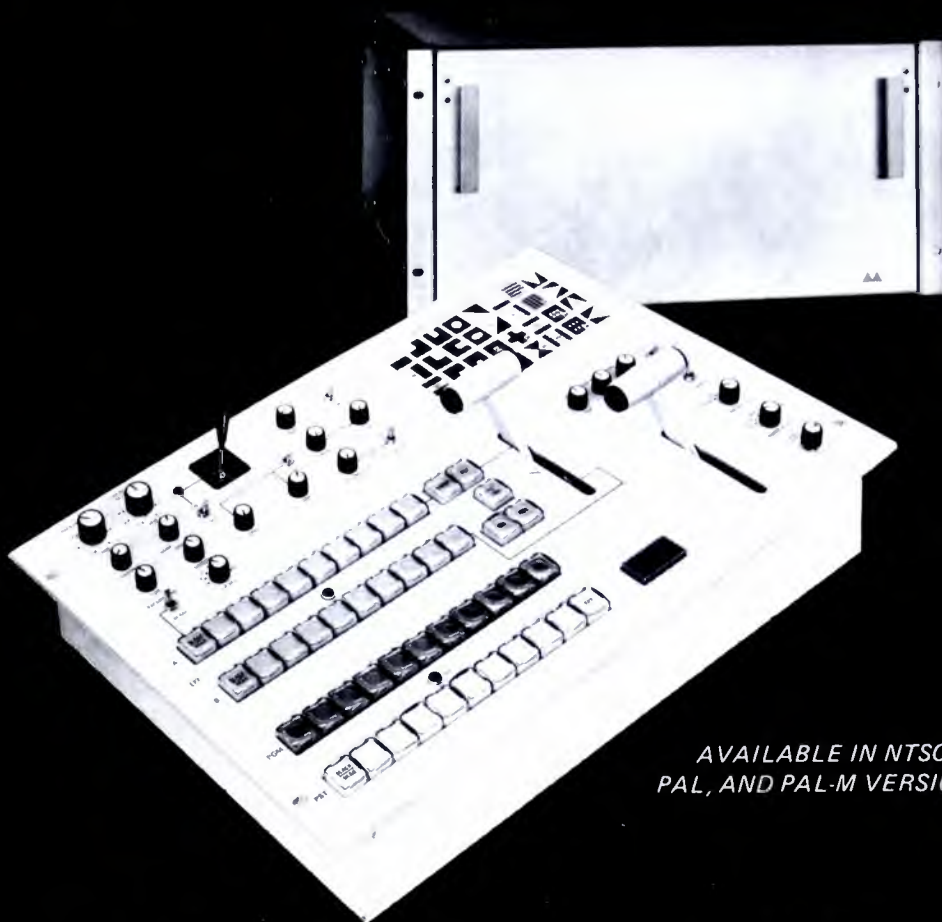
INTERTEC PUBLISHING  
Subsidiary of HOWARD W. SAMS & CO.

Copyright, 1976, Intertec Publishing Corp. All Rights Reserved. Material may not be reproduced or photocopied in any form without written permission of Publisher.



# Introducing...

## GRASS VALLEY GROUP MODEL 1600-1A SWITCHING SYSTEM




AVAILABLE IN NTSC,  
PAL, AND PAL-M VERSIONS

### FEATURES

- Unique compactness and economy
- 10 inputs (including color black and color background)
- Mix/effects system with positioner, color matte generator, and 32 wipe patterns
- PGM/PST mixing amplifier, plus take bar
- Non-sync and camera tally systems
- Color black and color background generators

### OPTIONS

- RGB chroma keyer
- Shadow chroma keyer
- RGB switching matrix
- BORDERLINE® generator
- Downstream keyer system with BORDERLINE®
- Future AFV system

THE GRASS VALLEY GROUP, INC.   
A TEKTRONIX COMPANY

Station Plaza East  
GREAT NECK, NY 11021  
(516) 487-1311

4419 Van Nuys Blvd, Ste 307  
SHERMAN OAKS, CA 91403  
(213) 990-6172

1644 Tullie Cir, NE  
ATLANTA, GA 30329  
(404) 634-0521

P.O. Box 482  
MABANK, TX 75147  
(214) 887-1181

810 W Bristol Street  
ELKHART, IN 46514  
(219) 264-0931

# DIRECT CURRENT



# FROM D. C.

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

## New FM Power-Height Policy Adopted

Section 73.211 of the FCC rules provides for maximum effective radiated power and height above average terrain for FM broadcast stations: 3 kW and 300 feet for Class A, 50 kW and 500 feet for Class B, and 100 kW and 2000 feet for Class C. When the height above average terrain is to be greater than that specified, the effective radiated power must be reduced by an appropriate amount. Until recently, the reduction was determined by reference to Figure 3 of Section 73.333 of the rules which gives permitted maximum power as a function of height above average terrain.

A problem arose, however, when the new FM (and TV) propagation curves were adopted last summer. The amendment to the rules (transmittal sheet #7) is just now being mailed out. Be careful when you use these curves, because the extra sliding scale supplied does not agree with the scale on the curves. A new corrected sliding scale will be forthcoming. If you are now operating with power reduced because your height above average terrain exceeds that specified for your class of station, it might be worth your time to see what this new policy will do for you. We know of one case where the station presumably can treble its power.

One word of caution: the Commission staff is actively working on a new Figure 3 and will, in time, replace the existing one. When that happens, all pending applications as well as future ones will have to comply. The new curve may be slightly less generous than the new policy now in effect. If you hurry, you might beat the Commission to the punch!

We gave you the good news first. Now we must report the bad news. Since Figure 3 is contained in both the Canadian and Mexican FM agreements, the new policy does not apply to stations within 199 miles of the Mexican border or within 250 miles of the Canadian border!

We haven't heard about a new policy yet for TV stations, but the principles are quite similar. Section 73.614 of the rules provides for maximum power and height and Section 73.699 has a Figure 3 (and Figure 4) for correction. And the new propagation curves for FM are the same as those for TV Channels 2-6.

(Continued on page 4)



# SPARTA CENTURY II

**WITH TWO YEAR WARRANTY!**



A new standard in broadcast tape cartridge equipment!  
Direct drive 450 RPM motor. Silent air-damped solenoid.  
Built-in splice finder. Digital tone Circuitry. And much more.  
The newest machine on the market, designed specifically for the  
stringent new NAB specifications, and...

**WITH TWO YEAR WARRANTY!**

 **SPARTA**  
Division of Cetec Corporation

5851 Florin-Perkins Road, Sacramento, Ca. 95828

For More Details Circle (4) on Reply Card

# DIRECT CURRENT FROM D. C.

(Continued from page 4)

---

## FCC Takes New CB Actions

The Commission is making another effort to try to resolve its never ending CB headache. In July of 1974, it started a rule making (Docket 20120) which, among other things, proposed to expand the 27 MHz band from 23 to 50 channels. Apparently, they were about ready to conclude this proceeding when someone discovered that the new allocations would result in some channels 450 and 460 kilohertz apart, close to the 455 kHz, first or second I.F. of most CB transceivers presently marketed (and millions of AM receivers). A Notice of Inquiry and Further Notice of Proposed Rule Making has been issued to ascertain the severity of the potential inter-modulation problem.

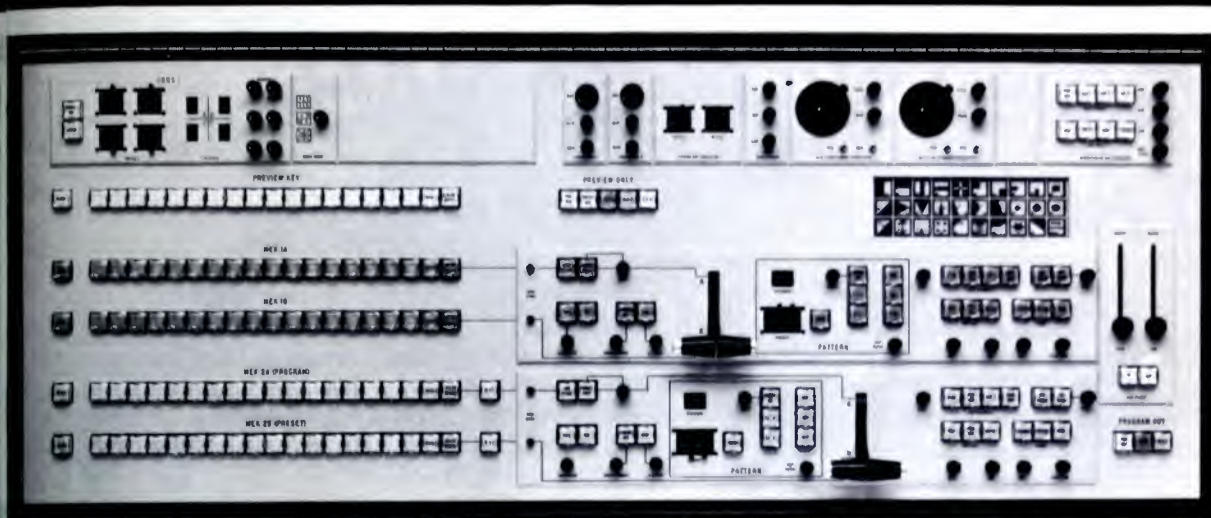
In a corollary action, the Commission has created a Personal Use Radio Advisory Committee (PURAC). It hopes to enlist from fifteen to twenty-five members as a cross-section of the Citizen's Band industry to assist in solving the critical problems which the explosion of the service has created.

## Short Circuits

The Canadian Radio Television Commission has established a rule which prohibits cable systems from carrying all non-Canadian FM signals...The FCC has denied a petition to raise the power of FM and TV translators east of the Mississippi from one to ten Watts ...General Electric's 1976 color line of TV receivers will contain models which use the Vertical Interval Reference Signal (VIR) transmitted on line 19 to automatically adjust color and tint... The FCC has finally proposed rules for AM, FM, and TV Automatic Transmitters (Docket 20403)...Also proposed by the Commission is rule-making (Docket 19079) looking into expanded multiplex (SCA) operation by FM educational stations. One interesting question is whether these stations should be permitted to render non-educational subscriber services (e.g. background music) for profit...In one for the books, the FCC has dictated that if a certain female FM licensee in Kentucky marries a certain male FM licensee, their marriage will constitute a violation of Section 73.240 of the rules (overlap of 1 mV/m contours)...The Commission staff is working on an Order which would extend for one year its decision not to use the terrain roughness factor in FM and TV.



# WE OFFER MORE (\*)



## WITH THE AMERICAN DATA 558

(\*) WHICH FEATURES THE **ONLY FOUR CHANNEL MIX EFFECTS SYSTEM AVAILABLE** — ALLOWING **ALL OF THESE PRODUCTION FUNCTIONS TO BE DONE ON A SINGLE MIX EFFECTS AMPLIFIER.**

- B Mix or Dissolve
- A-B Wipe
- A-B Wipe with Border
- A-B Wipe through 100% Border
- Mix or Dissolve to a Preset Wipe
- Wipe to a Preset Wipe
- Bordered Wipe to a Preset Wipe
- Mix or Dissolve to a Key
- Wipe to a Key or Wipe Key
- Mix to a Bordered Key
- A-B Mix Behind a Chroma Key
- A-B Wipe Behind a Chroma Key
- A-B Wipe with Borders Behind a Chroma Key
- Mix Wipe or Bordered Wipe to a Preset Wipe Behind a Chroma Key
- Mix or Dissolve to a Luminance Key Over a Chroma Key
- Wipe to a Luminance Key over a Chroma Key
- Mix, Wipe or Dissolve to an Electronic Spotlight Behind a Chroma Key
- Mix or Wipe to a Quad Split, with or without Borders, Behind a Chroma Key
- Luminance Key over a Quad Split behind a Chroma Key
- And More —

AND JUST THINK — **THE 558 HAS TWO!**



## AMERICAN DATA DIVISION

### AIRPAX ELECTRONICS, INC.

Cambridge Division  
Cambridge, Md.  
Control Breakers & Switches  
Controls Division  
Ct. Lanham, Md. 211  
Cylindrical & Control Instrumentation

1500 MOBILE DRIVE • P. O. BOX 5228 • HUNTSVILLE, ALABAMA 35805 USA • TELEPHONE 205 837 5180 • TWX 810 726 2175

1500 MOBILE DRIVE  
HUNTSVILLE, ALA. 35805  
(205) 837-5180

9424 WATERWAY  
ROCKVILLE, MD. 20853  
(301) 462-1424

2940 WILSHIRE BL. STE 900  
LOS ANGELES, CA 90010  
(213) 947-7796

2908 MULBERRY  
PASADENA, TX 77502  
(713) 661-7272

231 W. HILL AVE.  
GLENNVIEW, IL 60137  
(312) 469-6200

For More Details Circle (5) on Reply Card

## Wasilewski Calls NAB To Action

### Getting Off Ground Zero

The president of the National Association of Broadcasters criticized the federal government for meddling in industry affairs and said "the time has come for broadcasters to become militant" and "match the influence of others in our society."

Vincent T. Wasilewski, speaking at the separate radio and television assemblies of NAB's 54th annual convention said "the day is over when a strong sales force, good engineering and imaginative programming is enough."

Government, he said, has become another department at stations and broadcasters must spend more time and money to become effective in combating its inroads.

In his two appearances, the industry spokesman also:

- Called for repeal of the law Congress passed banning broadcast advertising of cigarettes.

- Urged broadcasters to petition their Congressmen to oppose pending legislation to require payment of record royalties for artists.

- Described cable and pay cable as "two massive reefs upon which our free television system may become shipwrecked" and announced that broadcasters no longer are constrained by the 1971 consensus agreement with cable.

Wasilewski said government has become "over-responsive to negative elements in our society" and should take a clue from political contests where the most successful candidates have disassociated themselves from government.

"It appears" he said, "that people are sick and tired of big, sloppy, meddling, inefficient gov-

ernment."

The NAB president told the station executives that in the last few years government attitudes toward broadcasting have changed. The most dramatic turning point,

he said, came when Congress passed a law banning the advertising of cigarettes on radio and television. That law, he said, should be repealed.

(Continued on page 7)



"It appears that people are sick and tired of big, sloppy, meddling, inefficient government." NAB president Vince Wasilewski delivered his call to action at the convention in Chicago.



Now we can refurbish  
the Mark XV, Max.  
It makes us number one  
in the world in quad head  
capability."

"And that's  
the truth."

## VIDEOMAX NOW REFURBISHES MORE KINDS OF QUAD HEADS THAN ANY OTHER COMPANY IN THE WORLD.

You now have a single source for refurbishing RCA High Band and Low Band video heads and the Ampex Mark III, Mark X and Mark XV heads. No other refurbisher works harder at satisfying a broader range of customer services than Videomax.



Videomax Corporation, An Orrox Company  
3303 Scott Boulevard, Santa Clara, CA 95050  
Phone: (408) 988-2000 Telex: 910-338-0554

SALES & SERVICE — New York: (212)947-8031, Los Angeles: (213)980-7927, Atlanta: (404)992-4490

For More Details Circle (6) on Reply Card



# NAB Takes On Justice Department

The National Association of Broadcasters has labelled as "pointless and unresponsive" arguments by the Justice Department that the Federal Communications Commission has failed to consider adequately the allegedly anticompetitive effects of the anti-siphoning rules for pay television.

In a reply brief filed with the

U.S. Court of Appeals for the District of Columbia, NAB said the Justice Department miscast the issues in stating that FCC has no statutory right to protect free broadcasting from siphoning by pay-television.

NAB's brief pointed out that the Supreme Court has ruled that the FCC was charged by Congress with the broad responsibility for the

orderly development of local television service that "is demonstrated a principal source of information and entertainment for a great part of the nation's population."

NAB said Justice Department arguments that free TV and cable TV should be allowed to compete as free competitors "rest on a faulty factual premise" which in turn "destroys the validity of its own arguments" in the present case.

It said cable could be considered a true competition if it established its own facilities and competed with free broadcasting by providing its own programming or obtaining it from a program supplier or network.

But there's no "true competition," it said, when a pay cable entrepreneur "piggybacks" on an existing cable facility, using the TV signals picked up by the existing operator, and then siphons off the films, sports and special programs that constitute the bulk of free TV's programming.

Noting that cable's free use of free TV's broadcast signals amounts to an "enormous subsidy," the NAB brief said:

"Obviously, true market competition never could exist where one competitor, free broadcast television, subsidizes its competitor, pay cable television..."

"The Commission's anti-siphoning rules are simply requirements with which the pay cable exhibitor must agree to comply as a condition of his concurrent carriage and exploitation of broadcast television programming..."

"When the real and substantial issue—the continued free availability of quality entertainment programming which only the broadcast industry is capable of providing—is divorced from the Justice Department's rhetoric, the Commission's goals of adopting anti-siphoning rules can be considered nothing more than fully legal."

Furthermore, it said, in view of the Supreme Court's decision, the FCC rules have been "mandated by the Communications Act directed that communications service be available to 'all the people of the United States.'"

## IT'S YOUR CHOICE

### Our New AAM-1 Analog Antenna Monitor

- FCC TYPE APPROVAL NUMBER 3-235.
- TRUE RATIO READINGS.
- GOOD STABILITY WITH MODULATION.
- UP TO 8 TOWERS DA-2.
- PHASE SIGN DATA ALWAYS AVAILABLE — NO EXTRA OPERATION REQUIRED.
- LOW PRICE.
- SIMPLE INTERFACE WITH REMOTE CONTROL SYSTEMS INCLUDING OUR NEW TMCS-2 DIGITAL TRANSMITTER/MONITOR REMOTE CONTROL SYSTEM.



### or Our DAM-1 Digital Antenna Monitor

- FCC TYPE APPROVAL NUMBER 3-218.
- TRUE RATIO READINGS.
- HIGH RESOLUTION.
- GOOD STABILITY WITH MODULATION.
- UP TO 6 TOWERS DA-2 STANDARD, 12 TOWERS WITH EXTENSION UNIT.
- BASE CURRENT ADAPTER AVAILABLE.
- DIGITAL REMOTE CONTROL SYSTEMS AVAILABLE FOR MONITOR ONLY OR FOR MONITOR AND TRANSMITTER CONTROL.



**DELTA ELECTRONICS**

5534 PORT ROYAL ROAD  
P.O. BOX 1508  
SPRINGFIELD, VIRGINIA 22151  
TELEPHONE: 703/321-9845 TWX: 710-831-0620





# (Ten minutes in the life of a pulse count news editor)



"And now for the 6:..."



"And now for the 6:00 O'clock..."



"And now for the 6:00 O'clock ne..."



"And now for the 6:02 O'clock news?"



CMX editing systems are committed to SMPTE time code editing because it is fast and accurate ( $\pm 0$  frame). There are no differences between preview and record. With CMX, you no longer have to "punch and pray". You can edit with precise syllable and frame control.



Keep your pulse under control with CMX time code editing.

## cmx systems

AN ORROX COMPANY  
3303 Scott Boulevard, Santa Clara, CA 95050  
Phone: (408)988-2000 Telex: 910-338-0554

SALES AND SERVICE—New York: (212)371-1122,  
Los Angeles: (213)980-7927, Dallas: (214)242-2690

For More Details Circle (7) on Reply Card

# Increase sharpness... improve camera sensitivity

For the sharpest image, the finest resolution, the best picture quality in your station's ADI, EEV's new 30mm Coaxial Leddicon® Camera Tube is the answer.

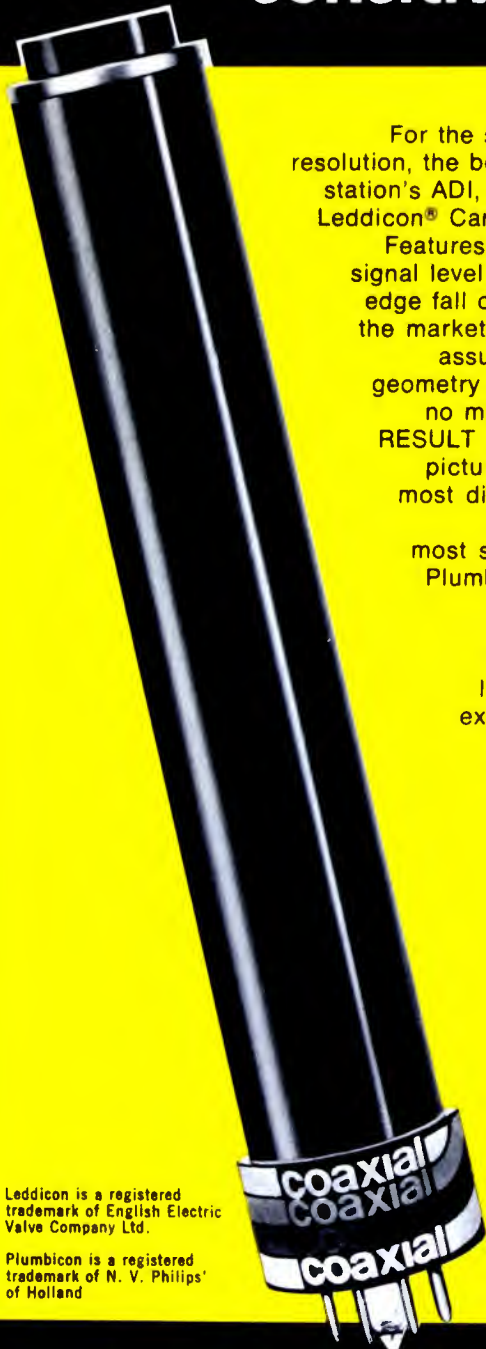
Features the fastest leading edge signal level rise and quickest trailing edge fall of any image tube now on the market. Patented coaxial design

assures consistently accurate geometry and optimum registration no matter the tube orientation.

RESULT . . . a noticeably superior picture quality even under the most difficult lighting conditions.

Direct replacement for most separate or integral mesh Plumbicon®, Vistacon or older Leddicon camera tubes.

Available with exclusive internal fixed or variable light bias in extended red, extended green, luminance, blue, green, red or monochrome types. Call or write today for details.



Leddicon is a registered trademark of English Electric Valve Company Ltd.

Plumbicon is a registered trademark of N. V. Philips' of Holland

## EEV NORTH AMERICA ENGLISH ELECTRIC VALVE NORTH AMERICA LTD.



1 American Drive • Cheektowaga, NY 14225  
(716) 632-5871 • TWX: (710) 523-1862

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

A member of the GEC-English Electric Group of Companies

## More Pickup Channels Needed

The National Association of Broadcasters has asked the Federal Communications Commission to locate additional channels to provide more frequencies for re-television pickups.

NAB requested that the 65-65.25 MHz band be shared by television broadcasters on a co-channel basis with the common carriers. This band currently is allocated to the common carriers for the special purpose of providing TV pickup service for television broadcast service.

In its filing, NAB said that due to the rapidly developing interest in electronic newsgathering, a rapid acceleration in the need for television auxiliary channels will occur in the very near future.

In addition to this requirement, NAB said "there has been a parallel increase in requirements for conventional television rental pickup and television STL channels. Many stations that formerly leased such facilities from common carriers are now planning, in view of the tremendous increase in cost of leased facilities, to discontinue this practice and to install their own equipment."

NAB said that the availability of this band to television broadcasters for the same purpose for which it is allocated to the common carriers "would have no adverse effect on existing assignments in this band, nor would the proposal have any adverse effect on the future use of the band by the common carriers."

The Association also said that a review of the existing assignments in this service indicates that approximately 75 percent of the licenses have been issued to Bell System companies, or other wireline carriers with which the Bell System has working arrangements for the provision of television service.

"It is our belief that the common carriers plan little expansion in this area since it is no longer economically justifiable to maintain a large investment in equipment which is used primarily to meet spasmodic peak demands of broadcasters and closed-circuit television operators."



# Harris' new TF-100 for highest quality color film reproduction.

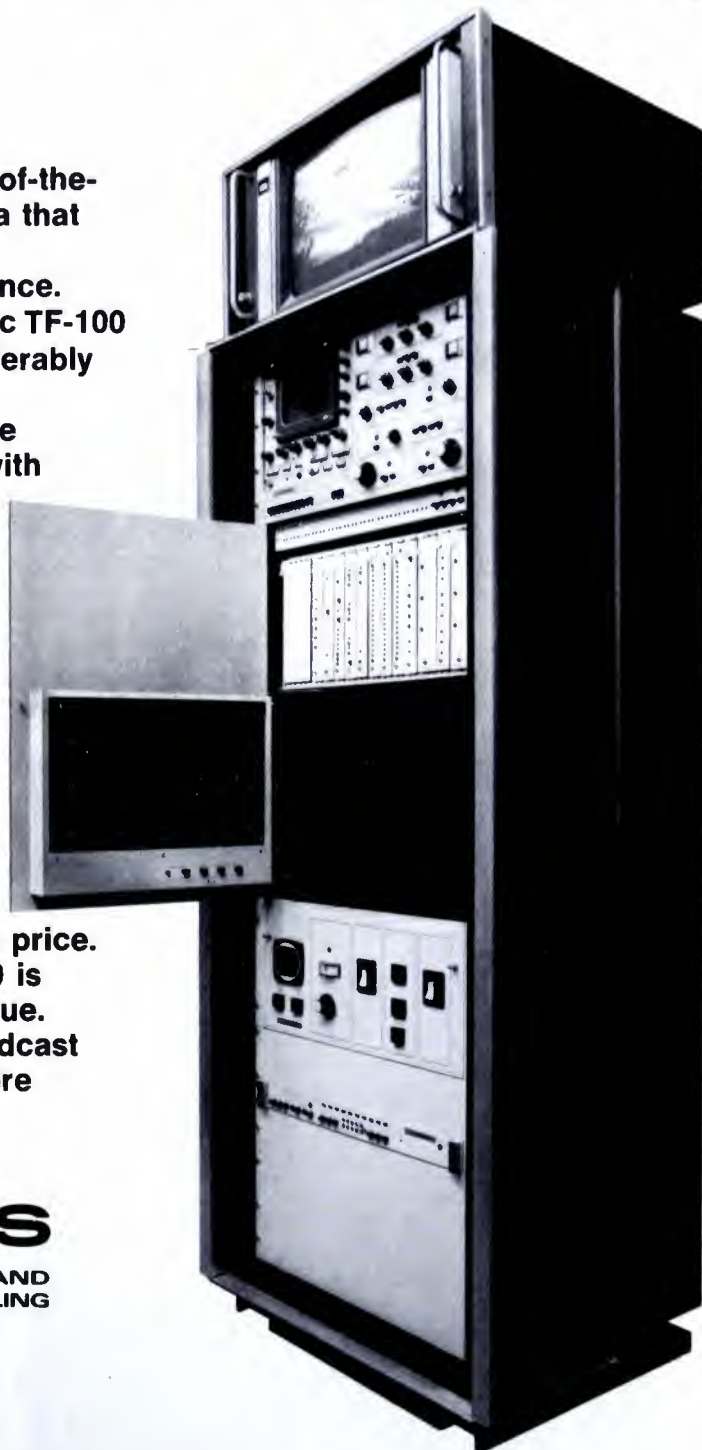
You won't find another top-of-the-line automatic color film camera that equals the TF-100 for quality, adaptability or overall performance.

But you will find that a basic TF-100 camera system is priced considerably below the major competition.

Like all Harris products, the TF-100 is built in accordance with strict standards of quality, and offers such unique features as:

- multiple input port locations for interfacing with any film island;
- true film gamma correction for uncompromised scene reproduction;
- optional internal diplexer to allow dual inputs without additional multiplexing.

Compare the performance. And the specifications. And the price. See for yourself that the TF-100 is unsurpassed in quality and value. Write Harris Corporation, Broadcast Products Division, 123 Hampshire Street, Quincy, Illinois 62301.



**HARRIS**

COMMUNICATIONS AND  
INFORMATION HANDLING

For More Details Circle (10) on Reply Card



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

## SBE Elects New Officers

The Society of Broadcast Engineers held its annual membership meeting at the Hyatt Regency Hotel in Chicago on Sunday, March 21, in conjunction with the NAB Convention. The following national election results were announced:

**President**—Glenn Lahman, KDKA/KDKA-TV, Pittsburgh, Pa.  
**Executive Vice President**—Robert Wehrman, Cox Broadcasting Corp., Atlanta, Ga.

**Secretary/Treasurer**—James Hurley, WTAE-TV, Pittsburgh, Pa.  
**Directors:** P. J. Ford, WIS, Columbia, South Carolina; Jack Grinnell, ABC Television, Chicago, Illinois; Albin R. Hillstrom, KOA Radio-Television, Inc., Phoenix, Arizona; John Lyons, Station WWRL-AM, Woodside, New York; William Orr, WBNS Station, Columbus, Ohio; Ralph Thompson, Post-Newsweek Stations, Washington, D.C.

### Membership Dues

Vincent Flanders acknowledges the enthusiasm with which members are sending their membership dues. However, he advises everyone to wait until billing notices are sent. This is especially important since membership dues were increased in this year's election to so amend the By-Laws. In order not to complicate the bookkeeping, wait until billing notices are received. This does NOT apply to new applicants sending their membership forms. They MUST enclose the \$15 membership fees (\$7.50 for students) with the application.

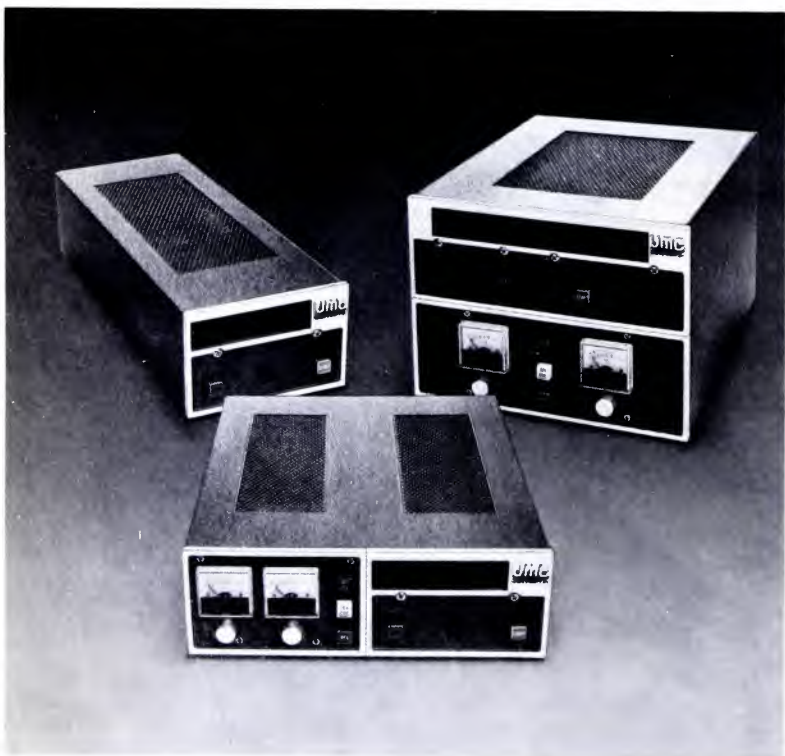
### SBE Regional Conventions For 1976

**May 26-27, 1976,  
Seattle, Washington**

Chapter 16 will be holding the first SBE Regional Convention of the year in Seattle at the Sherwood Inn, 400 N.W. 45th Street. The two-day Convention, Wednesday and Thursday, will include displays and papers by such distributors as AmpereX, Ampex Audio and Video,

Stan Bennett Engineering, Central Video, CMS, Custom Video, CS, IVC, John B. Jolly & Co., Northwest Industries, John Nuttgren, Panasonic, Puget Sound Recordings, RCA, Sea-Tac Productions, Sony, Tektronix, Telemation, TRI, and Videomax. For more information write Chapter Chairman Bob Ingalls, 5441 N.E. 11th

## The hottest, coolest cart machine you can use!



The long wait for a superior broadcast audio machine is over. We've built all the most wanted features into our complete new line of mono and stereo A, B, and C-size cartridge tape recorders and reproducers. Compact size, reduced flutter and wow, and lowest operating temperatures are just some of the many advantages. And Beaucart meets the new NAB standards, too.

What makes this hot new machine the coolest cart machine you can buy? Beaucart was designed by the manufacturer of the quality BEAU motor and incorporates our low profile, patented patented hysteresis synchronous direct drive motor. You've never seen anything like it. And you've never seen a cartridge machine like Beaucart either.

For complete information and pricing, write or call today.

# UMC

BEAUCART DIVISION  
UMC ELECTRONICS CO.

460 Sackett Point Rd. North Haven, CT 06473 (203) 288-7

For More Details Circle (9) on Reply Card



# "I had the budget to build any kind of FM station I wanted..."

KBWD's Jim Laird explains what Precision Monitoring can add to broadcast capability



## "TFT was a must, right from the start."

It's a rare event when a Chief Engineer gets to design his dream station from the ground up. Management's confidence in Jim Laird was amply rewarded, however, with perhaps the most modern, efficient FM station in southwest Texas. The TFT Frequency and Modulation, Modulation Only and Stereo Monitors were key ingredients of the new facility. Here are a few of Jim's reasons why:

### On Accuracy

"... when you've got an opportunity to do it by the best, why not go for it. I've read the broadcast books for a long time, and it seems that TFT gear is just above the rest. You get what you pay for, and they (TFT) just put it all into the system."

### On Coverage

"TFT gives us the extra edge we need so we can use our transmitter to maximum ability without worrying."

### On Accuracy

"... very darn good when it comes to proof of performance. If I have an error, I look at the transmitter, not the TFT monitor... I have the utmost confidence my TFT is telling the truth."

### On Design

"... they seem to be more easily operated as far as the way you set the thing up. And the fact that they can be located right here at the studio is one thing we really like."

### On The Frequency and Modulation Monitor

"... FM was a new adventure for us, and I needed good readout of our pilot. The TFT 723 was right on the money then and we're using it all the time now."

### On The FM Stereo Monitor

"... It does have the extra human engineering to make it easier to operate. I feel the thing is considerably more stable than others too."

### On Confidence

"... well, we got our FM gear based on our experience with the TFT AM monitor. Now, after checking out the FM, I envision having TFT at all the stations we own."

### On Price

"... sure it costs more, but even if I'd been on a tight budget, I wouldn't have scrimped on the TFT monitors... it's the only way I can keep my transmitter honest... do everything I want it to do and get a little bit more out of it."

### On Engineering

"... TFT is No. 1... there's no doubt about it."

Jim Laird, and many knowledgeable engineers like him can speak from experience on the reliability of TFT systems. And, when it comes to quality engineering, our specs will speak for themselves. Call or write for a set today.

## TFT Monitors: The Chosen Ones

TV, AM, FM, Stereo, SCA

**TFT**

**TIME AND FREQUENCY TECHNOLOGY, INC.**

3000 OLCOTT STREET, SANTA CLARA, CA 95051 (408) 246-6365 TWX 910-338-0584

For More Details Circle (8) on Reply Card



**Sintronic**  
*the classic choice  
 for all  
 power levels*

**AM ... 1KW - 50KW  
 FM ... 10W - 50KW**



**DFM-3K-A THREE KILOWATT  
 FM BROADCAST TRANSMITTER**

- FCC Type Accepted
- Direct FM Solid State Exciter
- Color Coded Wiring
- Designed for Stereo and Multiplex
- Silicon Rectifiers
- Grounded Grid Power Amplifier
- Designed for Remote Control
- No Neutralization Required
- Ultra Linear Wide Band
- Only Two Tubes
- 3.5 KW Capability

Sintronic Transmitters have been installed in over 27 countries. For over 10 years, they have performed optimally under severe environmental conditions. All Sintronic Transmitters are conservatively designed and constructed. Quality components are used throughout.

Sintronic manufactures a complete line of AM and FM broadcast transmitters to satisfy every broadcast requirement. Detailed information and comprehensive product brochures on request.

Sintronic Corporation is a subsidiary of  
 Singer Products Co., Inc.  
 Integrity and dependability since 1937.

**Sintronic**  
 CORPORATION

**Main Office and Plant:**  
 705 Haverford Ave., Bryn Mawr, Pa. 19010  
 (215) 525-3700

**Administrative & Export Offices:**  
 One World Trade Center, Suite 2365, N.Y., N.Y. 10048  
 (212) 432-1400

**SBE  
 Conventions**

Avenue, Redmond, Washington 98052, or call him at his office (206) 543-7774.

**October 1, 1976,  
 Syracuse, New York**

Chapter 22 will hold a one-day Convention on Friday, the first of October. The location may be the Northway Best Western Inn, same as last year, but these plans are still tentative. For more details, contact Gary Hartman, Chapter chairman, at (215) 474-3911, or at WSYR, 1030 James Street, Syracuse, New York 13203.

**October 15-16, 1976,  
 Chicago, Illinois**

Chicago Chapter 26 is still negotiating for space in the Chicago area for its convention so the site is yet to be announced. However, members are planning a two-day event with both papers and exhibits. For more definite information, call Convention Chairman Brad Anderson at (312) 996-7912, or write to him at the University of Illinois Medical Center, Office of Educational Resources, OER-Room 35, Pharm., P.O. Box 6998, Chicago, Illinois 60680.

**October 22, 1976,  
 Pittsburgh, Pennsylvania**

Chapter 22 has picked Friday, October 22, as the date for its Regional Convention, to be held at the Howard Johnson's Motor Inn in Monroeville, Pa. Mr. Roy Hoover

did such a good job on Convention last year, that he reappointed as this year's convention chairman. He says preliminary plans are to have a display area for 50 booths, with exhibits open from 11 a.m. to 8 p.m. For further information please call him at (412) 391-3911 or write, KDKA, 1 Gateway Center, Pittsburgh, Pennsylvania 15222.

**October 29-30, 1976,  
 Boston, Massachusetts**

Chapter 11 scheduled its Regional Convention on Friday and Saturday, October 29-30, at the Holiday Inn (located on Washington Street at Interstate 93) in Somerville, Mass. Mr. Frank Shufelt is convention chairman and can be reached at 5 Garden Street, Grafton, Massachusetts 01519. He can be called during the day at (617) 861-6800.

**November 7-8, 1976,  
 New York, New York**

Winding up the 1976 Convention schedule is Chapter 15 with its Regional Convention set for Saturday and Monday, November 7-8, at the Holiday Inn in Hempstead. Dr. Mark Schubin is Convention chairman, and he says that the convention committee plans on at least 50 exhibitors, several papers, a banquet on the first night and an exhibitor party the last night. For up-to-date information, call him at (212) 765-5100, or write to him c/o SBE, P.O. Box 607, Radio City Station, New York, New York 10019.

**SBE  
 Chapter  
 Meetings**

**Chapter 2: Northeastern Pennsylvania**

Mr. Terry Lloyd of Time and Frequency Technology was invited to the March 1 meeting of Chapter 2 at the WVIA FM & TV studios. Mr. Lloyd gave a slide presentation on the Emergency Broadcast System.

The April 15 meeting was a two-part program "Introduction to Microprocessors" and "Applications of the Microprocessor in Broadcasting." John Kowalchik, RCA solid-state design engineer, Tony Pietrzykoski, Eastern microwave field engineer, covered the background, hardware and software, construction, and organization of microprocessors. Ed Karl, sales engineer for Harris Corporation, spoke on the application of the 8000 in the Harris Automation System. *John Kowalchik, Chairman, RCA Solid State Division, Crestwood Road, Mountaintop, Pennsylvania 18707. (412) 474-6761, ext. 635.*

(Continued on  
 page 18)





# Your new automatic distortion measuring system for balanced measurements

## REDUCED OPERATOR ERROR

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

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

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

Features in the new 1710A include:  
 • a balanced, floating output (600/150 ohms)

• a balanced (bridging) input  
 • a high-level +26 dBm signal

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

## SPECIAL OUTPUT CIRCUIT

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

## FAST, SIMPLE MEASURING

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

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

## IM OPTION

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

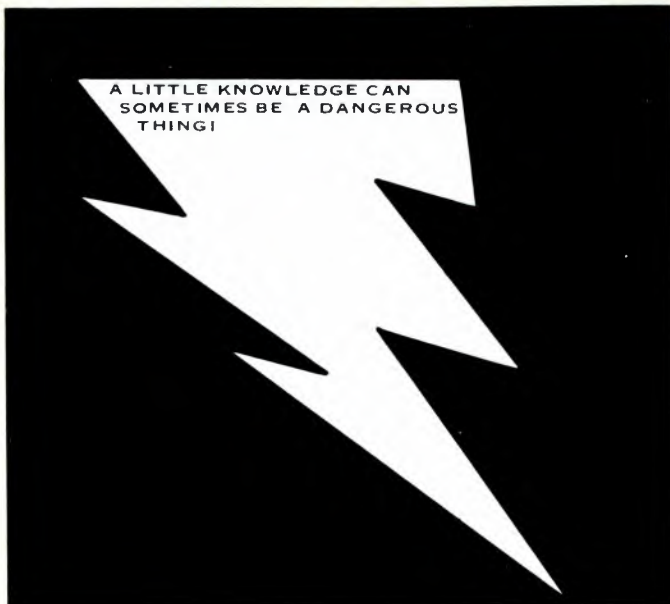
## CALL/SEND NOW FOR LITERATURE

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

**SOUND TECHNOLOGY**  
 1400 DELL AVENUE  
 CAMPBELL, CALIFORNIA 95008  
 (408) 378-6540

For More Details Circle (12) on Reply Card





And what you don't know can hurt you.

You may not know all the problems common-mode ground loop can cause - especially when using your video equipment in an unfamiliar remote location.

With your video equipment connected to one AC power source and your camera connected to another, you can get common-mode ground loop hum that tears up video signals. Dangerous voltage potentials due to faulty AC power distribution can damage equipment and be hazardous to personnel.

Traditional devices reject typically less than two volts peak-to-peak common-mode noise, and you still have problems. AC re-routing is usually impractical. Video transformers cause low frequency tilt, high frequency roll off, and loss of levels. Clamping leaves glitches that can roll through the picture. Differential amplifiers don't always meet differential gain and phase specifications in color. Humbucking coils create phase shift.

Circle the bingo card. Learn more about VACc VL-1 video line isolator. It passes your DC to 8 MHz video signal over an integrated circuit light pipe giving you 80 dB isolation at potentials as high as 1500 Vac. A warning indicator on the VL-1 tells you when ground loop potential is greater than 70 V. You know when a hazardous condition exists.

A little knowledge can be a dangerous thing. Don't let what you don't know hurt you or damage your equipment. Play it safe with VACc's self-contained video line isolator.

Manufacturer's of:

Editor-programmers      Cross-pulse Gen's.  
Party-Lines              Burst-Phase Meters  
Gen-Lock Sync Gen's.    De-Mod & Monitor Kits



**VIDEO AIDS corporation of colorado**  
112 West 4th Street, Loveland, Colorado 80537  
phone (303) 667-3301

For More Details Circle (11) on Reply Card

**SBE** (Continued from page 14)

### Chapter 9: Phoenix, Arizona

The March 18 meeting, held at the 1 studios, was an opportunity for members to more about digital video. The presentation, a priately entitled "Digital Video Made Easy, supplied by the Ampex Corporation.

In April, the Chapter held its annual Pizz Beer party. This get-together, always after the Convention, gives members who attende Convention a chance to report on the v activities and news items. The evening also the beginning of the year for newly elected of (*Leon Anglin, Chairman, SBE, P.O. Box Phoenix, Arizona 85001. (602) 285-7333.*)

### Chapter 11: Boston, Massachusetts

The March meeting of the Boston Chapte held on Tuesday, March 16, at the WCV facility in Needham. Members greeted Mr. Lloyd of Time and Frequency Technology spoke on both the manufacture of the TFT ment and on the FCC Rules and Regul regarding the new equipment. (*Bob Molloy, man, 66 Bellevue Street, Manchester, New P shire 03103. (603) 669-1250.*)

### Chapter 15: New York City

Chapter 15 welcomed Mr. William Mec Cablewave Systems, Inc., and Mr. Herb Hol local representative for Time and Freq Technology on March 11. The topics discusse transmission lines and the new Rules and lations for the Emergency Broadcast System. (*Lyons, Chairman WWRL, 41-30 58th S Woodside, New York 11377 (212) 335-1600.*)

### Chapter 16: Seattle, Washington

In Seattle, the March 10 meeting feature Tom Bowles, head of cable operations at F Mr. Bowles answered questions on all pha cable operation from what a cable system is it's built, how it works, the hardware used, n of channels, amplifiers, coaxials) to the qua the end result. He also brought some of the ment for the members to view. (*Bob Ingalls, man, 5441-187th Avenue, N.E., Redmond, Wa ton 98052. (206) 543-7774.*)

### Chapter 17: St. Paul/Minneapolis

"The Radio Remote-Site Studio" was the to April 21. The discussion centered on some problems faced at the site; the methods us transmitting the signal to the studio, and so the problems faced in each of these situation: evening also included a presentation/demonst of some of the newest equipment on the mark

A special meeting is scheduled on Saturday 22. Mr. Mark Persons, director of engine KVBR Radio, Brainard, Minnesota, has i members to tour the facility. Luncheon will fol the Holiday Inn. The afternoon tour will incl visit to the KVBR-AM transmitter site, the TV head-end site, the television translator sit a look at the future KVBR-TV transmitter. there will be a demonstration of various pie telephone equipment used for sports remote talk shows. (*Lance Raygor, Chairman, Route 337, Chisago City, Minnesota 55013, (612 4807.)*)

(Continued on p



# edit power!

Macro or Micro...we've got them both!

## EDi-120

### Computer Editing System

Computer Editing System that has  
gone with the industry... and that others  
are still trying to imitate... because it is  
state-of-the-Art.

Truly a modular system... we have  
successfully and continually kept pace  
with the industry's changing needs with  
additional new accessories and software.

Ease of operation, flexibility and reli-  
ability is recognized from coast-to-coast  
around the world.

Improve it... with our 13 minute video tape  
demo shows you what is being done every  
day with CDL's Computer Editing System in  
production and post-production facilities.

## EDi-200

### Microcomputer Editing System

Automatically locates, previews and records  
audio and video edits to a *single* frame  
of tape. Performs Insert, Assembly and  
End-Ended Edits. Offset audio edits can be  
combined with video edits... and executed in  
real time. Edits On-the-Fly and Lip Sync's.  
Audio and Video operations are selectively  
independent or combined.

Additional accessories available for Assembly  
editing without prerecorded time Code tapes  
plus Colorframing for Broadcast Quality.



#### Off-Line Editing with 3/4" Cassettes?

We have some exciting developments! Call or write  
for information about the BEST available system...  
It's from CDL... MACRO or MICRO...



### CENTRAL DYNAMICS LTD

Canada: 147 Hymus Blvd., Montreal, Que., H9R-1G1 ■ 514-697-0811  
U.S.A.: 230 Livingston Street, Northvale, N.J. 07647 ■ 201-767-1300  
Chicago: 312-991-4720 ■ Los Angeles: 213-789-0574

For More Details Circle (14) on Reply Card

# NAB Video Review



By Joe Roizen

It was an NAB with something for everybody. The engineers had exciting new technical gadgets to play with, the station managers came with loosened purse strings, the old timers could fall into VTR nostalgia and the exhibitors had "SOLD" signs on most of their displays. The concensus among the many marketing people interviewed was that NAB '76 was the best show from a business standpoint in the last decade.

There was plenty of reason for all this euphoria (inspite of the set-up problems) among the exhibitors. NAB '76 combined a noteworthy anniversary with some very significant product introductions that will greatly affect the future of Television operations. All this in an atmosphere of solid optimism among equipment buyers who came to NAB with check books at the ready, prepared to walk off with what they liked.

Surprises abounded in ENG cameras, new VTRs, editing gear, signal processing; factory fresh or refurbished, it was all there to be scrutinized, tested, compared and committed for so that the reels of progress could roll again in high gear. There was so much new video equipment on display that no single report could do it all justice without becoming unwieldy.

## The 20th Anniversary

In honor of this double decade milestone that catapulted the '56 NARTB Convention into history, the NAB organizers put together an interesting program and handed out some commemorative scrolls. Addressing the special luncheon on Monday, March 22nd, Douglas Edwards, the CBC commentator who

was the first newscaster to be recorded and delayed by Ampex VR-1000 machines at Television City in Hollywood, reviewed his and other programs that switched from kinescopes to magnetic tape. His remarks were interspersed with short VTR segments that represented advances in recording technology such as editing, color, high band, slow motion, digital time base correction and others.

The tapes were also a chronology of important events that shaped television from the Nixon/Kruschev Kitchen Debate in Moscow (1959) to the Apollo Moon Landings and other space spectaculars of more recent years. For the occasion CBS took out of service one of the original Ampex VTRs and had it on prominent display with suitable graphics on the NAB exhibit floor.

History aside, contemporary broadcast problems are being solved by a wide range of new and improved products that permeated the exhibitors' booths and many of them deserve comment and analysis.

## Portable Color Cameras

Electronic News Gathering and LIVE journalism continues to be the focal point of broadcasters' attention and the camera manufacturers are catering to this booming market by providing an assortment of cameras dedicated to this application that staggers the imagination. At least 14 well known hardware companies had their own or OEM produced cameras that offered varying degrees of portability, price and picture quality.

One of the ENG cameras that attracted crowds was the Thomson-CSF Labs Microcam, a 7 lb. fea-

therweight that was dubbed "Womens Lib" camera. It is loaded with belt battery pack, 6:1 zoom lens, the Microcam adds up to 12.5 lbs.

To emphasize its portability Thomson had a woman operator for the camera who doubled as a model and a cameraperson. In fact she had a television opera background.

From RCA, the TK-76 camera is finally getting into production. This camera weighs 11 lbs., has no backpack and was according to RCA's Ed Hill, the best of their exhibit. They mixed the camera with their full studio cameras to show quality and make a point of showing the maintenance accessibility of this \$35,000 camera.

IVC were also now in production running with their ENG version of the 7000 color camera. Now in production, the 7000P weighs 14 lbs. (plus lens) and shows very good picture quality. It has an interesting structure with a tiltable viewfinder. Available in a PAL or SECAM version, the camera attracted much attention from visitors representing European, African and Middle Eastern TV studios. It is priced around \$50,000.

Sony introduced a new broadcast quality ENG camera called the BVP-100. It is a 3 plumbicon camera available in the \$35,000 price range and is actually manufactured by Toshiba.

Ampex also added a new ENG camera, the BCC4, which uses three plumbicons, weighs 13 lbs., has a 6:1 zoom and needs no backpack. A 5.5 lbs. battery belt keeps the camera operational for 1.5 hours and is rechargeable. Cost is \$25,000.



Ami's entries in the ENG field was further enhanced by their new HL-37 which was the lightest such camera head (11) at the show. With the lens electronics pack it came up to 16 lbs. The price for the unit starts at \$26,000.

There were other lightweight cameras from Japanese, American and European manufacturers that had been previously shown or had specialized applications. In the studio camera field, most manufacturers showed the familiar formats with a few updated wrappings to improve picture quality or mobility. Most large cameras now come in normal or tri-axial versions. Harris Gates introduced what is claimed to be the first American-made tri-axial studio camera, the T-80. They had about a mile of cable coiled up out of the way on display and this option cost \$1,000 over the camera's basic price of \$56,000 plus lens and other peripherals.

The camera buyer at NAB this year had no end of choices from which to select a portable or studio camera in a very wide range of price and performance. Fundamentally, though, the basic format for broadcast quality cameras is three full sized plumbicons in the studio versions and the newer smaller sized plumbicons in the 3/4" portable configurations. As yet, CCD versions or combined tube and solid state sensors were shown.

### **The VTR Scene**

The VTR "Format of the Month" club peaked at this year's NAB with quite a few new entries into the field, and it takes more than a year to wade through all of the claims and counter claims of the competing systems. To make any sense of this burgeoning market, it might be best to separate the VTR formats into distinct categories, then break these down by manufacturer. There are four basic systems:

Quadruplex with 2" tape  
Helical reel-to-reel with 1" tape  
Segmented helical reel-to-reel with 2" and 1" tape  
Cassette helicals with 3/4" tape  
There are, of course, a few other formats with 1/2" or 1/4" tape, and

even a 1" quad, but these are not in the mainstream of broadcast usage at the present.

### **The New Quads**

Both major manufacturers of quad recorders, Ampex and RCA, have given this format a new lease on life by displaying their latest versions which eliminate most of the deficiencies (banding, etc.) that quads have exhibited up to now.

The fundamental secret to greatly improved quad performance is the combination of a super hi-band modulation system (9 MHz and up) and a pilot carrier at 1.5 times subcarrier which is used for continuous color correction. Quads so equipped and demonstrated at the show could virtually not be forced to exhibit color banding or first line hue shift, even with the female guide grossly misadjusted. In testing an Ampex AVR-2 equipped with the pilot carrier option, it required loss of tape/head contact before any picture deficiency became visible.

To further enhance the operational advantages of such a "hands off" machine, the quads now offer a 7.5 ips (half speed) mode which saves on tape costs. Both Ampex and RCA had similar new quad VTR configurations with some slight differences in modulating frequencies which will probably be ironed out in standards committees.

Ampex also introduced a new quad, the AVR-3, which could automatically detect the mode of the recording and switch itself into the complementary playback function.

### **Helical Reel-to-Reel Recorders**

There are 4 major manufacturers that now make helical reel-to-reel 1" recorders being offered to the broadcast user; Ampex, IVC, Recortec and Sony. While only the Sony machine reported a new format, there were some innovations to the other recorders that are worthy of mention. A 1" single head helical machine was demonstrated by Ampex in their VPR-1 recorder which incorporated an automatic tracking system that not only eliminated the major disad-

vantage of long track helical machines, but also added a new feature hitherto unavailable—broadcastable, stop-motion and 1/5 slow-motion.

While Ampex were not revealing just how they accomplished this technological breakthrough, it was possible by piecing a few available facts together to surmise the technique employed. Their engineering department apparently abandoned the standard approach of stabilizing the tape position around the rather large scanning assembly and attacked the problem from the opposite end, i.e., moving the video head to follow any geometric distortion in the video track.

Since it would be impossible to physically displace a high-band revolving head drum, the only method left would be to somehow physically modulate the video transducer itself in a plane perpendicular to the track angle. This is apparently accomplished through mounting the video head on a piezo-electric wafer whose thickness is transformed through the application of 5 to 6 kilovolts to its control surfaces. A sensing circuit establishes tracking accuracy through the recovered RF envelope and then positions the head for optimum tracking accuracy. The results are quite unique for a helical recorder.

No noise bar is visible in still or slow-motion images, and even severe disturbances of the tape longitudinal motion (touching the reel, etc.) do not affect the reproduced image. This automatic tracking accessory adds about \$9000 to the basic VPR-1 price.

While this recorder has retained the existing 1" Ampex format and is therefore compatible with their regular 7000 series, it has one significant change which makes it far more mechanically reliable than their old machines. The movable guides have been replaced with a fixed guiding system which, although somewhat more difficult to thread, promises a far greater reliability in use.

The completely new 1" helical reel-to-reel VTR introduced at NAB was the Sony BVH-1000. This is a

(Continued on page 25)







# When we promised a commitment to the industry, we weren't kidding.

## **BVH-1000 High-Band Production Recorder**

This is the most significant high-band recorder ever made by Sony, or anyone else, for that matter. It incorporates amazing signal capability with the economy of one-inch tape. Its transparent picture quality is so crisp and clean, you might even think playback is E/E camera output.

The BVH-1000 is non-segmented. Which means its production capabilities are infinitely versatile. And unlike ordinary broadcast recorders, Sony's unit combines optimum broadcast performance with compact size. It has fast, accurate edit and bi-directional search logic. So it's really suited for the studio as well as remote locations.

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

## **BVT-1000 Digital Time Base Corrector**

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

When it comes to time base correction, there's no better value than Sony's BVT-1000.

## **BVU-100 Portable U-Matic® Recorder**

This light-weight unit can vastly improve your picture quality. Thanks to Sony's unique SMPTE address track and special comb filtering, your ENG broadcasts can become high-quality broadcasts.

Your picture is sharp and distinct. Sony's BVU-100 is compact, rugged and ready to go.

## **4. BVU-200 Editing Recorder**

Why do so many broadcast engineers consider this unit to be the state-of-the-art U-Matic videocassette recorder? For one thing, it has frame servo editing as well as bi-directional search capability. It too lets you take advantage of Sony's new and unique SMPTE address track. But that's not all. Sony's BVU-200 comes with a stable DC servo system, too.

## **5. BVÉ-500 Editing Console**

Designed for use with Sony's BVU-200, this new control unit lets you achieve insert and assemble editing too. It also lets you preview as well as review your edit, and trim frames at either end of the edit.

What's more, this system features two separate counters and remote controls. All of which means fast, accurate editing — anywhere, anytime.

## **6. BVP-100 3P Color Camera**

This high-quality portable color camera can do double duty. It's ideal for ENG. And at the same time, it will give you excellent results in the studio.

It features three 2/3" Plumbicon® tubes. So it's capable of handling just about any assignment with optimum quality.

Plus, other products shown: 7. Camera Base Station; 8. AC Power Supply; 9. Color Pack; 10. Camera Control Unit; 11. Remote Search Control; 12. Remote Control Unit for BVR-510.

These new products are one cornerstone of Sony's commitment to your industry. A commitment that is backed by Sony's new approach to service, training and engineering.

And this is just the beginning.

## **Sony Broadcast**

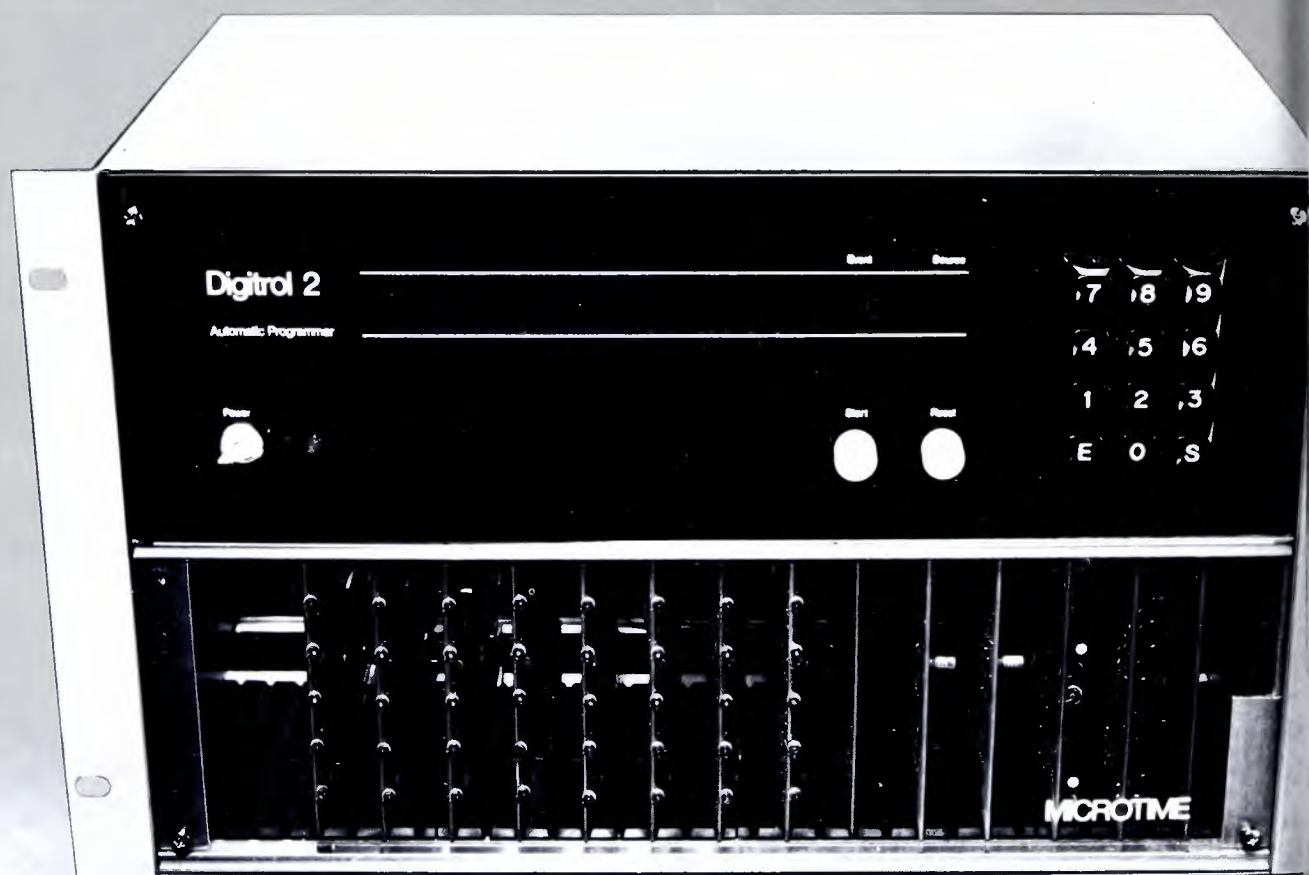
Sony Corporation of America, 9 West 57 Street, New York, New York 10019

SONY is a registered trademark of Sony Corporation of America. ® Trademark of N.V. Philips Co.

**For More Details Circle (16) on Reply Card**

# Digitrol 2

## Automatic Broadcast Control System



Station Automation  
Automatic Program Delay  
Commercial Insertion  
Quad VTR Back-Up

Microtime  
1280 Blue Hills Avenue  
Bloomfield, Ct. 06002  
(203) 242-4242 TWX 710-425-2390

**MICROTIME**

For More Details Circle (15) on Reply Card



ell built machine with high-performance characteristics few old Sony principles that proven useful. The video reel and backpack arrangement resemblance to their PV-120 reusing a 1.5 head structure on drum. This means that one transducer is used for the of the video signal and a slightly displaced video head the vertical internal during period of main head crossover one edge of the tape to the

The Sony recorder was speeded at 4 MHz bandwidth with a 48 signal-to-noise ratio on chromium dioxide tape. The basic machine is priced at \$32,000 and with digital TBC would run about \$500.

In writing speed, the Ampex and other machines are within .1% of each other (1000 ips vs. 1010 ips). In longitudinal speed, the Sony is 63ps as compared to the Ampex 61ps.

While the track geometry is different, it seems conceivable that a slight change in the Sony unit would make it compatible with the Ampex machine. Since Sony has built only a few of these recorders, such a move toward standardization would greatly simplify the potential user's problem with reel-to-reel helical machines of this type.

The video memory machine introduced at NAB last year, which was built around the standard Ampex 1" format, has now been taken over by Recortec and is being marketed with some improved features as a lower cost alternative for video needs. The basic price for the production model VM-1000 is \$1,000 without the TBC. It features 3-head editing and erase capabilities and is fully compatible with the high-band 7900 series of recorders. It is, therefore, also compatible with the new Ampex P-1.

The IVC standard 1" line using a single head principle was also on display although IVC had several other VTR innovations which will be described in the next column. IVC has added some new, sophisticated circuitry to their standard 1" format to achieve

better performance characteristics from their machines which have always been limited by the relatively low head writing speed.

The fundamental question still to be answered by field experience with regard to the 1" single head helical recorders that are now being offered is whether they have now overcome the basic interchangeability problem that has plagued such long tape path machines in the past. Both Sony and Ampex claim that the scanning assembly is specially made with what is referred to as a "controlled roughness" that eliminates the stiction problems of the past. Furthermore, in the case of the Ampex machine, even the tape distortions produced by the elasticity of the medium are eliminated through the automatic tracking system. If this proves to be true in practice, then VTR's of this format with an adequate writing speed to accommodate highband modulation systems will indeed begin to compete with the quads for serious studio applications.

### Segmented Scan Helicals

Up until this year, the only segmented scan helical available to an NTSC user was the IVC-9000 in its 8 ips, 2" tape format. This recorder was again being offered by IVC for maximum quality production applications with another wrinkle being added, that of a 655 line, 24 frame format for video origination intended to be transferred to film and projected on large screens.

To further compete with the 7.5 ips quad feature which tended to undercut the 900 claim on tape economy, IVC introduced a new 9000 version which runs at 4 ips longitudinally and not only cuts tape cost in half, but extends playing time to beyond 4 hours for a single reel. Specifications for this machine are almost identical with the original version, except for a 2 dB reduction in video signal-to-noise ratio.

The most surprising VTR event in the show was the revelation that 4 machine hardware producers, Fernseh, IVC, Philips and RCA, have agreed to cooperate in producing and selling a new segmented scan helical machine which Fernseh

introduced at last year's Montreux conference in a PAL/SECAM configuration.

This recorder uses 1" tape on a small, two head scanning spindle which segments the image into 52 line sections. Machines of this type produced by Fernseh were on display in each of the other manufacturer's booths, apparently to emphasize the wide-spread introduction of this new format. The recorder has a high enough writing speed to encompass high-band frequencies and, therefore, claims performance characteristics equal to a standard quad. In addition, Hans Groll, Fernseh's Manager, explained during their press conference that the machine has an inherent advantage of being able to provide an acquisition configuration that is physically very small and would therefore apply itself well to ENG portability or mobile applications.

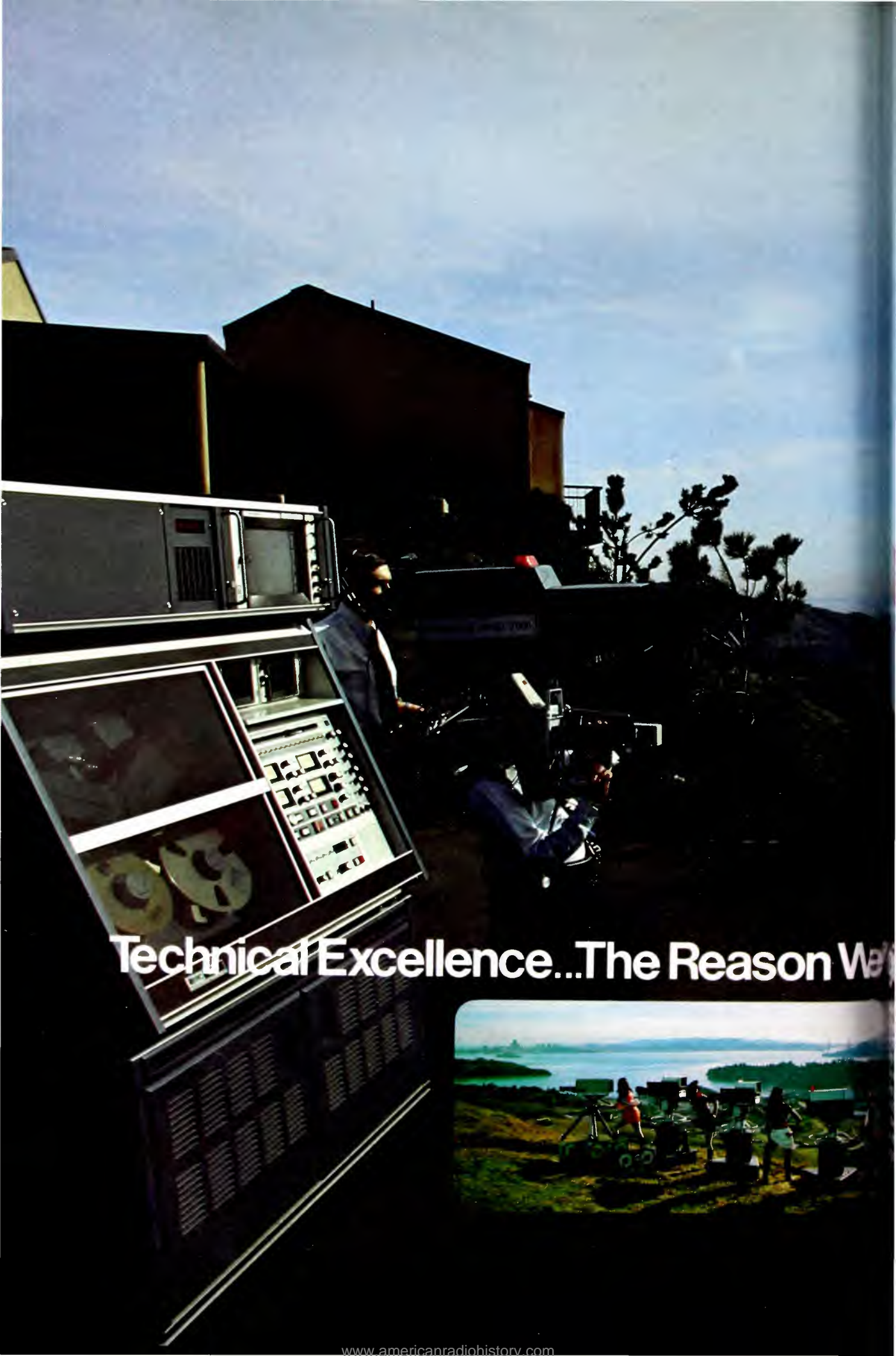
Philips have apparently abandoned their previous stand on the 1" format BCR and have now accepted the BCN in their product line. Both RCA and IVC verified that they would produce and sell this unit.

Echo Science, who have for several years now occasionally shown a very similar segmented scan machine (Pilot 1) were not actually at NAB with their version; but it seems likely that they could also enter this race by similarizing their almost identical segmented scan format to that of the Fernseh machine.

### 3/4" Cassette VTR'S

Perhaps the weakest link in every ENG system employing a portable VTR using the 3/4" cassette format was the recorder itself. While the portable cameras were capable of producing relatively good wide-band color images, the "color under" process on the cassette machine greatly reduced the luminance band pass and the overall quality of the reproduced image. In addition to that, most of the cassette recorders were essentially designed as closed circuit, semi-professional devices and were not usually intended for broadcast applications. However, in view of the massive use of these units in ENG work, there has been

(Continued on page 28)



**Technical Excellence...The Reason We**







## Changing the Picture in Broadcast Television

In a world of change and progress. Remember the photo at the left? We used it in a broadcast ad eight years ago. It showed the IVC product line on a hilltop in California's Marin County. We returned to that hilltop with our 1976 broadcast products . . . to make an important point. □ There have been some dramatic changes in setting. There's a home on that lot now. The San Francisco skyline has grown considerably . . . and so have we. Today we're firmly established as the nation's largest manufacturer of color videotape recorders and television cameras. The progress we have made stems from our commitment to technical excellence in broadcast television. Our new IVC-9000 Broadcast Videotape Recorder is unquestionably recognized as the finest teleproduction camera in the world, with well over 100 in use. The IVC-7000 has no peer as a studio camera. And watch the 7000 go. We think it's a better camera than most studio models. □ Indeed a lot of time has passed. And yet when we began it has only been ten years.

Look at us now!



For More Details Circle (17) on Reply Card

a trend toward upgrading of the 1/2" format to a closer approximation of broadcast requirements. This was very evident in this year's NAB show from the number of completely new cassette machines which, while retaining the format, have added more rugged mechanics and more sophisticated electronics to achieve a higher performance characteristic.

Sony's entire exhibit centered on their commitment to the broadcast industry by the introduction of new versions catering to the more stringent broadcast requirements. Their U-Matic format cassettes included a BVU-100 field acquisition machine with a companion color adaptor for playback and an AC adaptor that would permit it to be operated in a mobile situation where power was available. To replay these cassettes or edit them in the studio, Sony has a new U-Matic machine called the BVU-200 which can be controlled by different editing devices, either of their own manufacture, or of the growing number of

outside suppliers.

Sony's U-Matics now offer SMPTE code operation for frame-to-frame editing and, of course, the new equipment has such features as regular broadcast-type connectors for audio and video and adaptability to Sony's own peripherals, digital time/base correctors, remote controls, etc.

Sony, of course was not the only company with upgraded U-Matic machines. Somewhat similar offerings were being made by Ampex, RCA, and Panasonic, either through cassette VTR's manufactured by themselves or as OEM's for well-known Japanese lines. Most of the U-Matics have been modified to enhance editing operations by permitting still frame scanning and low speed tape jogging in both directions for edit point searching.

#### Editing Systems

The buzz word in VTR editing this year is "microprocessors". No matter how complex or simple the editing device, it seems to depend

on one of these new solid ultraminiature circuits to do part of its function. As an example, George Swetland of EECO, around the exhibit floor, a device that looked like an old hand calculator which actually a portable SMPTE time generator with an LED read single chip produced the complete 80 bit code.

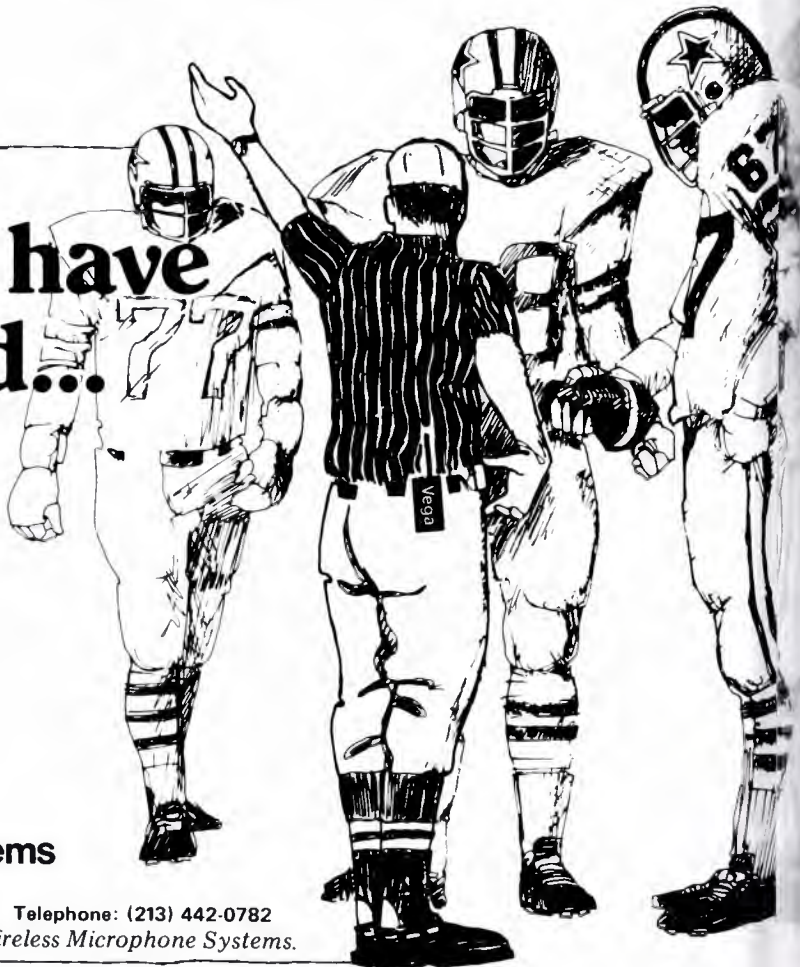
One interesting post-production editing system was being demonstrated by CMX. The heart of the CMX-340X system is a microprocessor that is dedicated to the or other device being controlled and is programmed to interface with the machine's internal characteristic. The unit is called Intelligent Interface (I<sup>2</sup>) and command information from a central computer which can control up to 32 devices (VTRs, ATF, no discs, switchers, telecines, etc.) eight of them simultaneously.

The 340X and its miniature configuration ENG version is

(Continued on page 10)

## When you have to be heard...

Whether you're an NFL referee, an entertainer, broadcaster, lecturer or anyone else who has to be heard — Vega has a wireless microphone system for you.



# Vega

## Wireless Microphone Systems

Division of Cetec Corporation

9900 Baldwin Place • El Monte, Calif. 91731 • Telephone: (213) 442-0782

The most experienced manufacturer of Wireless Microphone Systems.

For More Details Circle (164) on Reply Card



# CANON ANNOUNCES THE ULTIMATE STUDIO LENS



|   | <b>PV18x12B2</b><br>(for 1"/25mm<br>Plumbicon*) | <b>P18x16B2</b><br>(for 1 1/4"/30mm<br>Plumbicon) |
|---|---|---|
| Focal length                                | 12-216mm  | 16-288mm  |
| with 1.5x range extender                    | 18-324mm  | 24-432mm  |
| with 2x range extender                      | 24-432mm  | 32-576mm  |
| Maximum relative aperture                   | 1:1.6 (f=12-172mm)<br>1:2.0 (f=216mm)           | 1:2.1 (f=16-230mm)<br>1:2.7 (f=288mm)             |
| Zoom ratio                                  | 18x   | 18x   |
| Image format covered                        | 12.8 x 9.6mm, 16.0mm dia                        | 17.1 x 12.8mm, 21.4mm dia                         |
| Minimum object distance from front vertex   | 0.7m (27.6")                                    | 0.7m (27.6")                                      |
| Object dimension at minimum object distance | Wide<br>103.2 x 77.4cm, 129.0cm diameter        | Tele<br>5.3 x 4.0cm, 6.7cm diameter               |
| Back focal distance                         | 62.65mm (in air)                                | 78.08mm (in air)                                  |
| Glass compensation                          | 69.2mm (BK7)                                    | 70.2mm (BK7)                                      |
| Wavelength range for color correction       | 400-700nm                                       | 400-700nm   |
| Weight                                      | 23kg (approx 50lbs)                             | 23kg (approx 50lbs)                               |
| Dimensions                                  | 466.5mm length x 284mm width x 260.5mm height   |   |
| Focus and Zoom control                      | Manual, with plug-in interchangeable servos     |   |
| Range extender control                      | Plug-in servo/manual                            |   |

\*TM N.V. Philips of Holland

The new Canon 18x series for major broadcast cameras. With the best relative aperture, superior wide angle and shorter M.O.D. Choice of manual or servo focus and zoom. Built-in servo/manual operated 1.5x and 2x extenders. And interchangeable, plug-in servo modules, for easier service. All at a competitive price.

Judge for yourself. Compare the specifications below. Factor in Canon's nationwide service and comprehensive loaner program. And see a demonstration.

For more information, please write or call:

**Canon®**

Canon U.S.A. Inc. Head Office, 10 Nevada Drive, Lake Success, N.Y. 11040 (516) 488-6700 • 140 Industrial Drive, Elmhurst, Ill. 60126 (312) 833-3070 • 123 Paularino Avenue East, Costa Mesa, Ca. 92626 (714) 979-6000  
**Canon Optics & Business Machines, Canada, Ltd.**, 3245 American Drive, Mississauga, Ontario L4V 1B8, Can.  
**Canon Amsterdam N.V.**, Industrial Products Division De Boelelaan 8, Amsterdam, Netherlands

75. Canon U.S.A. Inc.

For More Details Circle (110) on Reply Card

# Ampex AVR-3. The

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

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

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

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

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

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

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





# First "Intelligent" VTR



With Super High Band you'll get a picture at 7½ lines per second that's virtually equal as you've learned to expect from 15 ips High Band. The tape speed means half as long a tape. It's a money saver.

## Recording options

When you order your AVR-3, you'll be able to choose from the following pairs of recording bands: Super High Band/Pilot/High Band; High Band/Low Band Color; Low Band Color/Low Band Mono. And no matter which recording bands you specify, you'll have both 15 ips and 7½ ips capability.

## "Intelligent"

Big the Brain to Work.

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

The second feature you'll notice is the way your AVR-3 plays tape. Punch up a fast tape, and AVR-3 programs the playback from a gradual acceleration speeds up to a flying 375 lines per second. When, as the tape approaches the end of a reel (or a cue point), the

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

## Editing

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

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

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

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

## Housekeeping and computer control

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

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

## Economics

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

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

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



brochure. Contact your Ampex Video Sales Engineer, or write us for your free copy.

# AMPEX

Ampex Corporation  
Audio-Video Systems Division  
401 Broadway, Redwood City  
California 94063, (415) 367-2011

For More Details Circle (18) on Reply Card

# NAB Sessions Help Update Engineers

## Engineering Advisory Committee Report

Issues ranging from automatic TV program identification and TV subtitling to roadside radio and the VHF drop-in plan were reviewed for broadcast engineers by the NAB Engineering Advisory Committee.

Committee Chairman Robert W. Flanders, vice president for engineering, McGraw-Hill Broadcasting Co., Indianapolis, Ind., submitted the report during the Broadcast Engineering Conference being held in Chicago as part of the NAB's 54th Annual Convention.

Flanders reported that the FCC has finally deleted the commercial coding rules which NAB has opposed for years. The rules would have permitted the use of a corner of the TV screen to transmit blips and keep tabs on commercials. However, the Commission did include a proviso that such material can be used until Jan. 31, 1978.

Flanders also described a proposal filed by Public Broadcasting Service (PBS) with the FCC requesting that Line 21 of the vertical blanking interval be reserved for use of captioning for those with impaired hearing. The PBS proposal is now being reviewed by the NAB Captioning Subcommittee and appropriate comments will be filed by the Association by May 10, 1976.

Regarding the captioning of emergency messages, Flanders said that the Committee had suggested that no action be taken in this proceeding.

In addition, the Committee chairman reported that NAB has filed strong opposition to the VHF drop-in plan.

The EAC chairman said the Committee also reviewed reports on the status of satellites and a future system of direct-to-satellite-to-home method developed by COMSAT.

The Committee discussed plans for the 1979 World Administrative Radio Committee (WARC), but recognized that the WARC is a long-term effort and therefore, the Association should not be deterred from seeking additional auxiliary broadcast service frequencies for immediate use.

Tower icing remains a high priority, the Committee agreed, and the Tower Icing Subcommittee is being restructured under the chairmanship of Ralph Batt, vice president for engineering, WGN, Chicago.

The Committee noted the Association filing in opposition to roadside radio, the use of frequencies at the upper and lower end of the AM band for travel and weather information.

Regarding the Commission's Notice of Inquiry on interference from spark-type ignition systems in motor vehicles, the Committee voted to alert the Electromagnetic Compatibility Committee to this activity so that proper action may be taken.

New cartridge tape recording and reproducing standards have been approved by the EAC and the NAB Board of Directors.

NAB, in cooperation with the Electronic Industries Association and the Institute of Electrical and Electronic Engineers has formed the National AM Stereophonic Radio Committee to study the feasibility of AM Stereo broadcasting.

Committee members in addition to Chairman Flanders are: Charles F. Abel, manager of engineering, KFMB, San Diego, Calif.; Ernest L. Adams, vice president for engineering, Cox Broadcasting Corp., Atlanta, Ga.; Ralph F. Batt, vice president and manager of engineering, WGN, Chicago, Ill.; Albin R. Hillstrom, vice president for engineering, KOOL Radio and TV, Phoenix, Ariz.; Leslie S. Learned, consulting engineer, Mutual Broadcasting System, Inc., New York,

N.Y.; Martin Meaney, director of allocations engineering, National Broadcasting Company, New York, N.Y.; James D. Parker, staff consultant-telecommunications, CBS TV network, New York, N.Y.; LaVerne Pointer, director, broadcasting engineering, American Broadcasting Co., New York, N.Y.; and Benjamin Wolfe, vice president for engineering, Post-Newsweek Stations, Washington, D.C. James Ebel, president and general manager, KOLN TV, Lincoln, Neb., is the NAB Board Liaison Member.

## Two-Way System Keeps News Flowing

How an all-news radio station established its own two-way communications system for on-air taped broadcasts from almost anywhere in its community was described by Christopher Payne, chief engineer of KYW Radio, Philadelphia, a 24-hour-a-day, seven-days-a-week, all-news operation.

He said the remote pickup system, developed specifically for KYW, features UHF base stations arranged for automatic repeat and full duplex operation. Multiple receiver installations incorporate an automatic selection technique that permits reception from a portable transmitter anywhere in the city.

He said this special technique is a "voting" system whereby on the receivers of a multiple series out around the city locks onto signal from a portable transmitter. The receiver receiving the strongest signal activates; the others, receiving weaker signals, pass.

Each of the "voting" receivers connected to the main studio kHz telephone lines, so that program quality voice connections made and can be broadcast directly or taped for later broadcast. Payne said that in this way





## Two Electro-Voice engineers have a quiet discussion about the merits of dynamics vs. condensers.

The discussion is easy to settle because there are such obvious differences. Take our RE20 dynamic and our new CS15 electret condenser:

### RE20 Continuously Variable-D Dynamic:

It's designed to be virtually free of proximity effect and p-popping. And it's designed for as near perfect response 180° off-axis as the state of the art allows. Also, we planned it to take SPL's you wouldn't believe.

#### Can It Deliver?

In the anechoic chamber, the RE20 exhibits the widest, most uniform response curve of *any* available cardioid dynamic. The RE20's cardioid polar patterns are almost identical on axis and 180° off. It has excellent transient response.

#### And The Durability?

This microphone's grandfather could drive nails into pine boards and continue to perform unabashedly. The RE20 adds the ability to handle very high inputs. That's durability. We back this claim with the strongest dynamic microphone guarantee in the business.

### CS15 Single D Cardioid Condenser:

It's designed to be light, to reject off-axis sound, and to provide controlled bass boost. In the recording, broadcast and sound reinforcement jobs where a swinging singer has two mike positions, close and closer, or the bell of a trumpet is surrounding the mike, it's designed to deliver wide, smooth response. And we've developed an electret that can endure SPL's that would have blown the charge off earlier electrets.

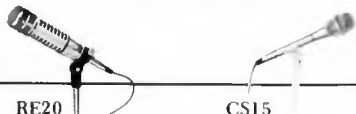
#### Can It Deliver?

In the anechoic chamber, the CS15 exhibits the wide, uniform on-axis response characteristics of the most expensive condenser microphones. Its off-axis response is excellent also. The microphone can be powered remotely with from 8 to 48 volts.

#### And The Durability?

The CS15 condenser is every bit as rugged as our most rugged dynamic.

We back this claim with the strongest condenser microphone guarantee in the business.



#### Specifications

|  | RE20                          | CS15                 |
|--|-------------------------------|----------------------|
| Model Number   | RE20                          | CS15                 |
| Element  | Dynamic                       | Electret Condenser   |
| Polar Pattern  | Cardioid                      | Cardioid             |
| Response   | 45-18,000 Hz                  | 40-18,000 Hz         |
| Output Level<br>(0 dB = 1 mw/10<br>dyn/cm <sup>2</sup> )             | -57 dB                        | -45 dB               |
| Max. SPL<br>(1% THD or less<br>at 1 kHz)                             | greater than<br>150 dB        | 141 dB               |
| Impedance  | 50, 150, 250 ohms<br>balanced | 150 ohms<br>balanced |
| Case Material  | Machined Steel                | Machined Steel       |
| Sugg'd Resale Net<br>Price (Slightly<br>Higher in Western<br>States) | \$300.00                      | \$198.00             |

**Electro-Voice** <sup>®</sup> INC  
a **gulton** company

Dept. 562V, 638 Cecil Street,  
Buchanan, Michigan 49107

reporter covering a remote event can always get through to the main studio, despite terrain or man-made barriers.

He said an ingenious method of using a duplexer at two-way automatic mobile relay stations permits the use of closely-spaced 450 and 455 MHz frequencies for transmitting and receiving without interference.

The requirement for a good base station receiver, one with a high intermodulation immunity and a very good desensitization characteristic, was emphasized by Payne. Both are needed, he said, to overcome the potentially destructive interference from nearby transmitters in the mobile business and public safety radio services in the 455 MHz band.

### **Take A Tip From The FCC**

Radio engineers were urged to emulate the inspectors for the Federal Communications Commission and check for overmodulation the way they do.

Joseph W. Looper, chief engineer of the Hampton Roads Broadcasting Corp., Newport News, Va., recommended use of a tunable receiver with a good IF strip and an oscilloscope of good quality.

FCC inspectors use such equipment when they monitor a station, he said, and broadcasters should follow suit.

Looper told the radio broadcasters that overmodulation can be cured in AM stations, albeit at high cost, by using plate-modulated transmitters with a line voltage regulator.

Alternative methods, he said, are to stabilize the modulator bias supply as well as the power tube filament supply. Both alternatives, he said, will extend the life of power tube filaments, and they thus will help pay for themselves.

Looper recounted tests that he has run at his station WGH that showed that overmodulation many times was caused by variations in power line voltages. Variations in the order of 5% to 10% are quite common, he said.

Severe cold winter weather or extreme heat in the summer also cause variations of from 10 to 15 volts on a 240-volt line. Many utility companies, he said, have a

problem with power line voltage variations.

### **Time-Delay Reverberations**

Engineers also were told they'd better latch on soon to something audiophiles have known for a long time—a third-dimensional "time" element that improves high fidelity music.

Use of what he called "auditorium ambience" was encouraged by William Hall, vice president of engineering for MicMix Audio Products.

Sound no longer is merely two-dimensional, Hall emphasized, but has become three-dimensional—pitch and timbre, plus time. The last, he said, is the reverberation that comes milliseconds after direct reception and echoes from the stage.

The ear, he explained, is subject to the original sound not once but many times. It's the repetition, he said, that gives "the fullness and satisfaction to the direct sound that cannot be duplicated by any other means."

Such ambience, Hall said, can be synthesized through echoes from recording studio patterns or artificial chambers having good reverb characteristics.

### **Avoid Those 'Funny Things'**

Engineers were given some tips on how to avoid "the funny things that happen to the signal on the way to the receiver."

William J. McCarren, associate director, AM Transmission Systems, CBS Radio Network, New York, said one example of problems with AM transmissions occurs when signals travel over multipaths due to reflections from earth objects or skywave propagation. One thing sure to occur, he said, is that the upper and lower sidebands can be expected to arrive at the receiving antennas at different times. They also will exhibit different ratios of sideband-to-carrier energy than when the signal was generated at the transmitter.

McCarren noted that if the carrier is canceled more than the sidebands, the signal becomes overmodulated. But if the sidebands are canceled more than the carrier, he said, the percentage of modulation

is lowered. The phase relationship of the sidebands to the carrier will be shifted from their original relationship, he said.

The problems of directional antennas are special, this is particularly true, the CBS engineer said, in the null radiation pattern where the amount of attenuation the sidebands may well be more than of the carrier, or in cases more for one sideband than for the other.

The complexity of matching impedance of the antenna to resistance of the transmission was also mentioned by McCarren. The matching is usually done at the carrier frequency, he noted, the sideband frequencies are usually not matched. Therefore the sideband load reflected back to the sending end of the line is something different than a pure resistance.

### **Pulser Saves UHF Power**

Power savings amounting up to \$14,000 annually in UHF transmissions were reported with use of an anode pulser to regulate the output of the station's power amplifier.

The system, using circuitry techniques perfected at RCA's Missile & Surface Radar Division in Moorestown, N.J., was described by John B. Bullock of RCA's Mechanicsville, Pa., facility during a television assembly at the Broadcast Engineering Conference.

Bullock noted that UHF stations can only obtain higher peak output than VHF stations to provide an equivalent signal through use of vapor-cooled klystron power amplifiers.

He said the beam power needed for the klystron is considerably greater than actually required. The power is needed only when synchronizing TV signal is being transmitted—or 8 percent of the time.

The anode pulser is designed to let the system operate at reduced power during the other 92 percent of the time and to apply power only during the sync period.

Bullock said tests have resulted in a 13.8 percent savings in power input to a 60 KW transmitter. Based on power costs in the Jersey market and assuming



# IT'S DECADE TWO

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

## **PHILIPS LDK-11. Full broadcast quality with ENG and commercial production!**

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

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

...All this and more add up to the

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

...Send for more information. Or, better still, have  
...your Philips representative set up a demo for you.  
...But do it today before you get TKO'd into anything  
...else. Broadcast Products, Philips Audio Video Systems  
...Corp., 91 McKee Drive, Mahwah, New Jersey 07430.  
... (201) 529-3800.

# PHILIPS®



\*TM - N V PHILIPS

For More Details Circle (20) on Reply Card

hour broadcast day, he said, this would amount to an annual savings of about \$7,000. "Similar calculations made for higher power transmitters suggest that savings would increase approximately in proportion to the transmitter's RF power output," he said.

### **Eliminating Ghosts**

Television viewers who sometimes have difficulty with pesky "ghosts" on their picture tubes can take heart. A method of overcoming most of these aberrations, caused by multi-path signals, is under way.

A circularly polarized antenna system capable of reducing ghosting, was described by R. E. Fisk and J. A. Donovan of Gates Broadcast Equipment Division, Harris Corp., Quincy, Ill.

The Harris engineers' report is an update of a previous paper delivered at a symposium held under the auspices of the Institute of Electric and Electronic Engineers in Washington last September.

It described an antenna configuration using a cavity backed radiator for the VHF frequencies. Two major features of the design are the exceptional pattern and impedance bandwidth capability, and the excellent on and off axial ratio. The latter is said to provide suitability for multiplexing.

The device can be mounted on triangular or four-sided towers and is independent of adjacent elements of the antenna system. It is enclosed in a special, low wind-load radome to protect the antenna from corrosive-causing pollutants in the air.

For channels 2-6, the cavity size ranges from 7.5 feet to 11 feet in diameter; for channels 7-13, the size is about 3.5 feet.

Authors of the paper said a special wideband flat dipole was developed to handle the required power levels and to excite the cavity. The development has separate 1 5/8-inch, 50-ohm coaxial inputs to the horizontal and vertical elements, permitting cavities to be fed for either horizontal, vertical or CP radiation.

### **Magnetic Digital Discs**

The slide projection unit, a mainstay at many a TV station

since the beginning of television in the late 1940's, may be on the way out. In its place is an all-electronic, digital device, using magnetic discs, that provides instant random access to 1,472 still pictures.

The device is called the Electronic Still Store system (ESS).

"The operation of the telecine slide projector represents what is perhaps the most antiquated activity of a modern television plant," according to J. Dierman of Ampex Corp. and W. G. Connolly of CBS Television Network who authored the paper on ESS.

The authors noted that the average station carries from 2,000 to 5,000 slides. The slide assembly, they noted, requires assembly, cleaning and physical carriage to the telecine room where the slides must be manually loaded. This is "a laborious operation," they said, "with inherent possibility of error."

Describing the development of ESS by Ampex and CBS, the paper noted that the choice of standard disc packs was determined by the need for magnetic storage device that can transmit a continuous TV signal without the need for a buffer.

Each disc pack, with a capacity of 800 TV frames, can be loaded and unloaded from the drive in a matter of seconds. The entire range of 800 tracks per disc pack, they said, can be traversed in about 60 milliseconds. Moves between adjacent tracks take 10 milliseconds. They compared these times with the 200 milliseconds that is required for a telecine mirror flip.

The ESS system, they said, is set up to use two disc packs at one time.

With a mini-computer, they said, it can be used with up to eight remote access stations. Each station consists of a keyboard and a 32-digit alphanumeric display. Panel selections contain operating modes (play, record/delete, sequence assembly, etc.). Data entry keys are used to select channels, or select an individual still and to manipulate internal memory to establish play sequences.

### **Modified Half-Track**

Economy and quieter performance was claimed for a modified

video tape recorder using half-width magnetic tape.

Donald E. Morgan, director of program management for the International Video Corp., Sunnyvale, Cal., said the 9000-4 recorder provides high quality pictures is especially adaptable for deliv- ering broadcasts and for storage.

He spoke during the Engineering Conference being held here as part of the 54th annual convention.

Morgan said the modified recorder has plug-in printed circuit boards and a new head drum that reads and reproduces on half-width tape moving at four inches per second. The redesigned head with clearly defined track widths is rigid and sturdy, he said, and will wear as long—typically 3,000 hours—a warranted 1,500 hours.

Morgan said a chief advantage of the modified IVC recorder is economy.

He said the signal-to-noise ratio of the modified recorder is 4 dB compared to 50dB of the 9000-4. "performance in this regard, he said, "agrees with the theory that halving the track width will reduce the signal-to-noise ratio by 3dB.

### **Computing Radio Coverage**

Two government engineers described for broadcasters how the Department of Defense uses computers to determine line-of-sight and shielding factors in determining coverage between sites in the United States.

A joint paper by Charles Gettier and James W. Deterding of the department's Electromagnetic Compatibility Analysis Center, Annapolis, Md., was delivered by Gettier.

Gettier said ECAC has developed a family of automated telecine analysis models as well as an automated data base of digital topographic information. Telecine elevation data based on longitude and latitude is stored in the computer.

In order to check the advantages or disadvantages of transmitting and/or receiving sites, Gettier said the elevations between two or more sites are brought up from the memory bank of the computer in a sequence of equi-spaced points along the great circle path between two known end points.



# Quality, Reliability, Service...

## Excellent Reasons for Choosing ADM<sup>®</sup>



Console custom-designed and built by  
Audio Designs for WKY-TV, Oklahoma City.

When you buy an ADM Console, you buy a company.  
You buy our skilled engineers and design personnel,  
our professional know-how and more than ten years  
of experience in building consoles that are *unexcelled*  
for quality and reliability.

Audio Designs<sup>®</sup> has consistently been a leader in innovative  
concepts and "state-of-the-art" techniques. Our principals have worked  
on the studio side of consoles—they know what professionals want and  
to do their demanding jobs faster and easier. And customers know that  
ADM Consoles are engineered for consistent high performance. That is  
the reason why our customer list reads like a "Who's Who" of the industry.

Our consoles are manufactured with the finest components for long life and  
trouble-free operation. Hopefully you will never need service, but if you do,  
we will provide assistance promptly and without question. Our five-year  
warranty is the most liberal in the industry. Before you buy any console—  
standard or custom—let us give you some more reasons why an  
ADM Console is your best buy. Call or write us soon.



AUDIO DESIGNS AND MANUFACTURING, INC.  
16005 Sturgeon, Roseville, Michigan 48066  
Phone: (313) 778-8400, Cable: AUDEX TLX-23-1114  
AMPEX DISTRIBUTED OUTSIDE U.S.A.  
BY AMPEX INTERNATIONAL OPERATIONS, INC.

For More Details Circle (21) on Reply Card



Attendance was great, and sales on the floor were better than average. There wasn't any indication of the turmoil that took place trying to set up these booths in shorter than normal time. Exhibitors and attendees appreciate the transformation that takes place from crates and concrete to super exhibit. The exhibit designers this year deserve more credit and...more time.

# BE Tours The Radio Exhibits At NAB

By Dennis Ciapura, *BE Audio Editor*

As each new year brings its technological advances, the character of the N.A.B. Show changes a little bit to reflect those advances and so, the show is always different, with the excitement of something new to look forward to. Although the convention is sometimes branded as a T.V. oriented affair, this year's event was packed with enough radio audio displays to keep a pack of radio broadcasters busy for better than a month of Sundays.

This review of the radio/audio exhibits is by no means complete, as space does not permit a complete wrap-up in a single issue, so look for more about the '76" radio exhibits in future issues. For readers who were there, perhaps this wrap-up will remind you of something you wanted to check out after the show, and for those of you who weren't able to make it this year, take the quick trip with us here and see what's new. The various exhibits are described here in the order that they appeared as we walked through the expanse of Chicago's McCormick Place in our semi-systematic wanderings.

One of the most notable features of the **R.C.A.** booth was the emphasis on stereo and quad suitability of the R.C.A. radio transmit-

ters. The AM rigs were "Stereo Compatible", while the FM transmitters were labeled "Stereo Compatible". An AM stereo demonstration was set up with high monitor quality speakers for demonstration of audio quality; an impressive demonstration of the system's capabilities.

**Harris** showed its System 90 Automation which boasts the use of micro-processor technology and is one of the other digital marvels. The MW-1 all solid state AM transmitter was also on hand and demonstrated (into a dummy load) for a demonstration of the transmitter's PSM, Progressive Series Modulation, audio system. Harris's Loopster was happy to demonstrate the rig for one and all, and seemed happy to have exhibitors fondle its knobs.

**Moseley** demonstrated its remote control equipment and showed the new SCG-9 generator which features low voltage shoot filter design. **Nortronics** showed a new splicer to show and which generated a lot of interest at the show among the "do it yourselfers". At the **Bird** booth we were able to get a look at the new Bird reject load, while the **Capitol**



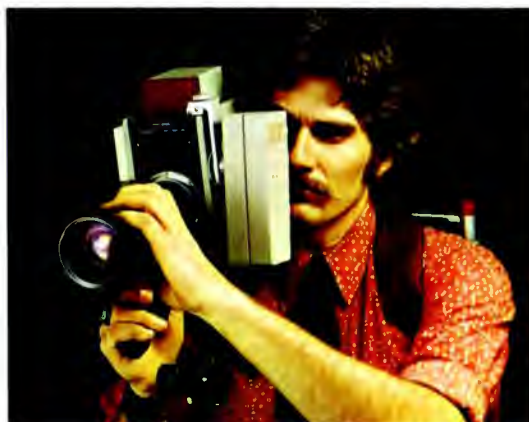
The press meets the exhibitor! Bud Carlson of Video Systems magazine gets a short course in cart machines from Sparta's Jay Cooke. Video Systems is a new sister magazine to Broadcast Engineering. It's published bi-monthly.



# Now Hitachi Covers The News...



Hitachi FP3030



Hitachi SK-70

## Three Different Ways

The addition of the new Hitachi SK-80 camera to your existing line, now gives you three top performance Hitachi ENG cameras to choose from. Each camera also has the versatility to be applied to other non-ENG operations.

**Hitachi FP3030** A low cost and lightweight (7 lbs.) completely self-contained portable ENG camera with built-in battery that is ideal for broadcast capability in ENG, as well as a variety of industrial applications. The FP3030 also features excellent colorimetry and sensitivity with registration-free tri-electrode single tube.

**Hitachi SK-70** A modular system camera that can be converted easily from studio to portable use with superior broadcast performance in either mode. Digital command control unit is also available. The SK-70 is many cameras in one!

**Hitachi SK-80** Totally self-contained ENG camera whose exceptional design and features are sure to be appreciated by broadcasters. Features three 2" Saticon tubes. Optional Gen-Lock available, as well as many other fine built-in features.



Hitachi SK-80

To get the complete scoop on ENG cameras, contact your Hitachi dealer today. And find out how much **more camera** Hitachi gives you for the price!



# HITACHI

Hitachi Denshi America, Ltd.  
FORMERLY HITACHI SHIBADEN CORP OF AMERICA

Executive Offices: 58-25 Brooklyn-Queens Expressway, Woodside, N.Y. 11377 (212) 898-1261

Offices in: Chicago (312) 344-4020 • Los Angeles (213) 328-2110 • Dallas (214) 233-7623 • Atlanta (404) 451-9453

For More Details Circle (22) on Reply Card



EBS monitors were in demand because all stations needed them by April 15. Some manufacturers brought them to the convention in numbers and sold them off the floor.



Oh, it was nice to find a place to sit down. The exhibit area was so large this time that it really took days to see everything. Meanwhile, in the same building the Flower and Garden show was being held, and about 35,000 people attended that one.

were on hand to talk about the Audiopak A-2 carts and Capitol's new Q15 and Q19 tapes for broadcast use.

At **AEL**, we found transmitters with meters at waist height and positive pressure cabinets to help fight dirt ingestion. AEL has added 5 and 10 kW FM transmitters for "76" and a new FM20E solid state FM exciter.

The **Marti** exhibit area bristled with remote pickup gear, S.T.L.s and digital remote controls for wire or S.T.L. applications and **Cooke Engineering** showed a line of audio pre-amps, distribution amps and monitor amplifiers in the "Dyna-Mite" series. At the **CSI** display, a new line of AM transmitters and a 1 kW FM were the big items, as CSI comes into its second con-

vention year with what is now a full line of transmitters. **IGM** had its automation and "Go Cart" demos ready for inspection. **Delta** showed its antenna monitors and digital control system, and **Belar** displayed their newest digital monitoring equipment.

The **CCA** exhibit boasted a complete line of transmitting equipment and a working demonstration of the audio fidelity capabilities of its new 40 watt all solid state FM exciter and stereo generator combination. The demonstration unit easily managed to generate a stereo signal with only 0.1% distortion and FM noise at -70 dB. A line of Bogner FM antennas also made its debut with CCA at the show.

**Rapid Q** had its line of cart gear to show off, as well as a Stereo

Phase Enhancer display. **Critical** had its see through demonstration transmitters on hand, including a 50 kW AM rig with screen and impedance high level modulation. The 5 and 10 W versions were all solid state to the final, which employs two tubes. **McMartin** tied its line of transmitters, monitoring and audio gear together with a single theme that was "It's only natural". **McMartin** showed S.C.A. gear and a new 2.5 kW AM and 25 kW FM transmitter. **Collins** came to the show complete with transmitters, components and the new "Phase 4" exciter. The DAP, Discriminate Audio Processor, could also be found on display at the Collins/Rockwell display area.

The **Cetec Broadcast Gu**

## At The FCC Booth....

The FCC booth featured FCC personnel and a direct line to the Washington office, to allow broadcasters to check the status of various applications in the mill and discuss details with the guys from the hill. We talked to Dennis Williams of the Facilities Branch about the areas that were drawing most of the broadcaster's attention and questions at this year's show. Mr. Williams reported that the most popular inquiries had to do with the status of

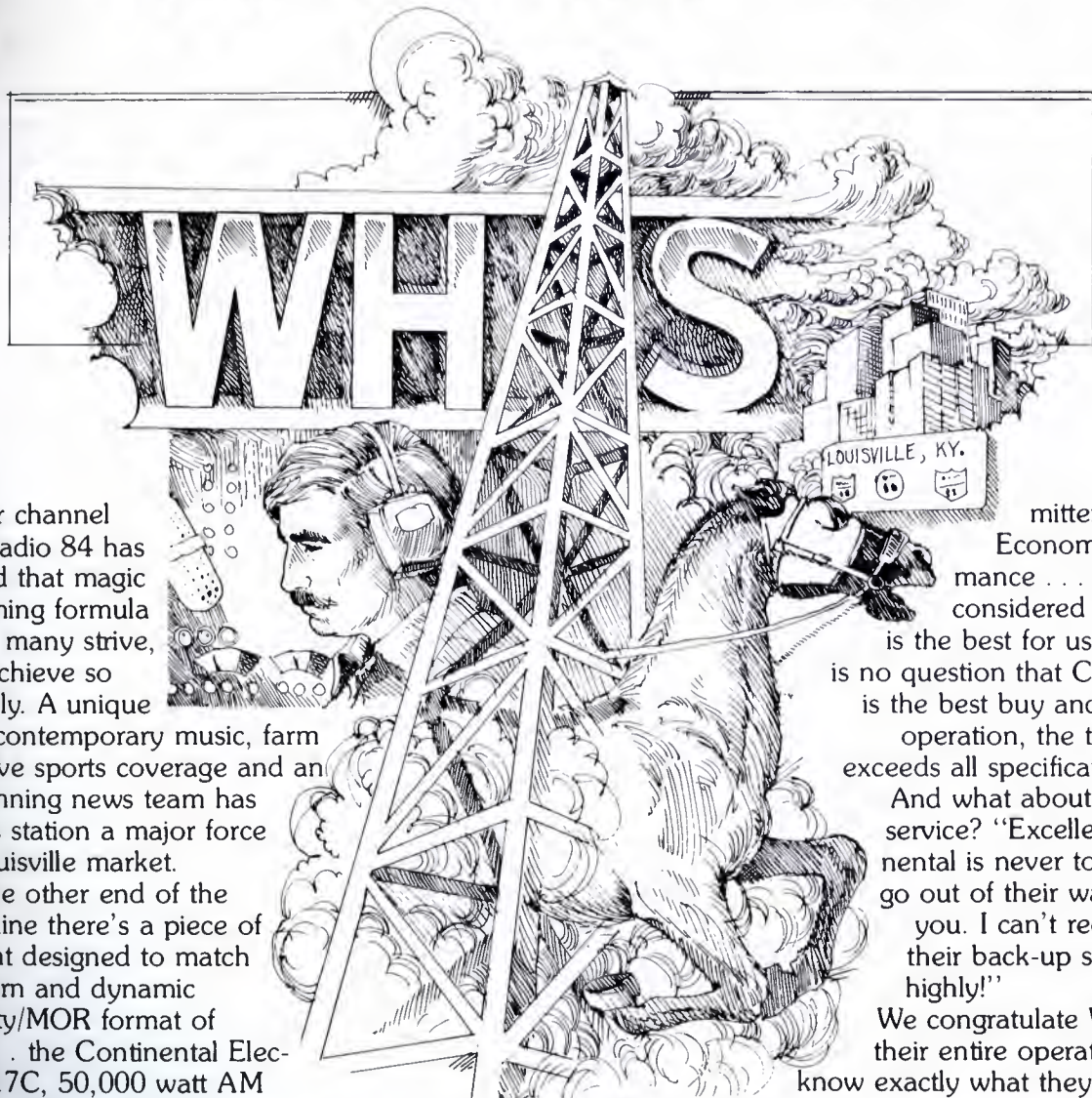
applications for new facilities, the new rule governing AM sample systems and, of course, the new E.B.S. changes.

We also asked if any area dominated the problem inquiries the Commission was getting at the show and not surprisingly, the answer was "AM directionals...". The direct line to D.C. was very popular and the guys who manned the FCC booth were made to earn their keep as they fielded what must have been a million questions. If the Commission is working to improve its image among broadcasters, answer banks like the one at NA certainly seem like a step in the right direction.



# WHAS KNOWS EXACTLY WHAT THEY WANT IN A 50 KW AM TRANSMITTER.

**SO DOES CONTINENTAL ELECTRONICS!**



Clear channel  
WHAS Radio 84 has  
developed that magic  
programming formula  
which many strive,  
but few achieve so  
successfully. A unique

blend of contemporary music, farm  
reports, live sports coverage and an  
award-winning news team has  
made this station a major force  
in the Louisville market.

At the other end of the  
program line there's a piece of  
equipment designed to match  
the modern and dynamic  
personality/MOR format of  
WHAS... the Continental Elec-  
tronics 317C, 50,000 watt AM

transmitter! Featuring high reliability and efficiency,  
small size and the Loud Sound of 125% positive  
peak handling audio, it is quality throughout.

It's no accident that it's in service at  
WHAS. Mr. William Hunter, Director of Engineer-  
ing at the station says, "We visited the various plants  
of the major manufacturers and watched their trans-

mitters on test.  
Economy, perfor-  
mance... all factors  
considered the 317C  
is the best for us... there  
is no question that Continental  
is the best buy and in actual  
operation, the transmitter  
exceeds all specifications..."

And what about customer  
service? "Excellent! Conti-  
nental is never too busy to  
go out of their way to help  
you. I can't recommend  
their back-up service too  
highly!"

We congratulate WHAS on  
their entire operation. They  
know exactly what they want in a  
50 KW AM transmitter... so does Continental!

For information  
on the 317C, write  
Continental Electronics  
Mfg. Co., Box 270879  
Dallas, Texas 75227



*Continental Electronics*



For More Details Circle (23) on Reply Card



brought everything from antennas to automation to transmitters to the show. The new Sparta 1 kW all solid state AM transmitter was the star of the Sparta transmitter display and we understand that the design will soon be extended to 2.5 kW and easily expanded from there to 5 kW. The new line of Sparta consoles was also on display to round out the Cetec story.

**QRK** had a very impressive display of turntable gear in its Reko-Cut line as well as Futura consoles. **LPB** had its consoles on display, including the S-20, along with cart machines and the Comp/limiter Audio processor. **Sansui** demonstrated the QS quad system and **Ampro** displayed cart gear and an interesting line of consoles that include peak indicators. **SMC** demonstrated its DP-2 automation programmer, automatic logging system and a new multiple play, random access cart device called the Caro-Stat, that plays the carts on end for reduced internal friction and smoother operation.

One of the most interesting units on display at the **Potomac Instru-**

**ments** exhibit was the FIM-71, solid state VHF field strength meter, which is priced to fill the void between an all out lab quality unit and the simple meters used for CATV maintenance. Transmitters, including a new 2.5 kW rig, monitoring gear, audio consoles and signal processing equipment were the name of the game at the **Wilkinson** exhibit, where the black wrinkle steel cabinetry served as pleasant landmarks. Meanwhile, at **Scully Metrotech**, the new 285B in 2 track configuration could be seen, along with a variable speed control. At the **Micro-Trak** booth there was enough professional quality phono gear on display to make a disc jockey think he had died and gone to heaven (or wherever they go).

The **Auto-Tec** display featured a dual capstan professional recorder and an electronics assembly for converting the older Ampex models to state of the art solid state decks with surprising performance. **Minneapolis Magnetics** joined the show for the first time this year with an array of tape heads for use in just about every popular tape

machine. **Mic Mix** had a re-chamber demonstration that allowed interested passers-by to in and sample the product awhile. **Automated Proce** showed their model 1604, which definitely in the super con category. Monitoring equipment abounded at the **TFT** exhibit including a new Model 754 monitor that allows monitoring to four stations for those interested in keeping track of the competition. The **TFT E.B.S.** gear was also on display.

**Pentagon** featured tape duplication equipment for both reel and cassette formats and **T** showed a line of test tapes and heads. **Thomson CSF** set up a working display containing the company's Audimax and Volu products, which could be conditioned through headphones connected to the display. **ITC** brought a working demonstration to the show in the form of a deck feeding test gear for a specification check. Cart gear was also displayed at **ITC**. **McC** featured a very attractive st

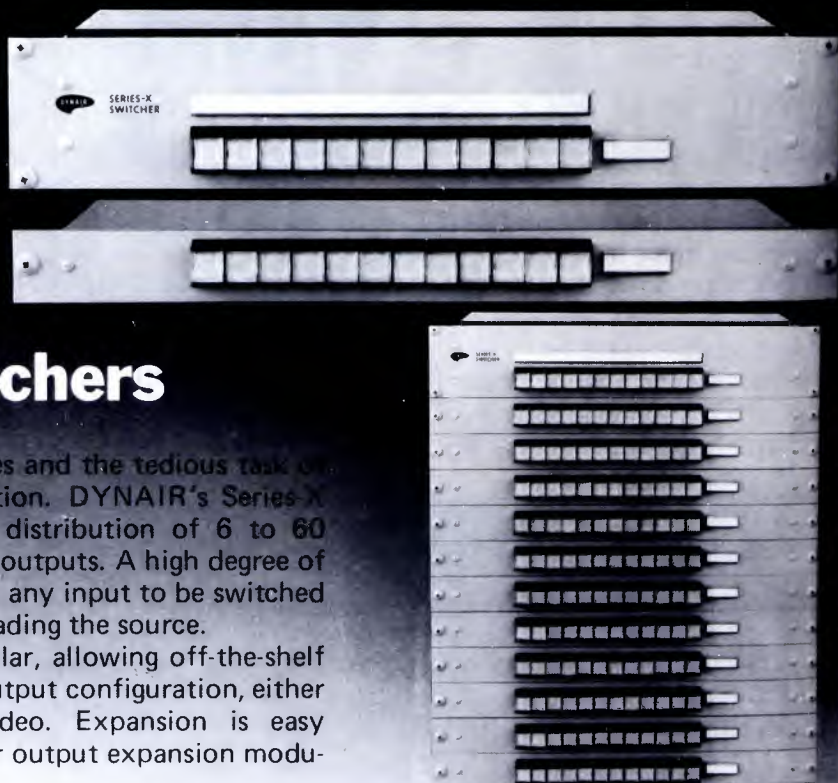
# STILL the best buy ...DYN AIR's Series-X Switchers

Forget about messy patch cables and the tedious task of re-patching to change distribution. DYN AIR's Series-X Switchers provide pushbutton distribution of 6 to 60 color sources to as many as 120 outputs. A high degree of input-to-output isolation allows any input to be switched to any or all outputs without loading the source.

These units are totally modular, allowing off-the-shelf assembly of almost any input-output configuration, either video-only, or audio-follow-video. Expansion is easy too . . . you simply add input or output expansion modules as required.

Wouldn't a Series-X Switcher solve some of your distribution problems?

*Write today for full details.*



**DYN AIR ELECTRONICS, INC.**

6360 FEDERAL BLVD, SAN DIEGO, CALIF 92114 U.S.A.  
TELEPHONE: 714-582-9211 • TWX: 910-395-2040

DYN AIR

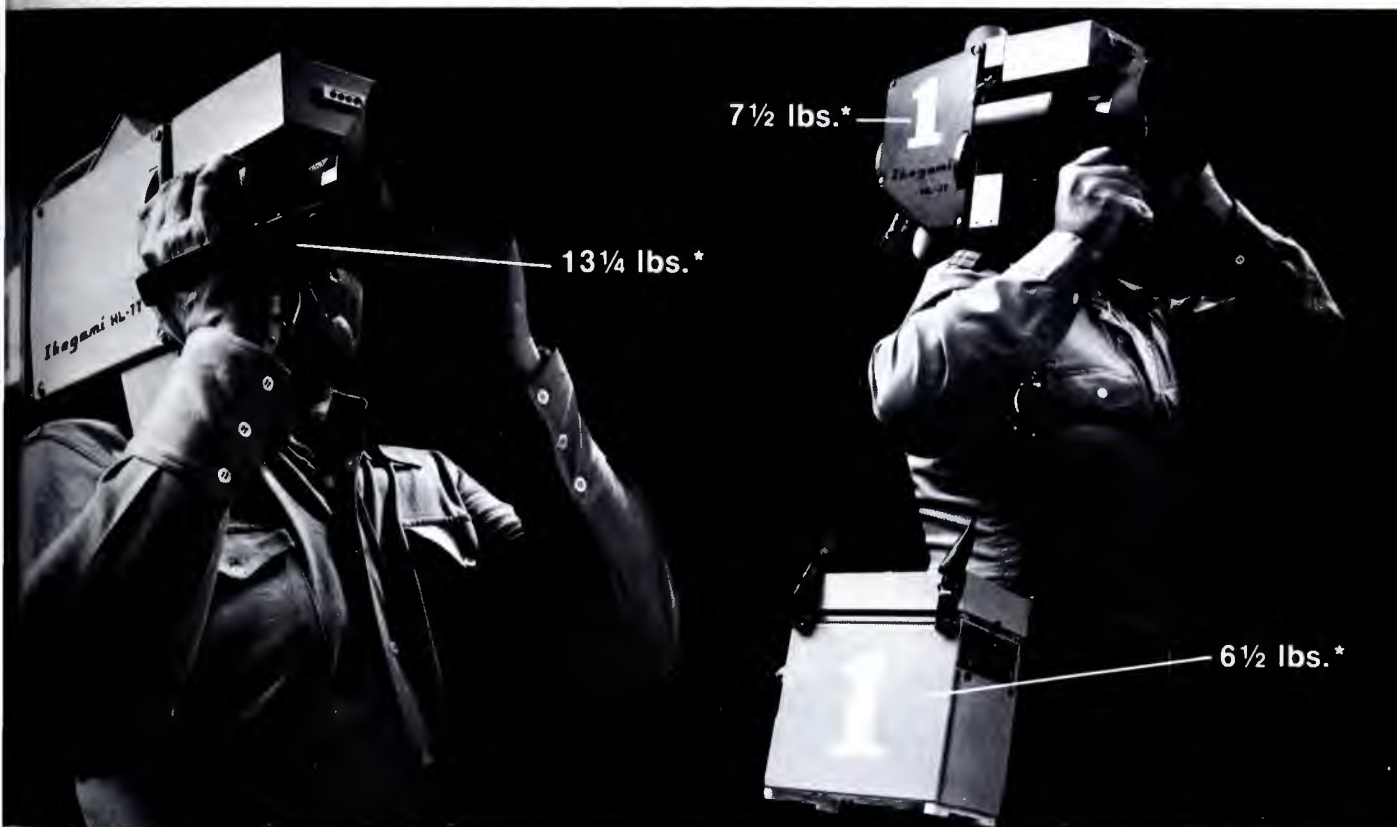
For More Details Circle (131) on Reply Card

BROADCAST ENGINEER



Weightwatchers:

# IKEGAMI ENG Dependables reduced to 13¼ lbs.\*



## ALL-IN-ONE "IKE"

Ikegami has dramatically cut the weight and power consumption of our best-quality ENG. But we didn't lose one ounce of the proved reliability, colorimetry, stability! A new generation in lightweight ENG is offered in two configurations. Give you film camera freedom. You can have the HL-77 as a single shoulder unit at only 13¼ lbs.\* or the HL-37 at 7½ lbs.\* with a 3½ lb. process pack of 6½ lbs.\* You can sling from a shoulder or

## ONE AND DONE "MINIMATE"

rest on the floor. Only Ikegami gives you a choice.

### Outstanding Performance Features

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

**IKEGAMI**  
Depend on it

Call or write for details.

Ikegami Electronics (USA) Inc., 29-19 39th Avenue  
Long Island City, New York 11101 (212) 932-2577

\*Does not include lens or 3 lb. battery pack

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

For More Details Circle (24) on Reply Card

ensemble featuring McCurdy audio consoles.

**U.S. Pioneer**, a name familiar to audiophiles, would like to be a name more familiar to broadcast engineers and demonstrated a line of tape decks and speakers for professional applications. **Audi-tronics** showed consoles and components and **Electro-Voice** put together a microphone display that just made you want to take them all home. Speaking of wanting to take them all home, **Pacific Recorders** displayed MCI tape equipment, a hypnotic timing device, Vari-Speed controller and a new signal processor called The Multi-limiter. **Control Design Corporation** introduced its new color and panel design for its line of automation equipment and a microprocessor brained unit called the CDC Time-Capsule with a real time capacity of up to 16,632 alerts per week. **Nagra** was also represented at the show and demonstrated a portable tape deck with 10" reel capacity.

Getting back to the equipment exhibits, we found a sharp little portable V.U. meter at the **WBS**

display and a chance to examine the new MX-5050 tape decks at the **Otari** booth. Consoles and audio gear at the **Ramko** display had an ultra modern look and solid state LED V.U. meters to boot. **Orban Parasound** demonstrated its Optimod signal processor, Parametric Equalizer, De Es'er, Stereo synthesizer and reverb system. The star of the Orban show, however, was the Optimod, which commanded much attention from the FM'ers.

**Microprobe** made its debut at the show this year in a combination display with **The FM100 Plan** a highly successful programming service. Microprobe demonstrated a simple, low cost automation system and The FM 100 Plan provided the programming for the demonstration. A see-through model of the system's sequencer was on hand for inspection. **Shure** displayed a variety of microphones and some very interesting audio gear, including the SR101 Audio Console, with EQ, slide pots and the works. **Motorola** featured communications equipment for news gathering, including the new MX 300 series. **Rank**

**Audio Visual** had an interesting wow and flutter meter as well 1742 console and **Camex** enjoyed a busy week showing off its Pro Automation. **W & G Instrument** joined the show for the first time this year with an impressive set of audio test gear including a set called System 300.

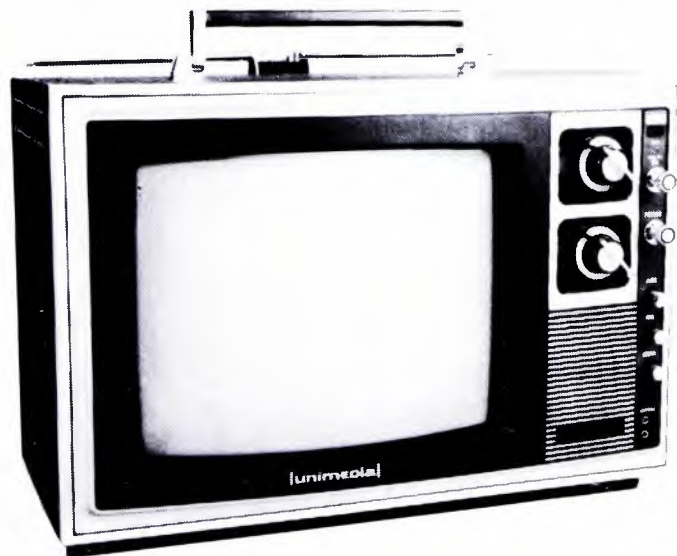
**UMC** and **Sparta** showed audio cart units. Of course, there was an all-new entry for UMC. Meanwhile **Fidelipac** introduced a delay cartridge. **International Instruments** introduced their PD-II machine series and reel-to-reel producers. **Broadcast Electronics** showed their complete line of equipment, including the series 5000 triple and five deck machines. **Contel** and **Rapid Q** also showed professional cart units.

**Tandberg** introduced a 10 1/2" reel tape recorder, using two motors and three heads.

And so the parade of new products went on and on. We'll keep you up to date in coming issues, but we suggest you visit the new products section of this issue as well.

## Portability and Affordability

UMT-1203 \$640



### ENG EDITORS REJOICE!

There are two great reasons you should use the UMT Series Unimedia Monitors in your ENG operations. Firstly, the high quality of these rugged monitors and matching receivers make them ideal for field use. Secondly, all the new lightweight cameras, VTRs, and other ENG gear available, why be bothered with a heavy monitor? Secondly, if you think about it you'll find it hard to justify spending two to three thousand dollars for an ENG monitor. You can have up to five UMT's for that kind of money!

Unimedia's UMT Series Color Monitors/Monitors/Receivers offer versatility and reliability usually found in more expensive monitors, but at a price you can afford. They're available in 9, 12, 15, 17, and 21 inch models, and priced as low as \$599. Yoke mounts, pulse cross, and demarcation audio and video output are available at special priced options. Find out more from your Unimedia dealer, or direct from Unimedia at the address below.

**UNIMEDIA**  
**UNIMEDIA**  
**UNIMEDIA**  
**UNIMEDIA**

22525 KINGSTON LANE, AUBURN, CA 95603

(916) 878-1250 (916) 272-1971

For More Details Circle (125) on Reply Card



# MARTIN



BA-2.5K shown

AM TRANSMITTERS  
1000W • 2500W <sup>NEW</sup>



BF-2.5K shown

FM TRANSMITTERS  
10W • 1000W • 3500W <sup>NEW</sup>  
5,000W • 10,000W <sup>NEW</sup>  
27,500W • 55,000W <sup>NEW</sup>

MONITORS • AM Modulation  
FM Frequency/Modulation mono  
stereo  
SCA



TBM-3200B shown

CONSOLES 5 and 8 Mixers



B-800 console shown

FM Relay and SCA Receivers  
RF Amplifiers  
Power Amplifiers

1956 twenty years serving the broadcast industry 1976

# NAB New Product Review

After the hassel of exhibit setup, manufacturers were ready for a good convention, and they got it. Several thought they had the "hit" of the show. That's for you to decide.

Because of the wealth of equipment unveiled at NAB, we will continue our NAB products coverage in the next issue. And as a reminder, you can get further information and spec sheets on these products by using our Reader Service Card in the back of this issue.

Meanwhile, we hope you understand that when manufacturers are gouged at convention time, the extra costs will show up somewhere. This is why, in our March issue, we discussed some of the problems exhibitors would have at McCormick Place.

## TV Production Switcher

**Central Dynamics** unveiled their CD-480 production switcher that's based on their unique CD-480 SFX sequential effects amplifier. Actually, it's a family of modules that can be configured to meet a tremendous variety of needs.

Within the switcher, a single CD-480 SFX amplifier gives complete control over four signal levels. Each level may be controlled independently or in conjunction with any or all the other signal levels (Key 2, Key 1, Background 1 and Background 2).

To get an idea of the level versatility, in level 1, Key 2 will allow you to cut, dissolve, wipe, soft wipe, and color border wipe to or from matte key, color border matte key, character generator key and blink key.

On level 2, Key 1, you can cut, dissolve, wipe, soft wipe and color border wipe to and from chroma key, luminance key, matte key, color border key, non-add insert,



split screen, spotlight and mask key. So, levels 1 and 2 are for keying, with full transition control to and from the processed signals.

Levels 3 and 4 are used for background video signals with the ability to cut, dissolve or wipe between them. The total on line effect of using four levels could be a reporters face, characters spelling out the 10 o'clock news and a split screen background of a fire and a fire engine racing to the fire.

For More Details Circle (133) on Reply Card

## 18X TV Zoom Lens

The new **Canon** TV zoom lens shown at the NAB convention came in two models.

One was called the PV18x12B2, and it's designed for use with a 1-inch/25mm Plumbicon. The other, called the P18x16B is for use with a 1½-inch/30mm Plumbicon.

These zoom lens are offered with a choice of manual or servo focus. Also, built-in servo/manual operated 1.5x and 2x extenders and plug-in servo modules for easy service. These lenses exhibit super-wide angle and M.O.D.

The CD-480 automatic preview system keeps one step ahead of operator, showing the complete result of the next transition. If a poor selection, the preview monitor will show it before he makes the transition.

In addition to the sequential effects amplifier, the CD-480 contains all the other features currently expected of a professional production switcher.

For More Details Circle (126) on Reply Card

## Solid State 1kW Transmitter

**Sparta** has added a 1 kW model to its growing line of solid state transmitters. The Model SS1000A, shown for the first time at the NAB Convention in Chicago, combines modern solid state technology with conventional Class B modulation to provide a highly efficient, high performance unit.

Paul Gregg, Sparta Transmitters Products Manager, claims the SS1000A can pay for itself in less than three years in power savings.

(Continued on page 4)



# Harris leads the way in transmitter engineering.

## Progressive Series Modulation.

Another First—Harris Progressive Series Modulator in the MW-1, 1kW solid-state AM transmitter is highly efficient, is DC coupled, has excellent transient response, and requires no modulation transformer, reactor or filter inductor.

## IF Modulation.

Introduced in Harris color television transmitters. Simplicity of IF MODULATION results in nearly perfect signal linearity for superb color fidelity.

## Pulse Duration Modulator.

This exclusive, Harris-designed AM modulation system is nearly 90% efficient! This means the Harris MW-50 and MW-5 offer less power consumption than any other 50kW or 5kW transmitter.

## Direct Carrier Frequency Modulation.

Harris was first with this FM design, where the oscillator operating at the transmitted frequency is modulated, thereby providing greater carrier stability and unsurpassed frequency response.

For complete information about any of these transmitter advancements, write Harris Corporation, Broadcast Products Division, Quincy, Illinois 62301.



**HARRIS**  
COMMUNICATIONS AND  
INFORMATION HANDLING

For More Details Circle (34) on Reply Card



compared to conventional tube models.

The RF amplifier has a peak capability of 4 kW. Although one would do for 1 kW out of the SS1000A, two are used in the conservative Sparta design. Audio modulating power of 650 Watts is provided by a low distortion amplifier of novel design.

Other features include instantaneous high/low power switching, digital metering, and simple on/off operation. There are no operator-required tuning controls!

For More Details Circle (127) on Reply Card

### **New Time Code Editing System**

During the NAB conference held in Chicago, CMX unveiled a totally new concept in SMPTE time code video editing.

The CMX 340X shifts the operational modes and edit functions away from the central control computer and delegates these activities to where they belong—an intelligent interface attached to each VTR or synchronous picture and sound source that is involved in the program assembly.

This novel concept is made possible through the use of the latest microprocessor LSI technology which was not readily available a few years ago. CMX has again advanced editing flexibility by pioneering this new approach to multiple machine control.

Watching a 340X system in operation, the qualified observer will immediately notice the lack of long searching or cueing sequences, the short precise pre-rolls and the utter flexibility of VTR assignment, switcher control and peripheral signal source integration. Up to 32 devices, each properly controlled through logic circuitry specifically designed for every individual type of TV hardware connected to the systems, can be interfaced with the 340X.

All of this is made possible by an optimum combination of a mini-computer and dedicated microprocessors that are controlled by the edit decisions fed into the system through a keyboard, a punched paper tape or other command medium.

For More Details Circle (128) on Reply Card



### **New Helical Recorder**

A unique new helical videotape recorder with an exclusive automatic-scan tracking system (AST) that can provide broadcast quality slow motion and still-frame playback has been introduced by **Ampex Corporation**.

The VPR-1 teleproduction recorder was designed for professional broadcast, CCTV, and post-production users.

The VPR-1 was demonstrated for the first time at the National Association of Broadcasters convention in Chicago.

Teamed with AST, the VPR-1 eliminates the problem of tracking and interchange, the classic shortcoming of all helical videotape recording.

With the optional Ampex AST accessory, the special scanner assembly provides fully automatic tracking, still-framing, 1/5 speed, and manual frame-by-frame "jogging" for simplified editing.

To achieve accurate video track-

ing, the AST system employs special video head assembly which can move in two planes. This technique allows the head to be electronically deflected over the actual video path during playback to automatically follow any deviation from the "ideal" path.

The sensitive AST system constantly adjusts to a tracking error or interchange problem during playback without causing any picture disturbance. The customary "noise bar" associated with high speed tracking operations has been entirely eliminated.

In the same manner, the VPR-1 with AST can also play back tapes which may have been improperly recorded and would otherwise be unrecoverable because of severe tracking errors.

In addition, the AST system provides full quality video synchronization. This feature allows the user to see a simultaneous production of a recording as it is being made.

For More Details Circle (129) on Reply Card

### **Solid State Audio Control**

**Ramko Research** has unveiled a unique audio control console line that has taken solid state into all functions, including the VU meters.

Behind the low profile front panel these units feature plug-in IC's, plug-in amplifier modules, patch panel gain select, and patch panel monitor and cue select.

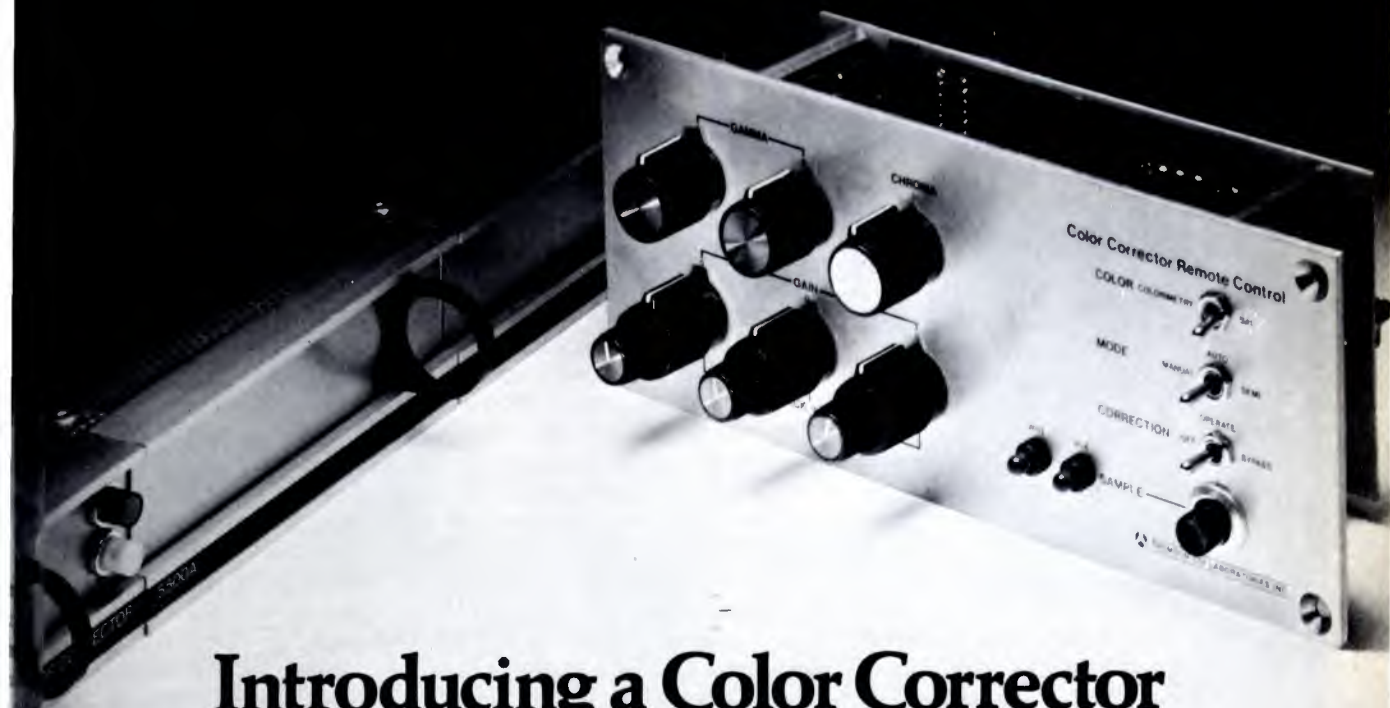
Unique to the front panel is their

illuminated touch pad audio switching. LED's tell you which a function is on. And if you're on the air with input #3 but would like to monitor input #1, that's no problem. On the air or not, the operator can always simultaneously cue input on this channel.

For More Details Circle (130) on Reply Card

(Continued on page 48)





## Introducing a Color Corrector for Electronic News Gathering.

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

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

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

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



**THOMSON-CSF LABORATORIES, INC.**

37 Brownhouse Road, Stamford, Connecticut 06902  
(203) 327-7700 / TWX (710) 474-3346

For More Details Circle (27) on Reply Card



# The Videotape Recorder Revolution

## PART 2

By Joe Roizen

In retrospect, all of the members of the small team that developed the Ampex VTR credit one individual for its eventual emergence. The accolade is not so much for his technical skills, which were considerable, as for his tenacity and purposeful single-mindedness in the face of every possible adversity that lack of time, money and technical precedent can impose. That man was Charles Pauson Ginsburg, a young obscure engineer who joined Ampex in late 1951, specifically to make pictures on tape and did so to the utter amazement of his peers in the rest of the industry.

For the group working on the project, the most stirring moment occurred in February of '56, and Ginsburg's own description of this event reflects the excitement experienced at that time.

"We gave a demonstration for what was originally supposed to be a very small management group, but turned out to be one attended

by 30 people. For all of us on the project, this was the most dramatic demonstration we were to make. The guests arrived; they were seated; a few words were spoken to the fact that we would show them what we had produced, and the machine was then put back in the playback mode and played back a program which we had recorded an hour earlier.

"The observers were quite intense as they watched the monitors. We then announced that we would record a sequence and immediately play it back. We recorded for about two minutes, rewound and stopped the tape and pushed the playback button. Completely silent up to this point, the entire group rose to its feet and shook the building with hand clapping and shouting.

"The two engineers who had done more fighting between themselves than the rest of the crew combined shook hands and slapped each other on the back with tears streaming down their faces.

"We had quite a few visitors during the next couple of weeks, including Bill Lodge of CBS, Frank

Marks of ABC and representatives of CBC and BBC. The visitors all sworn to absolute secrecy, they were ushered in and out separately so they would not see each other. As a result of Bill Lodge's visit, arrangements were made to use a demonstration model, a Mark IV machine which had not yet been built, as a surprise showing to the annual affiliates meeting which was to occur the day before the first opening of the NARTB convention."

With that goal now only a few months away, the work load of the group became almost unbearable. Demonstrations in house had to be held with crude looking consoles on partially filled racks. Management gently suggested that a VTR be packaged more attractively.

Anderson designed the Mark IV console with its compact mounting arrangement. After having returned from the Army, '55 developed the multivibrator modulator and other signal processing circuitry, including a minute head switching scheme.

## NAB Celebrates 20th Anniversary of the VTR

CBS News Correspondent Douglas Edwards was among those in attendance when the National Association of Broadcasters marked the 20th anniversary of videotape at a luncheon of television management and engineering executives at McCormick Place in Chicago, a major feature of the annual NAB Convention.

Among the 24 individuals honored with "Certificates of Appreciation" for their pioneering efforts in the development of videotape recording were four former CBS

Television Network executives: William B. Lodge, Vice President, Affiliate Relations and Engineering, retired; Howard A. Chinn, Director, General Engineering, retired; K. Blair Benson, former Staff Consultant, Advanced Technology; and Price E. Fish, retired, now contract engineer with the CBS Television Network Engineering and Development Department. They were also instrumental in arranging the first demonstration of videotape recording on April 14, 1956, at the CBS Television Network Affiliates Con-

ference in Chicago.

Douglas Edwards narrated a series of archival videotape demonstrations, which were displayed on monitors throughout the luncheon area. Edwards also received a special "Certificate of Appreciation."

Presiding at the luncheon were Robert D. Gordon, Vice President and General Manager, WCPTV, Cincinnati, representing television management, and John Bowman, Evening Star Stations, representing the engineers.



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



**CVS 520**  
High Performance  
"Super" TBC

**CVS 504B**  
The proven standard

**CVS 510**  
"Low Cost" digital TBC

The CVS 520 satisfies capabilities required by broadcasters. Standard segmented (Quads, IVC, etc.) and non-segmented (M-1, U-matic, etc.) video signals are time base corrected utilizing a 6 bit, 4 times subcarrier, PCM digital sampling technique. Specifications include:  
Signal-to-noise greater than 60 db  
Differential Phase less than 2°  
Differential gain less than 2%  
Standard Features include:  
Line-by-line velocity correction  
All color modes  
Automatic Direct/Heterodyne color switching  
Built-in Drop out compensator  
Built-in adjustable Proc-amp  
Video level meter  
Digital outputs on rear panel for future expansion capability  
Small size, low power requirements  
CVS 520 provides full flexibility with high quality performance necessary in any studio facility.

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

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



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

Specifications include:

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

Standard Features include:

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

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



**Consolidated Video Systems**  
3300 Edward Avenue  
Santa Clara, California 95050  
(408) 247-2050 Telex: 35-2028

Original and largest manufacturer of digital TBC's.

For More Details Circle (28) on Reply Card  
For Demonstration Only Circle (91) on Reply Card



*The inventors and the Vice President of Ampex surround a VRX-1000 which was about to be delivered. From left to right they are Phil Gundy, Shelby Henderson, Alex Maxey, Fred Pfof, Ray Dolby, Charles Ginsburg, and Charles Anderson.*



*Ray Dolby is shown here operating the VRX-1000 in the CBS suite in the Conrad Hilton in April, 1956. Dolby went on to form his own company which manufactures noise reduction systems.*

hide the transients in horizontal blanking. Even the administrative members of the group shed business suits in favor of jeans, work shirts and along with engineers spent their evening weekends making cable assemblies, modifying mounting brackets, wiring redesigned electronic u

The orphan of the system, which had been summarily neglected up to now was also proved to at least approach professional standards.

The super hero of this period Fred Pfof, who experimented heads up to the morning before departure for Chicago. Working about casting the system in concrete before he could optimize performance, he tried various structures, core structures, different numbers of core windings, spacing, guide setting, and core settings. All this while also buying new heads continuously. Altogether an unbelievable amount of during this hectic period.

After the NARTB success, men had to be built to meet the burgeoning orders, even while their work went on to achieve interchangeability, editing color. The first 16 hand-built called VRX1000's were shipped to users who had to save the time with any tape made on it if they wanted repeated replays.

### **Finally.... On The Air**

Television City in Los Angeles CBS' production and delay was the first to air a video recording on November 30, 1956, was the daily Douglas Edwards News Show that came from New York three hours earlier due to time zones across America. Confidence at CBS in these machines was not that high for a month, they ran a broadcast telecine in case of a breakdown. Headhunting was a major problem that caused picture for home viewers with receivers had horizontal AFC circuitry designed for fringe area recording. Viewer complaints instigated



program to alleviate this before CBS could make good threat to take the machines out of air.

Ampex engineers literally slept in the VTR room to have access to the machines during non-broadcast hours between one and five a.m. One go-around, when they thought they had things fixed, they were suddenly awakened by a self-declaratory telegram between CBS-Hollywood and New York headquarters which simply said, "The tapes are restless tonight". A lot of kerosene was literally burned to solve this problem.

ABC followed suit in early 1957, and ABC started delayed tape broadcasts at the beginning of day-evening time in April.

Television, being the highly communicative medium that it is, also tried to publicize videotape to its benefit. New developments which were quick and fast, as not only the reverse VTRs were updated or improved but new formats invaded a great variety of applications.

Regardless of the seeming simplicity and wide usage of video recording today, the fact remains that most of the latter day breakthroughs (with a few exceptions) are due to Ray Dolby's description of "best competent engineering".

To the five men who each brought their spark of intuitive insight to bear on a seemingly insurmountable barrier, then applied the pious toil and sweat needed to create the working model, goes the credit for opening up this field to the benefit of those who follow. The personal satisfaction that must be theirs is one that all members of this society can appreciate.

The inventors themselves often had visitors or technical meetings with humorous anecdotes about their early efforts which were tested and seemed to verify the inventors' opinion of the "lucky discovery" syndrome.

### Where Are They Now?

In successful teams eventually formed, and, of course, the VTR

group followed that pattern. Their present commonality is that they all still work in some engineering capacity closely related to video recording even though some of them are with different organizations.

Ginsburg and Anderson have remained with Ampex. Ginsburg is vice president of advanced research in video, a post which he has held for some time. He has received almost every honor the television industry and the professional societies can bestow, including the Sarnoff Medal, the Valdemar Poulsen Award, the Zworykin Medal, and many more.

Charles Anderson has had a variety of engineering management positions with Ampex and is now in charge of long range video product planning, a task he is eminently suited for in view of his background and present activities.

Anderson's major contribution to the television industry after being dubbed the "Father of FM Recording" have been mainly in his standardization work with the SMPTE and the IEC. He is past chairman of the SMPTE VTR standards committee, where he helped formalize the standards and recommended practices on quadruplex VTRs.

Alex Maxey took one of his own best ideas, segmented helical scanning, and left Ampex in the mid-sixties to build a separate organization around it. Westel, the new company, did not achieve any penetration of the broadcast field, but the unique characteristics of this segmented helical VTR made it ideal for high altitude reconnaissance or military applications. Maxey remained with his new company as vice president of engineering through two acquisitions, which changed the name to Echo Science and the ownership from Dictaphone to Arvin.

Fred Pfoest also left Ampex in the mid-fifties and went into private consulting work. His unique and highly specialized knowledge about video heads became a critical element in video projects other

companies were pursuing in Tape Recorder Alley (a euphemism for the area around Redwood City). He contributed significantly to the first slow/stop motion discs made by MVR and later by DMI. He assisted another group in setting up a video head refurbishing business which is now Videomax Corp.

Ray Dolby has perhaps fared the best in terms of fame and fortune, none of which is directly attributable to Ampex. He completed his university studies at Stanford while working part-time. His brilliant academic record garnered him a Marshall Scholarship which brought him to England, where he obtained his doctorate in Physics at Cambridge.

He developed a noise reduction scheme in electron microscopy and later did the same in the audio recording field. His patented and proprietary audio noise reduction system was quickly recognized as a boon to the tape recording industry and Dolby built a substantial enterprise which both manufactures and licenses his process.

### Acknowledgements

The compilation of this VTR history required more than the inputs of the original inventors since both the prior art and user experience helped to make a coherent story.

Prior art came from many sources, including: Dr. Peter Axon, Stoneplatt Industries; John Baldwin, IBA; Ted Barger, Echo Science; Blair Benson, Goldmark Communications; Peter Blaxtan, Rank Cintel; Yves Faroudja, Yves Faroudja Inc.; Jerry Grever, RCA; Hans Groll and Von Flegel Farnholz, Fernseh GmbH; and James Redmond, BBC.

References were made to: RCA Review, circa '54 and '56 Library; BBC Engineering 52, 72 E. Pauley; Handbuch des Bildtelegraphie, Dr. F. Schroeter 1932; Marzocci Patent, 1948; Ginsburg et al. Patent, 1960; Schueller Patent, 1953; Wireless World 75 Years of Magnetic Recording; and SMPTE Journals, 58-60. □



## What To Do Until The Doctor Comes

A continuing series/By Peter Burk, WQUA, Moline, Illinois

Intermittent problems in the transmitter control circuits can drive an engineer up the wall. Here's a sure-fire method for tracking these gremlins down, using a relay to "memorize" what happened when you weren't there (Figure 1).

If the transmitter starts popping off the air sporadically, put a test relay across the control circuit at some convenient point. Latch it closed with the reset button. The next time the failure occurs, turn the transmitter back on, then check the test relay at your convenience. If it's still closed, the intermittent is past the point where the test relay is installed. You can now reconnect the relay downstream from the original point, until you've isolated the intermittent component.

You can use a variation of this scheme to detect momentary power failures at a remote transmitter,

too. Use a spare position on your remote control system to remote the indication back to the studio and also provide a remote reset (Figure 2). Any time the transmitter drops, you can dial up the remote indication and quickly determine whether the power was momentarily dropped at the shack or whether the transmitter itself was at fault.

Okay, we have the transmitter on a proper diet, getting plenty of fresh air, and frequent check-ups, and we know how to diagnose at least most of its ailments. The only problem is, what happens when we don't have a spare for the component that's failed? Nine times out of ten, there's a way to get the transmitter back on the air at least temporarily, before we even call the manufacturer for emergency parts service. This is where we get a chance to practice our emergency room technique.

Let's take a look at some of the catastrophic failures that can occur and see what we can do. Transformers, being expensive and bulky, are not normally a part of the station's replacement parts inventory. However, in almost every instance, you probably have something that will do in an emergency right at your fingertips.

Most engineers live in constant fear of losing a plate transformer. It's fact that the transmitter won't operate without one, but there's still no need to panic. If you're lucky, one of several taps has opened, leaving the rest of the winding intact. You may be able to short across the bad winding and continue operating. If not, you'll have to replace the transformer, but not necessarily with an exact duplicate. Most local power companies will be happy to help you out of a tight spot by loaning you a couple of "pole pigs" which can be connected temporarily in reverse to provide you with plenty of B-plus.

If it's the filament transformer for the finals that goes up in

smoke, an automotive storage battery will do nicely in many cases but only for a short stint.

Although a similar scheme can be used for rectifier filament transformers, it's probably quicker stringing together a handful of capacitors eliminating the need for a filament transformer altogether.

Screen and bias transformers often be replaced with TV transformers from the junk bin if you don't come up with exact voltage you're looking for, a filament transformer wired in buck or boost configuration on the primary (Figure 3).

Filter chokes will occasionally short to the case. The choke is usable if you just insulate them from ground. A couple of shorts by fours will work fine. I've used a stack of old operating tubes when nothing else was available. Don't forget that the case of the transformer will be at B-plus potential!

If the first choke in a power input filter shorts, you'll see a dramatic increase in B-plus. If you have no spare on hand, you can bypass the first capacitor and return the choke input filter to obtain proper voltage. Several transmitters employ transient suppressors across the filter chokes. What appears to be a shorted choke might be a suppression device external to the choke. Just lift the end of the suppression device and you're back to normal.

If your transmitter uses state rectifiers, they are much more prone to line-transient induced failure. However, you can lose three of the six sections on a phase supply and still keep the transmitter running at approximately fifty percent normal voltage. Do this by temporarily connecting three good rectifiers in half wave configuration as shown in Figure 4.

Filter capacitors in the power supply can frequently be eliminated completely for emergency ru

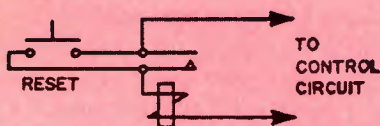


Figure 1

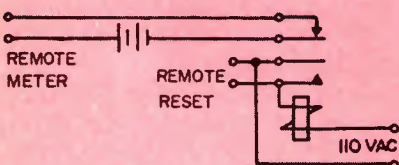


Figure 2

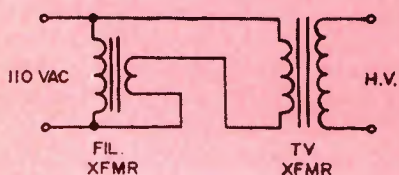


Figure 3



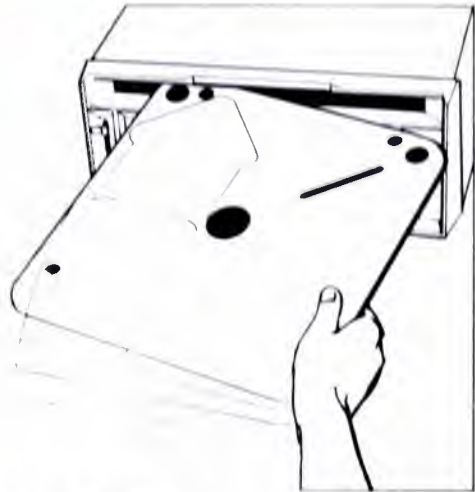
Here's a broadcast color Frame-Star™ that electronically stores 400 slides---200 on-line--- at a total cost of \$13,250. Need 3200 slides? Just add 7 DISCASSETTE™ records for \$525. Total system cost: \$13,775.

---talk about your dollars and sense!

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

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

There's a lot more we could say—like: We're producing, we're delivering. We have detailed technical information. We'll store our system under an airplane seat and give you a "live" demo. Just ask.



**ARVIN ECHO™**

an ARVIN SYSTEMS, INC. company  
485 E. Middlefield Road, Mt. View, California 94043  
Telephone: (415) 961-7145 TWX: 910-379-6499



For More Details Circle (29) on Reply Card



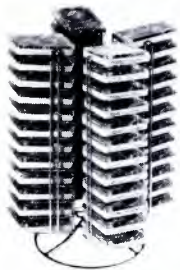
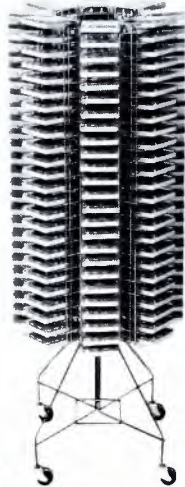
# FIDELIPAC®

## ACCESSORIES & CARTRIDGES

### CART-A-ROUND CARTRIDGE STORAGE RACKS

Each WR-25 Modular Rack holds 25 Type A Cartridges . . . eight can be mounted on our Mobile Carousel Base to make up the MR-200.

WR-25 \$15.00  
MR-200 \$145.95



### TABLE TOP CARTRIDGE RACK

Model TR-96 holds 96 Type A cartridges.  
Model TR-48 holds 48.  
TR-96 \$73.85  
TR-48 \$38.55



### STUDIO ON AIR LIGHT

brilliant red lettering on jet black background can be seen even in the brightest ambient light conditions. \$29.95



### CART-E-RASE DEMAGNETIZER

can be used for erasing cartridges, reel-to-reel tape, film sound stripping, etc. \$34.50



### ALIGNMENT PROBLEM?

Keep your cart equipment in perfect working order with:

- 350 STA Alignment Cartridge \$38.50
- 350 STF Wow and Flutter Cartridge \$24.50
- 350 STQ Cue Test Cartridge \$35.00
- Head Insertion Gage \$3.35
- Height Gage \$14.95
- Right Angle Zenith Gage \$21.75

Contact your Fidelipac Distributor or



# FIDELIPAC®

109 Gaither Drive - Mt. Laurel, NJ 08057  
(609) 235-3511

® Trademark

Of course the AM noise will increase, but at least you're on the air.

### Let's Get Some Modulation

Modulation iron has many engineers running scared. Actually, an AM transmitter can be modulated with practically nothing. Let's take each component separately and see what we can do to make the transmitter work. These circuits are from Harris Corporation's "Pride in Service" publication and really ought to be kept handy.

An open in the modulation transformer secondary is not really at all catastrophic. Disconnect the secondary entirely and connect the modulation capacitor between one side of the primary of the modulation transformer and the wire going to the P.A. plate circuit (Figure 5B).

If the modulation reactor opens or shorts, you'll have to drop back to one quarter power, but that's better than zero power. Remove the bad reactor and the modulation capacitor and strap the bottom of the transformer back to B-plus (Figure 5C).

A short or open in the primary of the modulation transformer makes the transformer completely useless, but the transmitter can still be made to modulate by connecting the circuit shown in Figure 5D.

If you'll have to run without the transformer for an extended period of time, parallel the two tubes and increase bias to achieve Class A operation.

### Look Out Below!

We've covered most of the major

components in the transmitter what about the antenna system?

One of the ironic things about tower collapsing is that it's brought about by the very nasty weather that increase public service responsibility station. If the winds are sixty an hour, temperature below and power lines are on the everywhere, your station **needs** to be on the air. So we do if the tower comes down?

Let's talk about AM first. Almost any length of wire can be made to radiate at least something. A coil of wire doesn't take up much shelf space, so why not a couple hundred feet handy case? You can run it out of a window, over to any convenient support, and load the transmitter into it the best you can.

You won't be able to radiate power with it, but you'll be able to serve the majority of the people in your area quite effectively. You might even want to build a simple antenna tuner out of box parts, just to have on hand.

What about FM? The importance of keeping an FM on the air is greater than it used to be. There's no reason for an FM station to fail to keep us down for long if the tower is still standing, but if the antenna or transmission line is damaged beyond use, you can run some RG/8 up the tower and use it into an improvised dipole. You won't win any DX contests, but if it's matched correctly, you can be able to run close to a thousand watts that way. Consult an antenna handbook for construction

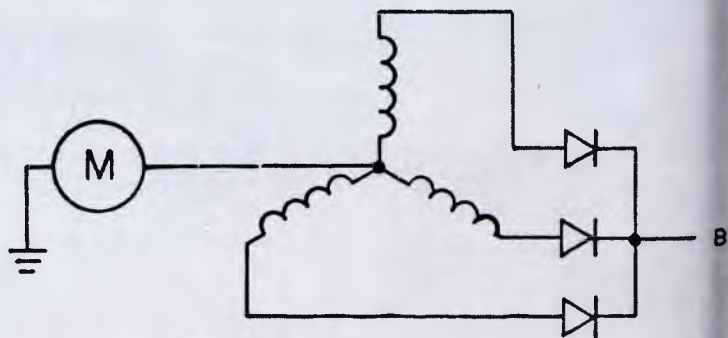
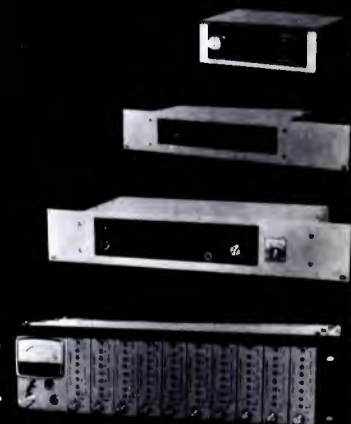


Figure 4



## Audio Distribution...



...made easy!

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

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

Call collect or write today!

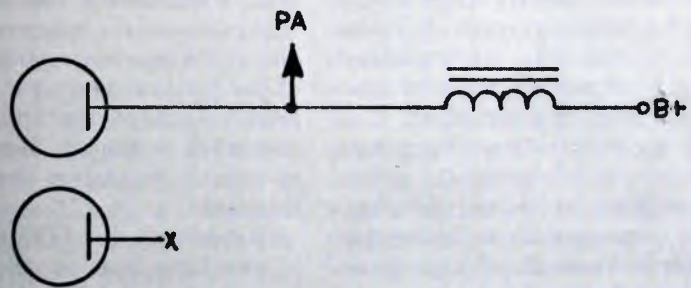
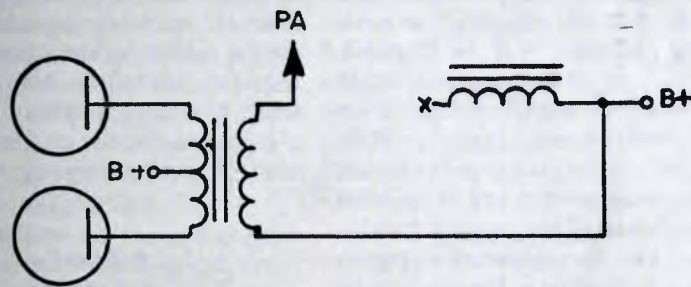
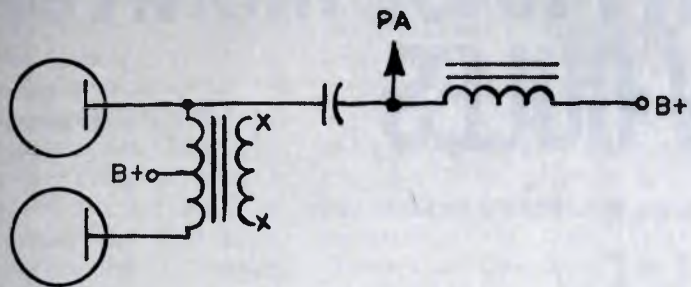
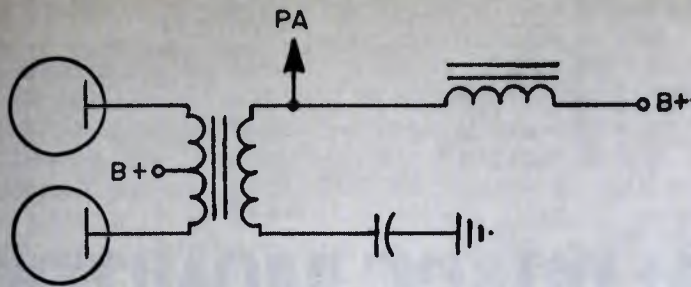
### Models & Prices

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

## RAMKO RESEARCH

3516 C LaGrande Blvd.  
Sacramento, California 98523  
Telephone (916) 392-2100

For More Details Circle (31) on Reply Card



matching details.  
All you can get on the air is the  
exciter, feed it directly into the  
antenna. Even ten watts can do a  
lot if the transmitter is out in the  
country, and the tower has assumed  
a prone position, it might be  
easier to take the exciter back to  
the shop and put up a temporary  
one.  
The point of all this is to  
administer first aid first, before you  
call the doctor. Do whatever you  
can to get some sort of signal on  
the air, then work out a permanent

**solution.** Watch physical fitness, diagnose and correct small problems before they become large, and prepare yourself for emergencies. Perhaps the doctor won't need to make that house call after all.

I'd like to thank the following people for providing much of the information presented here in these early parts of this continuing series: J. S. Sellmeyer, Collins Radio; J. Fred Riley, Harris Corporation; and William Shibley, RCA. A special thanks to Eldon Kanago for leading the way.

# AN UPDATE ON PHASE MONITORS AND THE NEW RULES

By Robert Jones, Broadcast Consultant, La Grange, Ill., and BE's Facilities Editor

Prophetically, in the July 1973 issue of **Broadcast Engineering** we promised that if and when the FCC concluded their studies in Docket 19692, B/E would keep you informed.

These new Rules formulate specific standards for phase sampling systems, and the FCC believes they represent a reasonable consensus of all parties. The comments submitted were from parties having formidable expertise in all technical areas concerned.

In this proceeding the FCC undertook to determine what constitutes the basic elements of an **adequate** sampling system, and to promulgate minimum standards for its design and construction. Thirty-one timely comments and three reply comments were filed. Nearly one half of the total comments filed were by consulting engineers, practicing before the FCC. As the FCC pointed out, the combined experience of all these men can only be described as vast. Most thought the FCC efforts in this matter were necessary and laudable. In furtherance of those objectives, they have supplied a wealth of technical material pertinent to sampling system construction, operation and maintenance.

Many parties agree that meeting the new rules will impose little hardship on new stations, or on stations applying for major changes. There was concern with the expense for existing stations, whose sampling systems fail to meet the new

standards the FCC adopted. In reply to this fear, the FCC says (1) existing stations will be "grandfathered," or (2) that stations which have systems who comply, or so modify their existing system, will be tied to a relaxation of certain existing monitoring and inspection requirements. This would provide an incentive for voluntary improvement of individual systems.

It is interesting to note that the FCC adopted new regulations at a time when they are making major efforts to simplify the broadcast regulatory structure. This is certainly a philosophical conflict.

Only the NAB offered the opinion that "there is no general problem with existing sampling systems." The FCC noted that, in connection with license renewals of a considerable percentage of stations using directional antennas, the FCC has occasion to question antenna performance and to require corrective action. It is reasonable to believe that this has been a not inconsiderable contribution to their difficulties.

Many existing sampling systems evidently were installed without proper attention being given to techniques which contribute to the stability of the system, and which will minimize environmental effects. In many cases it may be likely that licensees' interest in minimizing costs, rather than aiming to maximizing long term performance, may have exerted a predominant influence on the system design. The

opinion of most engineers as to need for adequate sampling system design is that, in the absence of required standards for such systems, cost may continue to remain a major factor for determining kind of system installed.

## A Flimsy Extension

The FCC contrasted the built transmission system used to feed power to the antenna, with almost flimsy construction of the systems used to monitor performance of the antenna; and concluded thereupon that they should extend regulatory control in this area.

Accordingly, the FCC stated it was their aim to adopt broadly drawn rules. In addition the FCC went into considerable more detail and into other related aspects of sampling system design. It was their hope that this effort would serve to establish requirements for such systems well as to provide such guidance may be desirable in the detail system installation. The required constructional features should be only those reasonably necessary to promote stability and repeatability in the antenna monitoring system and thus its ability to record accurately deviations from licensed operating parameters. Certain properly constructed systems deteriorates much more slowly, and one of poor design. Thus those



onal details which contribute to long term stability are of primary importance.

Electrical deterioration may occur and may not be discovered in the course of inspection most engineers would not make. In some cases a review of a given station's logs may reveal that the performance of its directional antenna is not satisfactory, and the reasons for its departure from proper adjustment may not be apparent. Excessive phase or current errors may not reflect in abnormal antenna point readings, but do reflect or indicate trouble in the antenna monitoring system. Of course antenna monitoring points can have their own vagaries. Thus all station antenna errors must rely on both antenna monitoring and field monitoring for a reasonably complete picture of directional operation. It is reasonable to expect that the antenna monitoring system should be installed that it can be relied upon to give accurate data to the antenna monitor.

### **Design And Installation**

The FCC went on to discuss four basic areas that need to be considered and to draw conclusions from these four areas. One is **Sampling Lines**. The devices which divert the sample currents from the antenna tower of the array to the antenna monitor. The second area is **Coupling Elements**. This is the apparatus used to extract samples of the tower currents to be fed into the sampling lines. The third area is **Maintenance of Sampling Systems**. Here the FCC talks about the measurement procedures used to detect any deterioration in systems performance. And the fourth area is what is called **Other Considerations**. This is a catch-all of the less important items to be considered sufficiently important to record for general reference, but not important for inclusion in rather broadly drawn

### **Sampling Lines**

A point on which there was not entire agreement (this writer is not in accord) is that sampling lines should have a solid outer conductor. And that braided or foil shielded lines afford insufficient protection against unwanted fields. Braided lines are subject to

moisture contamination, and thus may represent the weakest link in many older sampling systems.

There was also almost unanimity as to the necessity for all lines in the system having identical physical and electrical characteristics. The FCC has decided to make exceptions where it may be necessary to use more flexible cable between sampling line end terminations and the antenna monitor.

The FCC found, as most of us already knew, that when the ambient temperature of a coaxial cable is raised, the metal expands, resulting in an increase in the phase delay of a cable. A temperature change will also affect the dielectric constant in the cable, resulting in a negative phase shift. To some degree, these two effects cancel. If a solid dielectric is employed, the latter effect is pre-dominant. If the lines are reasonably long, there will be a rather large negative phase change with temperature. If the inside dielectric is air or gas, it will exhibit a much lower coefficient. This is generally in the positive direction. Foam dielectric, while not as good as air, is superior to most cables having solid dielectric.

Since the phase of the R.F. signal presented to the antenna monitor is delayed by its passage through the sampling lines, and since the sampling lines can vary due to temperature, it is obvious this will result in an error in the monitor indication. But if all the sampling lines to all the towers are of equal length, and exposed to the same temperature conditions, the errors will cancel. This is because we are concerned with only the **relative** phase between the towers. Any changes in the electrical lengths of all lines will leave the relative phase indications unchanged.

The FCC notes that the employment of equal length lines insures that temperature changes will have the least effect on stability. Further they note that this expedient is quite expensive, since in many cases it necessitates the addition of hundreds of feet of sampling line to achieve this end. It is interesting that the FCC is cost conscious here, but not cost conscious between RG type cables and solid cables.

Equal length lines offer another advantage. That is, that the antenna monitor will more closely

reflect the true relative phases of the fields actually existing in the various elements of any given array. This simplifies the initial adjustment of an array, plus any subsequent adjustments. In many cases this advantage may be sufficient to justify the extra expense of equal length lines. Most consulting engineers, including this writer, regularly install lines of uniform length for systems they design. In cases where it is the consultant's goal to produce, at the antenna monitor, the specific phase relationship existing in the array, this degree of precision is desirable.

The FCC does offer an option to use equal length sampling lines. This is to use lines that have no greater than a 0.5° temperature shift. The logic behind this limit is that most antenna monitors have a  $\pm 1.0^\circ$  tolerance, and if the station's license (as most do) requires  $\pm 3^\circ$  limits; then a 0.5° error would maintain the system within FCC limits. A reasonable basis for determining the tolerable differences in cable lengths is to ascertain the temperature variation to which the line would be subjected on a diurnal and on a seasonal basis. Then compute the difference between the longest and the shortest sampling lines required, based upon a temperature/phase differential, such that this maximum will not exceed 0.5 degrees of phase. Keep in mind that this phase shift with temperature is affected not only by the physical lengths of the lines involved but also by your operating frequency.

Many engineers prefer foam polyethylene dielectric type cables. They generally last longer and have fewer maintenance problems. They are satisfactory even in critical arrays, if practical measures are taken to minimize phase temperature stability.

### **Phase Stabilized Lines**

**Phase stabilized** lines are coaxial cables which on being ordered by a customer, are heat cycled by the manufacturer to reduce semi-permanent stresses. This type of cable will initially have a much lower phase temperature coefficient than line not so treated. The FCC concluded that this extra degree of perfection (and expense) is not



# system construction made easier with ROH

Model 212  
1X6DA with  
transformer outputs

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

Model 224  
Dual channel  
microphone pre-amplifier

Model 225  
Dual channel  
line amplifier  
+30 DBM

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

Power Supplies  
Rack mount  
Models 207, 208, 209



**ROH CORPORATION**  
107 Technology Park  
Norcross, GA 30071

For More Details Circle (32) on Reply Card

needed when one employs lines of equal length. But if a system has **greatly** different cable lengths, the possibility exists that as lines "settle in", the phase indications may drift from those of the initial adjustment. In those cases, phase stabilized cables should be required. An acceptable alternative to phase stabilized cable would be **Phase-Compensated** line.

It is apparent that if the sampling cables between each tower base and the transmitter building are buried, not only are these portions of the system subject to less extremes in temperature, but are better shielded from troublesome ambient fields, better protected from damage, and of course less subject to deterioration from weather. Buried lines should be jacketed. However, soil conditions in some areas, or other factors, may make it impossible or undesirable to bury. In such cases it is desirable to run cables above ground between the tower and the transmitter house. When this is done, adequate support and protection of the cable is necessary. In addition, to avoid the build-up of troublesome R.F. currents in the outer conductors, the cable must be tied to the station ground system at periodic intervals through-out its horizontal run.

## Coupling Systems

The majority of those filing suggested the use of a single turn, unshielded loop as the best coupling element. Such a loop should be rigidly constructed, and mounted on the tower at a point near the current maximum, but in no case closer than 10 feet above ground level.

The other type of loops commonly used is the shielded type. In this loop the shield is used to impart rigidity and to enclose the conductor. The shielded loop has a theoretical advantage by virtue of the fact that coupling to the tower field takes place only electromagnetically. The advantage, the FCC says, is generally held to be of no practical significance. The FCC says this is also outweighed by the fact that shielded loops can accumulate internal moisture, which results in a deterioration of performance.

Some thoughts were expressed

that if rotatable loops are omitted, in the course of time will be rotated, either inadvertently by high winds, by workmen on towers, or possibly by **misg** operators seeking to adjust monitor readings within their license.

While the majority of the engineers believe that the orientation of the loop with respect to tower should be rigidly fixed, suggested that the plane of the in all cases include the vertical center line of the tower, is restrictive. An alternative orientation with the plane of the including a tower face, should be permitted.

The FCC originally proposed all loops be of equal size and shape. Many engineers believe such a requirement leaves too little flexibility for adjusting the degree of coupling to each tower section. Sample voltages delivered at the terminations will be within a range of values which the antenna tower can accept. Thus, while the FCC believes that the loops should be of the same general construction, they will not preclude adjustments of the effective size of individual loops as may be necessary to establish proper coupling levels.

There were many who held that base sampling, usually with a shielded current transformer, is an acceptable alternative for towers of limited height. The advantages of base sampling are that the element may be enclosed in the transmitter house, protected from the weather from air contamination, and from rain or moisture; which may improve the short or long term performance of an exposed coupling loop. By having the coupling unit at the base, it is readily available for testing and maintenance.

Some parties noted that base sampling more closely "tracks" with the actual tower current. The importance of adequate shielding of such transformers is emphasized, particularly the need for an electromagnetic static shield between the antenna feed line and the transformer secondary.

Those who favor tower base sampling point out that a sample taken at or near the point where the tower current can be expected to be the greatest, will show a



# YOU ASKED FOR IT. AND HERE IT IS.

Announcing the first **COMPLETE FM Proof of Performance Manual** ever offered.

Everything you need to comply with the FCC's annual FM Proof-of-Performance test. Every procedure, every detail is spelled out *step by step* in simple, concise language—all reviewed by the FCC. You save time, money, headaches—and the frustration of doing it right the first time.

Broadcast Engineering's FM Proof-of-Performance Manual includes *all* the logging forms for pulling *both* mono and stereo proofs. A complete glossary on FCC Rules. Dozens of helpful troubleshooting tips and time-saving measurement and logging techniques. Detailed procedures on how to *pre-test* the equipment before pulling the Proof. And more.

**The FM Proof Manual shows you**

- how to prepare the test equipment
- how to connect the test equipment
- an efficient method of measurement and
- how to check at the performance requirements
- how to use the data summary sheet and
- how to use the graphs
- how to comply fully with FCC rules and standards
- and more...you get individual *replaceable* forms for completing the equipment performance tests.

**Everything is in one package. And all for \$6.95**



Use this coupon to make your life easier!

## SPECIAL OFFER!

Order Both Manuals AND SAVE!



ONLY **\$12** for both!

Over 1,000 AM Manuals now in use

Volume discounts available on request.

## BROADCAST engineering®

1014 Wyandotte St., Kansas City, Mo. 64105

- Please send me \_\_\_\_\_ copies of the FM Proof-of-Performance Manual @ \$6.95 each
- Please send me \_\_\_\_\_ copies of the AM Proof-of-Performance Manual @ \$6.95 each
- Please send me \_\_\_\_\_ sets of the FM and AM Proof-of-Performance Manuals @ \$12 for BOTH.

My check or money order is enclosed

Please bill me

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ ZIP \_\_\_\_\_

NOTE: Broadcast Engineering pays the postage on all orders!



accurate reflection of the relative magnitude and phase of the field radiated by the tower than will a sample taken from the current in the antenna feed line at the tower base. The later sample can contain a reactive component representing current flow through the antenna capacitance to ground. The magnitude of this reactive current can be affected by ground moisture, height of weeds, and other variables. Towers of uniform cross section, up to one-quarter wavelength in height, usually have antenna base resistances that are sufficiently low, and shunt reactance that is sufficiently high, so that the error in the base is usually small. Self-supporting towers of any height would not be desirable, since they have lower shunt reactance. That this effect is real is illustrated by the difficulty frequently experienced in maintaining adequate correspondence between base and loop ratios in arrays having one or more tall towers.

Assuming reasonable precautions are taken, the FCC has determined that base sampling is an acceptable alternative to tower sampling for uniform cross sectional towers up to  $110^\circ$  in electrical height.

If one uses a single turn, unshielded loop, it may be operated either at tower potential or at ground potential. When operated at tower potential, the inner leg of the loop should be electrically bonded to the tower. The cable which descends from this type of loop should also be at tower potential, and should be bonded to the tower leg at frequent intervals, including the point at which the sampling cables leaves the tower. In order to transfer to ground, an isolation coil, consisting of many turns of sampling cable, wound on a cylindrical form, must be used. This coil should have sufficient inductance alone at the operating frequency, to present a high reactance. If it doesn't it should be tuned to resonance by use of a suitable capacitor.

If one uses a grounded loop, it should be installed on insulators, with the sampling cable so mounted. With an insulated loop, there is no need for an isolation coil. This type of installation is usually less expensive and more trouble free.

The FCC has concluded that the insulated loop is acceptable for all

towers up to  $130^\circ$  of electrical height. But for those using taller towers, all sampling loops must be installed to operate at tower potential.

### **Maintenance Of Sampling System Performance**

The FCC had asked for suggestions as to a measurement procedure which might be prescribed to determine whether the electrical performance of a given sampling system remains at a satisfactory level. Their hope was that this could be a comparative type of measurement. The advantage of such a procedure is that it could show any deterioration in the monitoring system performance.

Most consultants presently conduct more or less elaborate tests of sampling systems. These include not only simple DC resistance tests, but also R.F. impedance measurements at selected frequencies. The FCC concluded that since complicated equipment is required to conduct R.F. impedance measurements, it is not practical for the average station to perform these tests on a yearly basis. For this reason the FCC did not adopt rules which would require such measurements to be made.

### **Other Considerations**

The FCC suggests that loops be mounted on the tower at a point well removed from lighting conduits. Also they suggest the cable be brought down the tower inside one leg, for mechanical protection. This they suggest even in the case of insulated loops. The cable should be supported at sufficiently close intervals to provide substantial lateral restraint from "whipping" or displacement.

Also, where feasible, the sampling cables should be in a single length (without splices). Short lengths of more flexible cables (i.e. RG/U types) can be used to connect the sampling line to the monitor.

If isolation coils are used, they should be constructed of the same kind of cable which is used to make up the sampling lines. The coil form upon which this is wound should provide rigid support to the coil.

Where a sampling cable is to be buried, it is desirable to tie the

outer conductor to the ground system at the tower again at its termination with transmitter building.

### **Summary And Conclusions**

These new rules went into effect on March 18, 1976. They apply only to new stations authorized after that date, or to stations authorized to make major changes after that date. In the case of existing stations, they will be "grandfathered." But in instances where a particular station's monitoring system is patently inadequate or where its directional antenna exhibits instabilities in its operation, which may be attributable whole or in part to inadequate the sampling system, they will be required to meet these new rules.

As an incentive to all stations who do not now meet these new requirements, the FCC will now exempt stations (who comply) to be exempt from compliance with existing rules requiring the periodic reading and logging of base currents. The necessity of reading base currents should be retained for test purposes. This means that you have to have your base current meters at the tower but you never have to read them.

The FCC as a further incentive will permit stations who have installed these new more accurate monitoring systems to read and log their monitor points. The new Rule 1.1311 prescribes a schedule of no more than once per month for such readings.

I appreciate the FCC's thoughtfulness in providing these incentives to broadcast licensees who have installed sampling systems. This saving of time and expense on the part of the licensee to read and log base currents and monitor points, will, with the arrays, completely pay for the installation of new loops and sampling cables in a year's time. Certainly the elimination of "logging" requirements is a step forward in the FCC's efforts to deregulate.

For those readers interested in a complete copy of the new Rules, as well as the procedure to be followed in installing or repairing a sampling system, these will be printed in the new 1976 Edition, Volume III.



# audiopak<sup>®</sup>

BROADCAST CARTRIDGE

# A-2

BY CAPITOL<sup>®</sup>



## Think of it as a car.

Because, in a sense, it is like a car. All of the major components are assembled to get you from point A to point B. With efficiency and precision. For example, the constant force, foam pressure pad assures unvarying contact to tape contact over the life of the cartridge. The selective, non-slip brake mechanism locks the tape, rather than the hub, assuring accurate cueing and timing. And, to assure you of premium performance, each unit is individually tested—100%—for wow and flutter,

electrical output, tension, and other properties. And because we manufacture the entire package—from tape to packaging—we can assure you of the highest possible quality control.

The Audiopak A-2 by Capitol Broadcast Cartridge. The car you drive probably *isn't* as reliable as the A-2.

AUDIOPAK<sup>®</sup> A PROFESSIONAL PRODUCT MANUFACTURED BY THE SAME PEOPLE THAT MAKE AUDIOTAPE<sup>®</sup>, AUDIOFILM<sup>™</sup>, AUDIODISCS<sup>®</sup> AND THE LEARNING TAPE<sup>™</sup> BY CAPITOL<sup>®</sup>.

# audiopak<sup>™</sup>

BY CAPITOL



CAPITOL MAGNETIC PRODUCTS

For More Details Circle (33) on Reply Card

[www.americanradiohistory.com](http://www.americanradiohistory.com)





# UHF-TV TRANSMITTING ANTENNA PROVIDES CUSTOM-OPTIMIZED RADIATION PATTERNS

The Andrew custom-designed slotted array transmitting antenna is a new concept for UHF television broadcasting. Now it is economically feasible to optimize both azimuth and elevation radiation patterns for any given service area.

Elevation patterns are shaped by controlling the phase and amplitude of energy distributed to each slot of the array. As there are typically 20 to 40 slots, very fine control is maintained over the aperture distribution, permitting null-free pattern performance. The cosecant squared pattern, which provides relatively uniform signal strength to both near and distant locations, is very closely approximated (see graph).

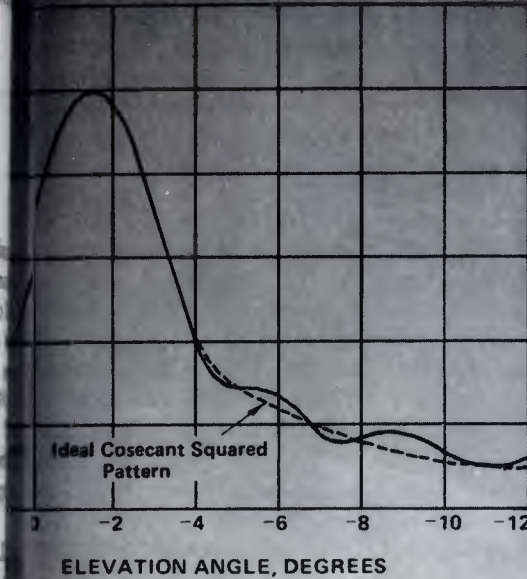
An unlimited number of azimuth patterns are available. Each pattern is custom-optimized for the service area.

Other advantages include:

- High power capability: 55 – 110 kW CW, depending on requirements.
- Pressurizable radome eliminates problems caused by corrosion and ice formation. Powered radome heaters are not required.
- Antenna weight is only 1/4 to 1/3 that of other antenna types for the same gain.
- Cylindrical shape minimizes wind loading on tower.

For further information, contact your Andrew Sales Engineer.

IDEAL ELEVATION PATTERN FOR 15.0 dBd CARDIOID OR 12.0 dBd OMNI



ANDREW CORPORATION 10500 W. 153rd St., Orland Park, IL., U.S.A. 60462 Telephone: (312) 349-3300

ANDREW ANTENNA COMPANY LTD. 606 Beech St., Whitby, Ontario, Canada L1N 5S2 Tel: (416) 668-3348

ANDREW ANTENNA SYSTEMS Lochgelly, Fife, Great Britain KY5 9HG Telephone: (0592) 780561

ANDREW ANTENNAS 171 Henty St., Reservoir, Victoria, Australia 3073 Telephone: (03) 460.1544

ANDREW ANTENNAS LIMITADA Av. Brigadeiro Faria Lima, 830s/64 Caixa Postal 22.252, 01452 São Paulo, Brasil Tels: 210-2808, 211-513



For More Details Circle (35) on Reply Card

[www.americanradiohistory.com](http://www.americanradiohistory.com)



To sum up Figure 1, Zener voltage rating equals lower voltage limit minus the LED cutoff voltage (1.8-2V.). Series R equals maximum operating voltage minus lower limit voltage divided by desired LED current (6-10 ma.).

### Current Indicator

The second "trick" is to use the LED as, in effect, a **current** indicator rather than a voltage indicator. This is useful, for instance, where you have a piece of gear that uses a primary power supply and a back-up secondary supply. While the usual case is an A.C. primary supply and a battery secondary supply, each may be of either type. It is helpful to the operator to know from which supply he is working. If you combine the LED and dropping resistor with a suitable transistor, as in Figure 2, you'll have indicators showing when current is actually being drawn from which supply, not merely when a supply is turned on. And here again, at the minimum "wasted" current drain possible.

Figure 2A shows the arrangement for connecting two Common Negative supplies, requiring two PNP transistors. Figure 2B shows that for two Common Positive supplies using NPN transistors. Either circuit's operation is simple: When the higher voltage primary supply is on, its transistor's Emitter-Base junction is forward-biased and turns on. The Collector current then lights the LED, with the series resistor R, again chosen to limit saturation current to the desired level (6 to 10 ma. being optimum for most applications).

With primary supply on, secondary supply is turned off. The voltage at the load will be the primary supply minus the EB junction drop of .6V. for silicon, or .2V. for germanium. If the secondary supply is lower than the primary by more than that amount (say 1V. for silicon transistors), the secondary transistor is reverse biased, and thus turned off, by the supplies' differential less the junction drop. Of course, when the primary supply fails, or just de-

creases output sufficiently as case of batteries, the second transistor becomes forward and the secondary supply over. The primary LED goes out and the secondary LED turns on to indicate the changeover.

### Handling The Load

You've noted that the full current drawn must pass through the Emitter-Base junction in some cases. You may be skeptical, thinking that junction is too delicate to handle the current. But in developing the circuit, I've used a 2N3906 for the "A" circuit, a 2N3903 or 2N3904 for the "B" circuit, at a constant load of 200 ma. through the junction with no overheating. In fact I've passed up to 500 ma. through their EB junctions to five minutes and, while they were awful hot, they weren't destroyed. So you can use any transistor with sufficient Beta so long as the current does not exceed the manufacturer's maximum continuous

## Orban/Parasound solves the Stereo Tape Cartridge Dilemma

Just use one track of your existing stereo cart machines — or, ideally, mono machines. Then, add the Orban/Parasound Stereo Synthesizer to the output bus of your bank of cart players.

The result is a highly seductive pseudo-stereophonic effect for stereo listeners. And listeners with mono receivers receive perfect reproduction of the original mono tracks — without any phase cancellation or quality loss.

You can also use the Stereo Synthesizer for converting announce mikes, mono discs, and mono agency spots to pseudo-stereo. Try it to generate a stereo effect from your mono remotes or network feeds. The results will delight your listeners!

At \$299, the Orban/Parasound Stereo Synthesizer pays for itself in reduced cart machine maintenance and in increased sponsor satisfaction with the air quality of his spots.

We also make a proven Spring Reverb with an excellent reputation for quality and reliability. Also, our Parametric Equalizer combines reasonable cost with unprecedented versatility for production work, line and remote equalization, "air-sound" frequency contouring, and dozens of other applications. And our Dynamic Sibilance Controller lets you equalize your announce mike and production work for stand-out impact without excessive "ess" sounds.

Four rather interesting products from Orban/Parasound — the price/performance leader. For further information, contact:

**orban/parasound**

680 Beach Street, San Francisco, CA 94109. (415) 776-2808  
or your local Orban/Parasound professional products distributor.

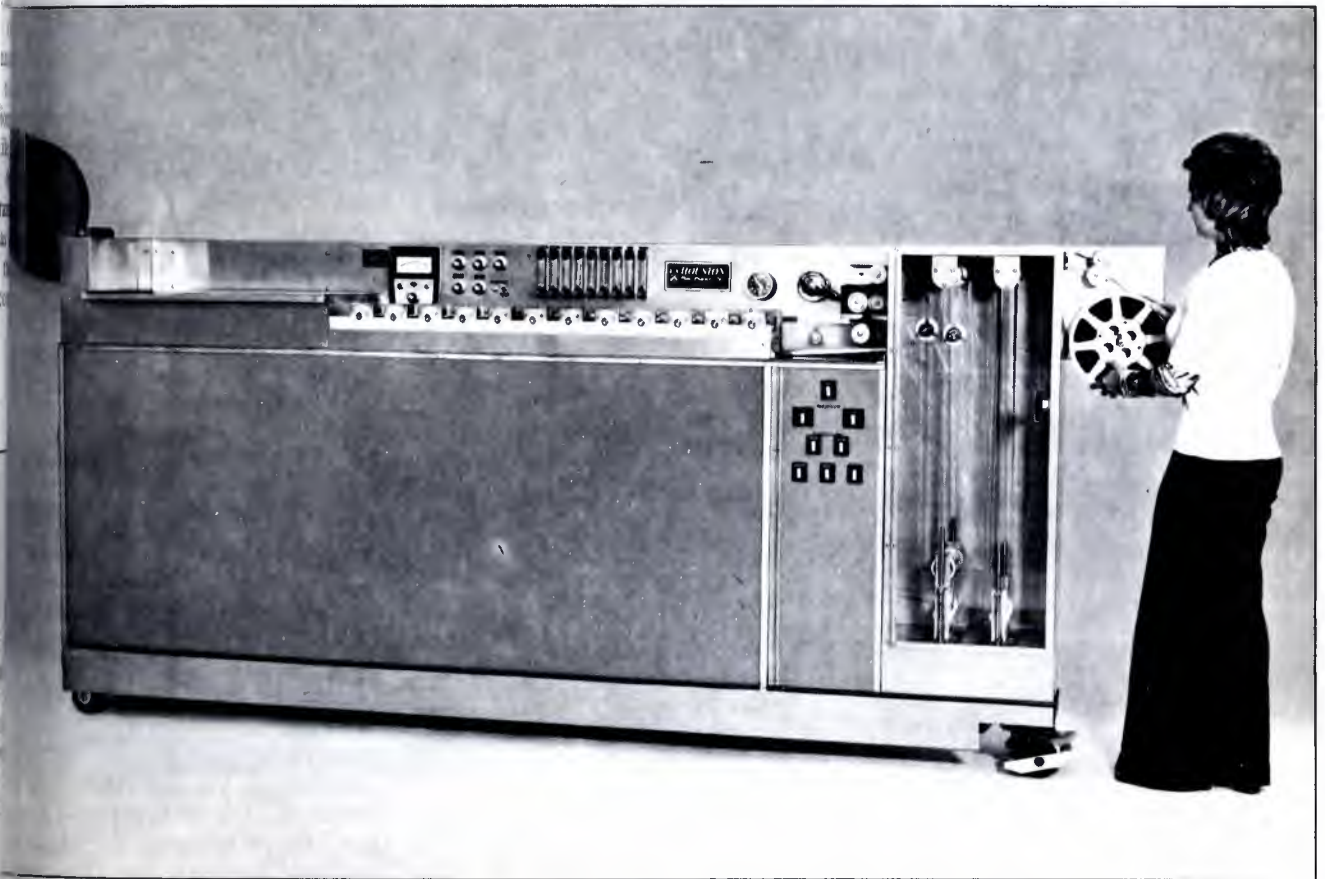


For More Details Circle (36) on Reply Card



# New from Houston.

## Compact machines for ME-4 or VNF-1 process.



The advantage of the improved  
high speed, high temperature  
for films with these new,  
smaller Houston machines, using  
ME-4 or VNF-1 process.  
Require only 17 sq. ft. of space.

These new Houston machines are  
designed for easy operation and  
maximum quality processing.  
Precise timing and accurate  
temperature controls in each  
phase of the processing cycle  
insure consistently excellent

results. Houston's exclusive  
demand-type film drive system  
reduces film tension to a  
minimum. Film is completely  
processed, from dry to dry,  
in only minutes.

Houston dependability is built  
into every part of these machines  
— the same dependability that  
has kept Houston the world leader  
in continuous film processors for  
46 years. Yet, they are priced  
within the reach of small labs.

Write or phone today for full infor-  
mation. Houston Photo Products,  
Inc., 655 E. 20th St., Yuma, Ariz.  
85364. Ph: (602) 782-3677.  
European sales and service: Jos  
DeJonghe, 8500 Kortrijk, Belgium.  
Ph: 56/2117.10. Telex: 85.185.

**HOUSTON**  
PHOTO PRODUCTS, INC.  
YUMA, ARIZONA

For More Details Circle (37) on Reply Card





Chuck Ealston DJ, on the air at WKLS.

## WKLS, Atlanta, broadcasts 100% disc-to-air. That's why it uses Stanton's 681 series...exclusively

Top notch broadcasters who capture a large share of the listening audience, are critically aware of the necessity to achieve a superior quality of sound. Station WKLS is just such a station.

As Bob Helbush, chief engineer, states: "We broadcast 100% disc-to-air except for some commercials. So, for maximum quality sound and phase stability, we use the Stanton 681 SE for on-the-air use. We consider it the ideal answer for that application. And our program director uses Stanton's 681 Triple-E for auditioning new releases before we air them".

And Don Waterman, General Manager, added: "Today, every station in the SJR Communications group . . . all eight of them, all in Major Markets . . . use Stanton 681 cartridges on every turntable".

There are good reasons for this vast acceptance. Stanton's 681 Calibration Series cartridges offer improved tracking at all frequencies. They achieve perfectly, flat frequency response to beyond 20 Kc. And the top-of-the-line, superb 681 Triple-E has an ultra miniaturized stylus assembly with substantially less mass than previously, yet it possesses even greater durability than had been thought possible to achieve.

Each 681 Series cartridge is guaranteed to meet its specifications within exacting limits and each one boasts the most meaningful warranty. An individually calibrated test result is packed with each unit.

Whether your usage involves recording, broadcasting or home entertainment, your choice should be the choice of the professionals . . . the STANTON 681.

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



For More Details Circle (38) on Reply Card

Collector current rating.

### What's The Limit?

We've seen that the two supplies' voltage differential must be about 1V. minimum (in the case of silicon transistors). There is also a **maximum** allowable differential as well. That is the other manufacturer's spec we are interested in: the Maximum Emitter-Base Voltage ( $V_{EB}$ ). For the 2N3903(4) it is 6V., for the 2N3905(6) it is 5V. So in our example, the secondary supply must not be more than 5 or 6 volts below the primary supply. This presents no problem, as we usually want the supplies to be as close in voltage as possible.

However, if for some reason you do want the two supplies to differ by more than the  $V_{EB}$  MAX, insert a diode in the Base lead of the secondary supply. Connect diode

anode to transistor Base, cathode to load, in the circuit of Figure 2A. Or, vice versa for Figure 2B. The diode PIV rating must exceed the supply differential and the  $V_{EB}$  MAX rating. Collector current rating must exceed that required by the load.

Under reverse EB voltage condition, the diode will block current flow and prevent junction breakdown. But, under forward voltage, diode conducts load current completely with only the junction voltage drop.

So there you have two ideas for LED's you may not have considered. They may be able to be used in your battery operated

The obvious next step is to combine the two circuits so that when the supply switches from battery to battery, its LED will turn on when to replace the battery!

## Monitor Adjustment of Burst Phase

If your 2" Quad or other phase Locked color VTR doesn't have a Vectorscope, here is an inexpensive way to monitor your adjustment of burst phase for a more accurate uniformity of playbacks and post editing duping.

A burst phase meter can give you this accuracy during play-backs and post editing duping.

The burst-phase meter has better than 1 degree resolution that reads on an analog meter requiring less time consuming tape to tape adjustments on your VTR.

A burst phase meter compares the burst on the composite Video from your VTR to the 3.58 reference subcarrier.

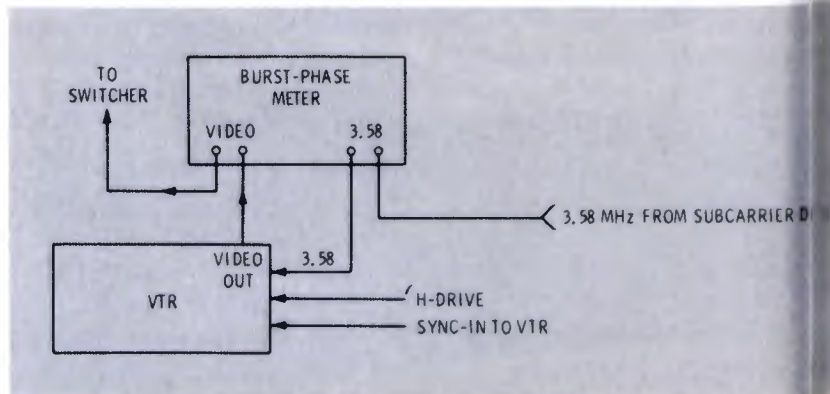
The following interconnect schematic shows the simple hook up.

To interconnect the burst phase meter, loop the 3.58MHz subcarrier through the meter and then through the VTR 3.58 input.

The output of the VTR Video Out loops through the Video input of the burst-phase meter then through the switcher, monitors, etc.

This completes the interconnection.

To adjust for system calibration, play back a tape and adjust the proc. amp. and colortec, or coherent color recovery unit of the specific machine, to place the vectors normal on the screen of the vectorscope.





# Tomorrows audio consoles . . . . . . here today!



## THE BIGGEST ADVANCE OF AUDIO CONTROL IN THE LAST 15 YEARS . . .

input select switches. Noiseless on/off/program select switches. audio mixers. Noiseless cue switches. Do these things make any sense? You bet! Probably the sweetest low distortion sound heard from any audio console at this price. Not only that but consoles are loaded with features you will only find in consoles 5 to 10 times more; (2) you'll find these consoles . . . period.

exclusive illuminated Touch Pad patch switching, thru our, "better

than a VU meter", solid state light emitting meters, to the highly reliable & noiseless method of audio control. That's not all. Prices that are almost unbelievably low (compared to what you're used to) and performance that takes second place to **none**.

Want more? OK, how about RAMKO's exclusive SIMUL-Q or our full range gain select on each input, or the cue and monitor mute select patch boards on each channel (except the last one). The plug in amplifier cards or the RF suppression.

Call collect or write today. You'll find it both an exciting and profitable adventure!

### MODELS & PRICES

|                                   |         |
|-----------------------------------|---------|
| SC-5M Single Channel, mono . . .  | \$ 605  |
| DC-5M Dual Channel, mono . . .    | \$ 742  |
| DC-5MS Dual Channel, stereo . . . | \$ 979  |
| DC-8M Dual Channel, mono . . .    | \$1,199 |
| DC-8MS Dual Channel, stereo . . . | \$1,760 |

## RAMKO RESEARCH

3516 C LaGRANDE BLVD.  
SACRAMENTO, CA 95823  
Telephone (916) 392-2100

For More Details Circle (39) on Reply Card

When correct burst and vectors are set, adjust the zero adjust locking pot to read center scale or zero degrees on the burst-phase.

This zero control will adjust for only 180 degrees of phase. If zero center scale cannot be reached by this adjustment, a delay line (approx. 90 feet of RG-59U) inserted in the 3.58 MHz Line ahead of the burst phase meter should provide the proper delay.

Then recalibrate the proc. amp. and/or TBC as previously instructed. The burst-phase meter should now go through zero to calibrate.

When calibrated, lock the shaft on the zero pot. The calibration need only be rechecked occasionally to verify continued accuracy, if the proc. amp. and/or color tec type device both need quick recalibration. In playback you can reference the color to tape and adjust the proc. amp. to zero degrees, then switch to reference or automatic and rezero. This will return both the proc. amp. and coherent color recovery device to the original settings.

The burst-phase meter will also be useful in the record mode if the input video cable is cut to length or a delay line introduced at the VTR Video input to zero the meter in the EE or Record Mode. This can also be a means of a quick recheck of meter calibration when using the VTR monitor switches to select the input.

**Jim French & Walt Skowron**  
**Video Aids Corporation**

## Send Your Technic Tips and Ideas To Station-To-Station

Send your station management and engineering tips to: Broadcast Engineering magazine, 1014 Wyandotte, Kansas City 64105. Yes, we pay!

## Emergency Hub Adapter

I feel you may be able to use the following idea since I have never seen anything about it in print.

If you are looking for an emergency adaptor for playing a 10½ inch metal tape reel on a standard hub tape recorder, there is a simple solution. Take a plastic reel, one with a large diameter (3") center, we get many of these with commercials on them, carefully remove one of the side flanges removing any remaining burrs. You now have

a hub that just fits the center of the 10½ inch metal reel. Slit the adaptor on the large reel with a utility knife and use the remaining flange on the other side to mount the assembly on the standard tape recorder and it will keep going until you can get a more substantial replacement.

Neil  
Chief Engineer  
KREL  
Corona, Calif

## Improve your quad performance with a **LINE BY LINE AUTO-EQUALIZER**

Upgrade your VR-2000 and VR-1200 for full automatic line by line and channel by channel chroma correction

- Eliminate saturation banding
- Improve tape interchangeability
- Reduce head wear

*For information on pricing and delivery, please contact*

### **COMPUTER MAGNETICS CORP.**

125 W. Providencia Ave., Burbank, Calif. 91502, U.S.A.

(213) 843-6674

TELEX NUMBER 69-6279



High Precision Rebuilding—and...

# THE PRICE IS RIGHT!

## The Comparison (New vs. Rebuilt)

Typical savings on rebuilt tubes are as follows:

| Tube Type   | Econco Price | New Tube Distributor Price | Savings  |
|-------------|--------------|----------------------------|----------|
| 6C2500      | \$115.00     | \$230.00                   | \$115.00 |
| 6C3000      | 125.00       | 265.00                     | 140.00   |
| 6C5000A     | 265.00       | 530.00                     | 265.00   |
| 6D17C24     | 180.00       | 400.00                     | 220.00   |
| 6D17C24     | 180.00       | 395.00                     | 215.00   |
| 6E6A/7007   | 550.00       | 1225.00                    | 675.00   |
| 6E6C15,000A | 400.00       | 825.00                     | 425.00   |

Our prices average slightly less than 50% of new tube prices. These savings are even greater when you include sales tax on new tubes.

## Service

Econco's prompt 30 day repair service coupled with fast UPS handling makes getting tubes repaired probably a better method than ordering a new tube from a distributor. 7 day delivery on new tubes is not uncommon now. Econco provides 7 day rush repair service and 1 day delivery for locations that find power output down and no good spare tube available.

When we have both a cost and service advantage over new tubes, rebuilt tubes have proven that tube life equals and often exceeds that of new tubes.

## Used Tubes

To encourage stations which are continuing to buy new tubes, we consider selling their used tubes to us. A price list is available upon request. Save your packaging and when you get a lot, send them to us for cash. We buy any amount of tubes you have if they are on our list.

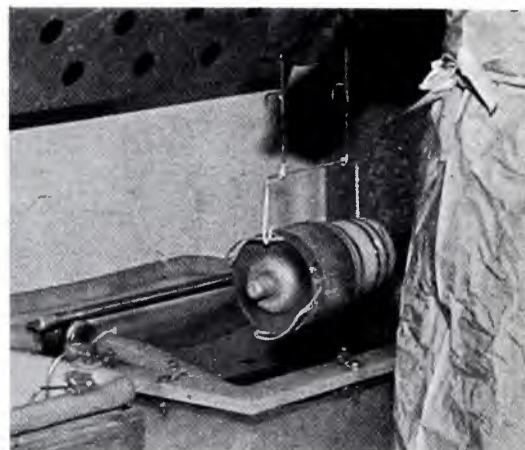
## Testing

Rebuilt tubes are fully tested and must meet new tube specifications or we do not ship them. Tubes which do not meet specifications are repaired again or scrapped if not repairable.



**Leak Detector**

Leak checking tube prior to pump operation



**Silver Plating**

A rebuilt tube ready to be silver-plated



**Tube Testing**

A finished tube getting tested to factory specifications



## ECONCO BROADCAST SERVICE INC.

Route 2, Box 188  
1302 Commerce Avenue  
Woodland, California 95695  
Telephone (916) 662-4495 or (916) 662-6031



# NAB Called To Action

(Continued from page 8)



Action on the exhibit floor was good, and many exhibitors were recording record sales. Meanwhile, behind the scenes, it would curl your hair to hear about putting six union men into the act just to raise and mount a video monitor. Most exhibitors we talked with insisted they would never return to that situation again.

He also said the license renewal process should be stabilized and pointed out that of all the competing applications and petitions to deny filed with the Federal Communications Commission over the last six years, 60 percent were filed against radio stations.

The NAB president pointed out to the radio executives that Congress should not contain a provision requiring radio broadcasters to pay fees to recording companies and performers to air records.

"If anything," he said, "they should be paying us."

He said the bill also should prohibit cable systems from deleting television commercials and filling that time with advertising they sell themselves. He said such a practice would violate "every concept of fairness," and would not only damage local radio, but might even destroy it in some cases.

He urged the broadcasters to contact their Congressmen and let their views be known.

## Format Intrusion

Wasilewski also attacked the courts and said that because of a misguided decision, the FCC has been forced to rule on format changes. This, he said, is an area

"totally outside its jurisdiction" and stated that "it is none of the government's business to prescribe programming."

To combat these intrusions, he

urged government officials to examine the Constitution and recognize that its purpose is to protect citizens against government.

The government, Wasilewski said, also seems to forget that citizens should be presumed innocent until proven guilty.

"Broadcasters," he noted, "must defend themselves against accusations which have become accepted as truths, charges which become near-convictions."

Wasilewski charged that the government has become "oversensitive to negative elements in society," that a few dissidents make their living by criticizing and "have become influential with the government far beyond their numbers."

"Yet," he said, "the FCC and the Congress listen solemnly to every one. Little or no effort is made to find out if their grand claims that they represent large numbers of people have any basis in fact. Most of them, in fact, represent few but their own selves. Nearly all the people they claim to represent have never heard of them."

In his address to television and radio executives, Mr. Wasilewski

(Continued on page 9)



Julian Goodman, NAB's 1976 Distinguished Service Award winner (right), is presented his plaque by NAB Board Chairman W. W. Wearn.



# There's News Out There...



## Farinon's Portable, Frequency-Agile Microwave Works It On The Air!

The new FV Portable Microwave system is suitable for all bands from 1.99 to 13.25 GHz. You dial-tune to your operating frequency and spot. There's no need for bench-work when you set up a remote pick-up. No filter selection. You don't even need a screw-

You can plug in video monitors, or clampers, or up to three sub-carrier channels.

You can run 500 feet of cable between the RF head and the FMT or FMR remote unit without roll-off or equalization.

And you get 1-watt output level from 6.875 to 13.25 GHz, 5-watt output (optional 20-watt) from 1.99 to 2.11 GHz,  $\pm 0.002\%$  frequency stability; 60-dB signal-hum ratio from dc to 10 kHz, and 70-dB signal-noise ratio from 10 kHz to 5 MHz.

Farinon Electric, 1691 Bayport Ave., San Carlos, CA 94070, U.S.A. Tel. (415) 592-4120. Telex 34-8491.  
... in Canada: Farinon Electric of Canada, Ltd., 657 Orly Ave., Dorval, P.Q. H9P 1G1, Canada.  
Tel. (514) 636-0974. Telex 05-82-1893.

# Farinon

For More Details Circle (112) on Reply Card

## NAB Called To Action

(Continued from page 72)

said broadcasters no longer are constrained by the 1971 Consensus Agreement with cable owners.

He said cable and pay cable are "a great threat to broadcasters and two massive reefs upon which our free television system may become shipwrecked."

### Explosive Cable

He cited as examples the explosive growth of pay cable, the "largely innocuous" cable sections of the copyright bill passed by the Senate, the "weak legislation" being considered by the House, and the House Communications Subcommittee staff report which promotes cable and "excoriates the FCC for the overprotection of free

### Senator Hartke Applauds Industry

Senator Vance Hartke praised the broadcast networks for reassessing the use of violence in programming and challenged all broadcasters to "maintain your preeminent influence on thought and opinion in our society."

The Indiana Democrat, who is in line to become Chairman of the Senate Communications Subcommittee if re-elected, addressed a television assembly at the 54th annual convention of the National Association of Broadcasters.

He emphasized the importance of radio and television as the major source of information and political stimulation in local communities and said Congress cannot overlook the threat of cable or any other broadband services to "effectively eliminate that basic local service."

And he suggested that regulations of the Federal Communications Commission "which do not assist you in serving the needs of your community should be stricken from the books as quickly as possible."

The Senator told the broadcasters that television is such a pervasive force in America that the industry has a special responsibility

television."

The FCC, he said, also is "enchanted" at the prospect of a wired nation and is "steadily eroding its own once-reasonably constraining cable rules."

Wasilewski stated that under the bill now in the House, copyright payments by cable are not to be determined by the give and take of free enterprise as they are in broadcasting, but are to be fixed by government and are set very low.

"We believe," he said, "that this compulsory payment should cover only local signals. If cable systems are allowed to bring in distant signals, they should have to negotiate those fees, just as all other users do."

### Let's Open Up!

As he did with the radio broadcasters, he urged the television station executives to contact their

Congressmen and voice the objections.

Wasilewski said that now "crucial stage of the battle to preserve the American principle of free television service."

"It is a battle worth joining. We must have all our soldiers on the line. This means that those who are being hurt by cable, and who are not dared to admit it for fear of additional hurt, must resign themselves to defeat."

"You, who are being harassed by cable, must supply us with the leadership that only you have. This means that the top-50 market broadcaster, as yet, sees cable only as a cloud no bigger than a man's shadow. He must join with his smaller counterparts to protect the public's interest in free television in every part of the nation. We must resign ourselves to protect this most marvelous of the world's communications systems."

to make sure programming is not designed merely to attract the largest audience but is also intended to enlighten and inform.

He expressed a desire for more variety and less violence, particularly during television's family hour, and praised the industry's own moves in that direction. It is reassuring, he said, "to see the networks begin to reassess the use of violence in programming, particularly where explicit violence...is presented as the only effective method of conflict resolution."

Saying broadcasters "stand alone in their influence and awesome responsibility to our nation," the Senator said he believes the industry "has told the average citizen more about what it means to be an American than any other medium... and I think the nation stands in your debt."

"Together," he said, "you give the nation the most extensive and creative information service in the world..."

"The broadcast industry," he said, "stands today at the pinnacle of thought and influence in our society...and can continue to maintain your preeminent influence... only if you continue to meet the future and its challenges."

He said broadcasters, as "vigorous defenders of the viewers rights

to hear all manner of thoughtful opinions," must do more to enlighten their independent news judgment. FCC regulations designed to achieve that purpose, he said, should be viewed as minimum, not maximum standards.

Senator Hartke said the times he had disagreed with the actions taken or advocated by the industry was when he thought the industry "was capable of more."

He said the "lifeblood of our society is the free flow of information" and Congress needs the cooperation of broadcasters and their expertise, fortitude, and courage to bring to the task.

Among the "most difficult policy questions" faced by Congress, he said, is the identification of coming technologies in communications and whether they will be integrated, will "further or frustrate our national goals."

"You in broadcasting," he said, "will have the difficult task of identifying your own interests and conveying them persuasively to Congress as well as conveying the substance of the debate to the general public..."

"The free flow of information is critical if the Congress is to

(Continued on



# NOW! AUDIO DESIGNS' UNIQUE DA16 AUDIO DISTRIBUTION SYSTEM

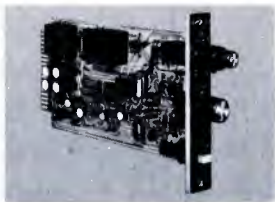
... a combination  
of features  
no competitive  
system offers



The ADM® DA16 incorporates an advanced design approach, with superb specifications. It is the ultimate in audio distribution amplifiers. Each amplifier is a one in, six output plug-in card with +24DBM input and output capability.

The input is transformer coupled, and each of the six outputs is individually transformer isolated. Amplifiers have individual front panel adjustments. Noise level is ultra low, and distortion is less than .1% at +24DBM.

Up to six DA16 amplifiers can be housed in the Audio Designs® CH20 rack frame, which includes a redundant power supply with automatic changeover. Built to exacting quality standards, DA16 amplifiers offer exceptionally high reliability. Write or call for specification sheet.



## OTHER HIGH-INTEGRITY ADM COMPONENTS

**302 LIMITER**—a unique, instantaneous device designed to allow constant output regardless of input level.



**301 NOISE SUPPRESSOR**—a new, fast gain expander that puts silence where there was noise.



**1500/1501 EQUALIZER**—unity gain, four band, 14 frequency reciprocal equalizer designed to provide EQ anywhere in an audio system.



**AUDIO DESIGNS AND MANUFACTURING, INC.**  
16005 Sturgeon, Roseville, Michigan 48066  
Phone: (313) 778-8400, Cable: AUDEX TLX-23-1114



**DISTRIBUTED OUTSIDE U.S.A.  
BY AMPEX INTERNATIONAL OPERATIONS, INC.**

For More Details Circle (113) on Reply Card

ately reflect the needs and requirements of the public and the broadcast industry."

He said his door is always open to broadcasters and they should feel free to call on him at any time.

Broadcast engineers were urged to support moves to protect spectrum space allocated for use by the U.S. broadcasting industry at two world administrative radio conferences scheduled for 1977 and 1979.

James D. Parker of CBS-TV, New York, a member of the Engineering Advisory Committee of the National Association of Broadcasters, stressed the importance of the forthcoming meetings during the Broadcast Engineering Conference.

"The need for spectrum space for all types of services is growing by leaps and bounds," he said, and U.S. broadcasters will be competing

at the conferences with both government and private interests of the available spectrum.

While the conferences may be "pretty dull" in comparison to many technical advances displayed and on display at this year's meeting, he said, they are a major proportion because frequency spectrum is "the foundation of our entire industry."

He said all administrative regulations, including the international table of allocation, will be subject to review and possible modification at the 1979 world conference.

"The future course of all communications services," he said, "will be cast in cement possibly the next two decades to the year 2000..."

"The broadcasting industry will be competing not only with government users of the spectrum but also with government users," he said.

"Your interest and support in preserving the foundation of the industry are urgently needed."

Parker said the competition for spectrum space is of "serious concern" to UHF television because of "further inroads" on useful frequencies that appear to be facing in demands from mobile users and possibly government.

He said requests for frequency requirements through the year 2000 already have been submitted to the Federal Communications Commission and will be made available after FCC's review.

"Informally" he said, "I've been told that these requirements will not all be satisfied even if we have a negative frequency spectrum; an imaginary frequency spectrum in addition to the available real spectrum."

Former Senator Sam J. Ervin of North Carolina became the recipient of the Grover C. Whipp Memorial Award for his efforts to improve broadcast-government relations.

A bicentennial slide show presented on three screens summarized U.S. political, economic, technical, and pop culture history 200 years before the Declaration

(Continued on p. 77)

# Spotmaster® THE MARVELOUS ONES

## SERIES 3000

- The "Cool One" with low power consumption to protect your tapes from heat.
- PHASE-LOK III head bracket minimizes stereo phasing problems.
- Auto release deck, massive, quiet air damped solenoid and massive deck plate.
- Full range of models and options.



## SLIDE CONSOLES

- Series 3006 Mono and Stereo Versatile slide consoles, 10 mixers, dual channel operation with intercom features.
- Series 4006 Mono and Stereo — Advanced design, completely modular consoles with plug-in electronics and input modules. Unique features include cuing without disturbing preset levels.



## CLE-FM

- Automatic level control for FM mono and stereo broadcasters.
- Provides maximum modulation to increase coverage.
- Full protection against over modulation.
- Tailors sound to individual station's programming.
- Minimizes background noise expansion.



FULL LINE OF SINGLE AND MULTIPLE DECK CART MACHINES, AUDIO CONSOLES AND STUDIO ACCESSORIES

## BROADCAST ELECTRONICS INC.

— A FILMWAYS COMPANY —


8810 BROOKVILLE ROAD, SILVER SPRING, MD. 20910

PHONE: 301-588-4983, TWX: 710-825-0432

CABLE: "SPOTMASTER"







# Is America ready for CP-TV Antennas? Jampro is!

When the FCC authorizes the use of CP-TV antennas JAMPRO will be ready with the only patented Circularly Polarized production line of TV antennas — low band VHF, hi band VHF and UHF.

The first circularly polarized omnidirectional TV broadcasting antenna in the world was installed in May, 1975 at KLOC-TV UHF channel 19, in Modesto, California, under a STA from the FCC. This time tested, spiral antenna is mechanically symmetrical. It is available for all TV channels.

Antenna power gains vary from 2.2 to 7 for VHF channels with input power ratings of 35 and 100 KW. UHF power gains are 16 to 32 with safe input powers up to 220 KW. Its comparatively modest wind loading will permit replacing existing antennas without tower changes, in many cases. Write on your letter head stating your requirements. A quotation and a copy of the propagation test results comparing standard and circular polarization will be mailed to you without charge.

## Let Jampro help you get ready.

**J****A****M****P****R****O****ANTENNA  
COMPANY**

A SUBSIDIARY OF  
CETEC CORPORATION

(916) 383-1177  
6939 POWER INN ROAD  
SACRAMENTO, CALIF.  
95828

For More Details Circle (114) on Reply Card

Independence to the present.

A film from the Advertising Council previewed a new public service campaign to educate the American public on the subject of free enterprise economics.

Goodman, introduced by NAB President Vincent T. Wasilewski, was presented his award by NAB Board Chairman Wilson C. Wearn, Multimedia, Inc., Greenville, S.C.

In accepting the most coveted broadcasting award, Goodman urged his fellow broadcasters to

"show our detractors that we stand behind our beliefs and that we are prepared to work and fight to defend them."

He said a "Broadcaster's Declaration of Independence" would reaffirm the industry's determination to maintain journalistic freedom and would advance public interest and trust in the broadcast media.

The NBC executive was escorted to the stage by a committee of leading broadcasters—Jack Harris, KPRC-TV, Houston, Tex.; A. Louis

Read, WDSU-TV, New Orleans, La.; Harold (Hod) Grams TV, St. Louis, Mo.; Robertson, WTRF-TV, Wheeling, (all former chairmen of Television Affiliates) Cla Collough, WGAL-TV, La Pa., former NAB board chair and a past DSA winner; Elm WSB, Atlanta, Ga., (former man of NBC's Radio E Committee) and by Ancil KING-TV, Seattle, (current Affiliate Board Chairman).

The Award was created this year by NAB's Radio and Television Political Education Committee to honor the memory of former senior executive vice president for government relations who died March 7, 1975.

It is to be given annually to a broadcaster or public servant who demonstrates unusual dedication in improving broadcasting's relationship with the federal government.

The Award was presented to Senator Ervin by Jack Ros Harriscope Broadcasting, Cheyenne, Wyo., past chairman of the Federal Communications Commission's Political Education Committee.

### AM, FM Translators

The National Association of Broadcasters has urged the Federal Communications Commission to initiate rulemaking proceedings to authorize use of FM translators modified to accommodate both AM and FM radio signals in sparsely populated areas.

Its comments, filed at the meeting of NAB's Board of Directors, called for speedy affirmative action on a longstanding petition from Rocky Mountain Broadcasters Association seeking the use of translators with AM input in areas where regular radio station service is "gravely inadequate."

NAB said the modified translators could provide AM as well as FM service in so-called "transition areas" which now lack any broadcast service. In some instances, the AM input translator could be used to bring radio service to areas where the conventional FM translator is not technically feasible.

By careful placement, it said, translators would not "hamper or infringe" upon existing stations and could enlarge the markets they serve.

# We Sell Protection.

## It's Called the 400 Logger.

Dictaphone's 400 Logging Recorder gives you a precise record of the exact words — at the exact time they were broadcast. That's why the 400 is standard equipment at major radio and television networks worldwide. Extremely slow speed and automatic reversing let you pack twice as many words on an inch of tape as any other logger. And the 400's performance is unequalled. The features speak for themselves:

- Dual system automatically transfers signal when tape runs out.
- 1, 2 or 4 channels.



- Separate or simultaneous monitoring of each track.
- 4400 Time Code Generator optional for encoding time without dedicating a track.

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

Get full protection, by getting the facts on the 400 Logging Recorder. Write or call: Dictaphone, Scully/Metrotech Division, 475 Ellis Street, Mountain View, Calif. 94043 (415) 968-8389 TLX 345524.

 **Dictaphone**  
Scully | Metrotech Division

**Dictaphone does it right. Obviously.**

For More Details Circle (124) on Reply Card



# Shopping for a Distribution Switcher?

## SAVE SPACE.

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

## SPEND LESS.

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



40 x 50 AFV Switcher

# SPECIFY THE SWITCHER WITH PROVEN RELIABILITY.

The TVS/TAS-1000 is more reliable because its simple design requires fewer active components in the signal path. This reliability has been proven at installations throughout the world in configurations ranging from 1 x 10 to 80 x 50. To find out more about the one switcher offering compact, cost-effective signal distribution with true broadcast quality and reliability, contact your nearest TeleMation sales office.

**TVS/TAS-1000  
Video/Audio  
Distribution  
Switchers**



 **TeleMation**  
the discovery people

TeleMation, Inc. P. O. Box 15068, Salt Lake City, Utah 84115 (801) 487-5399. Other sales offices located in: San Francisco (415) 348-3322 • Los Angeles (213) 845-7831 • Chicago (312) 729-5210 • Atlanta (404) 451-1801 • Washington, D. C. (202) 937-8700 • New York (212) 575-1466 • London • Rio de Janeiro • Sao Paulo • Santiago • Mexico City • Cairo.

# **AUTOMATE** STATION BREAK and **COMMERCIAL INSERTS** for **LESS THAN \$25,000**

## **The RHL MSA1032 AUTOMATION SYSTEM gives you—**

- 32 EVENTS.
- INTERFACE WITH THE MAJORITY OF EXISTING SWITCHERS.
- EASE OF OPERATION. NO SPECIAL TRAINING REQUIRED.
- CONTROL OF 2 AUDIO/VIDEO BUSES.
- STANDARD TRANSITIONS.
- SELECTABLE PRE-ROLL TIMES FOR TELECINE, VTR, ETC.
- CRT DISPLAY OF UPCOMING EVENTS.
- MANUAL OVERRIDE 'HOT' AT ALL TIMES.
- EDITING UP TO AIR TIME VIA DATA ENTRY KEYBOARD.

*Contact our AUTOMATION SYSTEMS DIVISION and they will be happy to discuss the feasibility of incorporating any specific features you may require in the MSA1032.*



**RICHMOND HILL LABORATORIES** LIMITED

1240 ELLESMERE RD., SCARBOROUGH, ONTARIO, CANADA M1P 4K4

Telephone (416) 291-7921

Telex 06-2173



# RCA power tubes of the future have a remarkable past: actual lifespans up to 30,000 hours.

| Tube Operating Hours Reported by 20 TV Stations* |             |             |
|--|-------------|-------------|
| <b>Up to 5 kW</b>                                | 24,142 hrs. | 21,329 hrs. |
| Types 8890 & 8806                                | 12,263 hrs. | 19,200 hrs. |
| Aural service                                    | 16,200 hrs. | 14,000 hrs. |
| <b>Up to 12.5 kW</b>                             | 10,096 hrs. | 10,525 hrs. |
| Type 8891  | 9,402 hrs.  |             |
| Visual service                                   |             |             |
| <b>Up to 17.5 kW</b>                             | 16,600 hrs. | 18,300 hrs. |
| Type 8807  | 29,800 hrs. | 21,200 hrs. |
| Visual service                                   | 30,100 hrs. | 20,400 hrs. |
| <b>Up to 27.5 kW</b>                             | 9,778 hrs.  | 9,776 hrs.  |
| Type 8916  | 7,875 hrs.  | 13,183 hrs. |
| Visual service                                   | 10,799 hrs. |             |

\* Serial numbers and tube type data available on request

RCA power tubes are at work now in new-generation color transmitters. Proving their value with an excellent combination of high gain, high linearity, plus long operating life.

*Documented* long life. In the table, you can see actual operat-

ing hours reported by 20 TV stations. That reliability comes from RCA's sturdy, coaxial CERMALOX® construction and thoriated-tungsten mesh filament, which minimize inductances and feed-thru capacitances. So you can use simple, economical broadband circuitry.

In fact, RCA can supply you with the right circuit and cavity to go with the tube you select.

For high performance and proven long life in a wide range of power tubes, there's one thing to do. Contact your RCA Representative. Or, RCA Power Tube Marketing, Lancaster, PA 17604. Telephone 717/397-7661.



# RCA

For More Details Circle (111) on Reply Card

## NAB Products

(Continued from page 48)

### Video Spot Assembler

The **Recortec Video Spot Assembler (VSA)** is a microprocessor based system designed to provide the convenience and versatility of a cartridge system at a fraction of its cost. The VSA uses the same two VTR's used for A-B rolls for spot/spot sequences. Unless the VTR's are vacuum column buffered types,

each VTR must be modified with the Recortec R-MOD to give it full automation capability.

The VSA provides: random access for up to 100 spots plus additional VTR's; access to slides and film chains; no restrictions on spot length (even 2 second spots); playing of 10 second spots back to back; plays up to 100 breaks without reprogramming; program-

ming of up to eight event break; last minute spot change to the last break time.

Before air time, all spots used are dubbed sequentially on master tape. This tape is placed on the "A" deck and a "catalog sheet" made up. A microprocessor in the VSA automatically memorizes all the start and stop times with accuracy. The operator refers to the "catalog sheet" and "programs" the VSA by just keying in numbers of all spots to be played each successive break. When the operator has programmed a break (up to 100), the first break assembled automatically from "A" to "B" in proper order. "B" is cued to air under station master control.

Automated remote start of a break and a preroll is provided at 10 seconds from end of the last spot. After finishing playing the current break the next break is automatically assembled from "A" to "B". The operator can modify any break stored in the microprocessor through the simple keyboard control displays. Even last minute spot changes can be incorporated into program breaks by calling an external station placed under VSA control.

For More Details Circle (136) on Reply Card

### Quad Polarized ENG Antenna

At the NAB Convention, **Inc.** exhibited a new quad polarized antenna capable of both simultaneous and independent operation in the 2 GHz and 7 GHz bands. The antenna is the key element in **Nurad's 20/70 QP1 Receiver Antenna System**, which provides the broadcaster flexibility in his Electronic News Gathering/Electronic Journalism operations.

The system embodies four dual-band antennas. Each antenna covers its own directional quadrant and is fully independent of the other three. Further, each antenna is quad-polarized, that is, it can be operated in clockwise-circular, counterclockwise-circular, horizontal-linear, or vertical-linear polarization modes.

These features provide the operator a number of very significant

(Continued on page 49)

# control by phone

Use a regular touch button telephone to control:

- Cable TV circuits
- Pollution sampling equipment
- Microwave transmitters
- Call diverters and automatic answering devices
- Antenna systems
- Telephone equipment
- Radio/telephone interconnection equipment
- Pumps, motors, overhead doors

**CIRCUIT CARDS FROM \$49 TO \$99**



Tone Detector



Line AMP  
Vox.  
Squelch



Relays

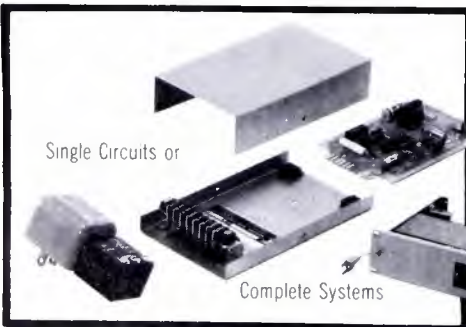


Power Supply



Timers

Use Monroe Electronics plug-in circuits to construct your own custom system with off-the-shelf ready to use circuit cards



**MONROE ELECTRONICS, INC.**  
INSTRUMENTS & SYSTEMS

100 HOUSE AVENUE • LYNDONVILLE, N. Y. 14098 Area Code 716 765-2254

For More Details Circle (45) on Reply Card

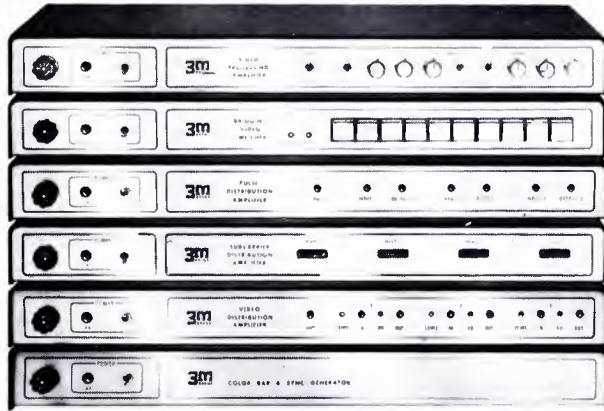


# Meet more members of our growing family.

**Six low-cost products for professional-quality video systems.**

## PULSE PROCESSING AMPLIFIER

Active built-in pulse-cross generator automatic brightening allows use of expensive monitor to examine the ahead switch area for tracking and adjustments during on-line operation plan auxiliary monitor output. Front controls for six video signal channels. Operates with both color and composite inputs. Accepts all U.S. sync standards. Can be used as a camera control unit.



- P-50 Processing Amplifier
- Vertical Interval Bridging Video Switcher
- Pulse Distribution Amplifier
- Subcarrier Distribution Amplifier
- Video Distribution Amplifier
- Color Bar and Sync Generator

## VERTICAL INTERVAL BRIDGING VIDEO SWITCHER

Highly sophisticated 10-input switcher with relay-contact, illuminated buttons. Built-in Pulse Distribution Amplifier to eliminate loading. Optional Remote Unit and Standby Power System.

input, 4 outputs per section. Front panel gain and cable equalization adjustments. High impedance, loop-thru inputs. *All three units have front panel test points, and are provided with rack mounting hardware.*

## VIDEO DISTRIBUTION AMPLIFIERS

A complete line of products is suitable for any application. **Pulse Distribution Amplifier** reforms and gates incoming sync pulses. If your application requires, this unit will accept composite video, and convert it to sync and distribute it as needed. Four channels, 1 input, 4 outputs per section. **Subcarrier Distribution Amplifier** has four independently adjustable outputs. Provides full 360° phase adjustment on front panel. High impedance, loop-thru inputs. **Video Distribution Amplifier** has three sections; 1

## 3M COLOR BAR AND SYNC GENERATOR

Now your system can have a stable signal source for a surprisingly modest cost. This unit produces a full field NTSC 8-bar pattern and all studio synchronizing signals. It also provides a 1 kHz audio test tone output.

For the name of your nearest dealer, contact: Video Products, Mincom Division, 3M Company, 15932 Shady Grove Road, Gaithersburg, MD 20760. Ph: 301-948-0460.

**3M professional-quality video products for broadcast, CCTV, CATV.**

VIDEO PRODUCTS  
**Mincom Division** **3M COMPANY**

For More Details Circle (46) on Reply Card

**WORLD'S BEST STEREO GENERATOR  
WILKINSON ELECTRONICS SG1E**

**POSITIVE PROOF**

- \* 60 db separation ..... 50 Hz-7500 Hz
- \* 55 db separation ..... 7500 Hz-10000 Hz
- \* 50 db separation ..... 10 KHz 15 KHz
- \* FM Noise - 75 db ..... Cross Talk - 60 db



**COMES COMPLETE WITH POWER SUPPLY  
REQUIRES ONLY 3½" RACK SPACE  
ONLY ONE FRONT PANEL ADJUSTMENT  
REMOTE STEREO ON/OFF FUNCTION**

**WORLD'S BEST FM EXCITER  
WILKINSON ELECTRONICS FME10**

**POSITIVE PROOF**

- \* Frequency response ±¼ DB 15 HZ-350 KHZ.
- \* FM Noise Level - 70 DB below 100% Mod.
- \* Distortion - 0.3%
- \* Modulation - Direct FM
- \* Power Output - Adjustable to 18 watts
- \* Stability 1 part in 100000
- \* Requires no oven and is not susceptible to rumble and microphonics



**FCC TYPE ACCEPTED  
POWER SUPPLY INCLUDED  
REQUIRES 7" VERT. SPACE  
IMMEDIATELY USABLE IN ANY TRANSMITTER  
SHIELDED BY BOTH STEEL & ALUMINUM  
COMPLETELY METERED  
ADJUSTMENT FREE**

**NO ONE CAN MATCH THIS COMBINATION**

**WILKINSON  
ELECTRONICS, INC.**

**701 Chestnut St.  
Trainer (Chester) PA. 19013  
Telephone (215) 497-5100**

For More Details Circle (47) on Reply Card

**SBE Reports**

(Continued from page 18)

**Chapter 20: Pittsburgh, Pennsylvania**

Chapter 20 met March 18 to see guest speaker Bill Nichols of Echo Sciences demonstrate a video disc system—that is priced under \$1000. (Jim Hurley, Chairman WTAE-TV, 400 Ardmore Blvd., Pittsburgh, Pennsylvania 15230, (412) 4300.)

**Chapter 22: Central New York**

On March 18, Mr. Terry Lloyd from TFT gave an interesting program on EBS. Mr. Lloyd had a program explaining the interconnections and operational procedures of EBS and the manufacturing screening and circuit board testing. (Gary Harter, Chairman, WSYR, 1030 James Street, Syracuse, New York 13203, (315) 474-3911.)

**Chapter 26: Chicago, Illinois**

In May, Chapter 26 plans to visit the Commonwealth Edison/Westinghouse Nuclear Power Plant in Zion, Illinois. This will be a reservation tour, so please call as soon as possible if you are interested. (Bob Churchill, Chairman, SBE, 1 Wacker Drive, Chicago, Illinois 60601, (312) 5215.)

**Chapter 28: Milwaukee, Wisconsin**

Chapter 28 had a big evening on Tuesday, March 30 at the University of Wisconsin-Milwaukee Cunningham Nursing Building. The subjects covered at that meeting were: instructional media operations, computer controlled learning systems, automated closed circuit tape distribution, Convention reports, and a discussion of the certification program. Invited speakers were Lindgren, Tom Tompter, and Jan Pritzl, UWM, plus SBE members reporting on NAB. (Dezurick, Chairman, WRJN, 4201 Victory Avenue, Racine, Wisconsin 53405, (414) 634-3311.)

**Chapter 35: Louisville, Kentucky**

Chapter 35 met Thursday, March 18 at WKLE-TV. Mr. Bob Brock from Brock Electric was invited to discuss primary power circuits. (Robert J. DeWitt, Chairman, WKLE-TV, 600 Cooper Drive, Louisville, Kentucky 40502, (606) 233-0666.)

**Chapter 37: Washington, D.C. / Northern Virginia**

The March meeting of Chapter 37 was held on the last Wednesday of the month at WMAL-TV, Washington, D.C. The program was a round table discussion of the SBE engineering certification program. (Charles Riley, Chairman, Tele-Productions, 708 N. West Street, Alexandria, Virginia 22314, (703) 683-3203.)

**Chapter 42: Orlando, Florida**

Mr. Joe Lang, vice-chairman of Chapter 42, demonstrated the new ISI video switcher on March 24, and former assistant chief engineer of Channel 24, Aldo Vivons, showed members and guests the Channel 24 color remote unit. (John Weir, Chairman, 5765-F Kingsgate Drive, Orlando, Florida 32809, (305) 857-3729.)



# From BLUE BANANAS to SAG TAILS

## Keep It Rolling

My local newscasts on television are far different from those of the mid-fifties when pictures-radio came to my home town, a market of 40,000.

Contrast today's three-man news show, replete with color actualities, special effects, sets that move, and analysis by people who have time to understand what they are talking about with the show of yesterday.

At the station I remember frequently had a live news show. The operator used to turn on the one camera (a black-and-white vidicon that made pictures electrically and acoustically—whenever you turned the focus too fast). At the same time he would roll the opening-type announcement on reel-to-reel tape. Then, gathering up his news copy and holding the seconds to himself, he would run down from the control booth and walk calmly onto the news set.

Another man was supposed to be getting off shift at the same time at a radio station several blocks away. This man would saunter over in time to make the closing-type announcement on the audio recorder and prepare to switch to the next program at the appropriate time.

Naturally some problems would creep into the picture, like the time the radio announcer felt playful. The man picked up a bicycle which was waiting for him to make a commercial at some later date. He began to laugh and walked off the set and capped the camera. I understand the news show was cancelled until there was enough money to hire another man to run camera and help with switching.

**John H. Wiegman**  
Chief Engineer  
KWAL Radio  
Mullan, Idaho

## Guess What Happened On The Way To Church

I can't absolutely guarantee this one's true, but a Nebraska station network is being broadcast. The network is "taken" from the control room, and then control is transferred to master control,

# CSI



## FM BROADCAST TRANSMITTERS 3, 5, 12 and 20 KW

For months we've been shipping transmitters—100 alone to the CBC in Canada. Now we're accepting orders and shipping to U.S. broadcasters. Exciting things are happening at CSI!

- New design features increase efficiency, provide greater reliability, and reduce maintenance.
- Sliding shorting contacts for tuning and loading. All tuning and loading adjustments from front panel.
- Zero bias output stage for stability without neutralization.
- Solid state phase lock loop excitors.
- Output power directly adjustable from front panel without changing tuning or loading.
- Low voltage control circuitry for personnel safety. Control relays front panel mounted for easy adjustment and replacement.

**DEPENDABLE AND EFFICIENT  
WITH INNOVATIVE DESIGN FEATURES  
FOR TODAY'S BROADCASTER**

**CSI** ELECTRONICS INC.

2607 RIVER ROAD, CINNAMINSON, N.J. 08077  
TELEPHONE 609-786-1060 • TELEX 831679



# audio \* Stereo MIXERS AMPLIFIERS! → turntables PREAMPS RUGGED

RUSSCO engineers design the broadcast equipment that works for you—Solid state stereo and mono 5-channel audio mixers, amplifiers and preamps, the finest turntables and precision tone arms. Using modern, trouble-free technology and RUSSCO-RUGGED construction, we bring you products you can really depend on. There's just no other name to consider for Top Quality and Economy!



• Write us for our brochures

**RUSSCO**  
ELECTRONICS INCORPORATED  
1070 BROOKHAVEN, CLOVIS, CALIF. 93612 Ph. (209) 299-2167

your  
**BEST BUY**

For More Details Circle (49) on Reply Card

## Blue Bananas (Continued from page 85)

upstairs. When a studio feed is about to take the studio again "takes" sound and picture network, and control is transferred down again.

When Pope John XXIII died, Tom Brokaw of NBC news, was adjusting his tie and clipping his microphone, as the audio man in the studio checking out the sound instead of running radio. A floorman asked Tom what had happened as the master control man had transferred the control to the studio. The picture (a soap opera) continued, as Brokaw's voice broke in momentarily and said "The Pope croaked."

Jim  
Ridgecrest,

## Policing The Police

Commercial Broadcasting is not the only public-audience "broadcasting" medium, a metropolitan Police Dispatcher can quickly tell you. And, having spent 20 years in that end of communications, I've been exposed to quite a few blue bananas (as well as intentional purple episodes). Somebody managed to fall down the elevator shaft of one of the now defunct hotels; it hit the "Man fell down the ambulance shaft, an elevator on the way."

B. J. H. Abraham  
Indianapolis, Indiana

## Perfect Timing



## console mount clocks and timers

Reliable ESE clocks and timers are now available in compact (2" x 3.7" x 3.6") console mount enclosures with bright red LED's to read .33" red LED's. Provided with rear solder pins for connection to your own switching or the optional remote connector, 6' cable and pushbutton set. Other options include BCD Output; Crystal Timebase; 220V-AC-50Hz; and Kit Form. In addition the ES-370 is available with Stop and/or Relay Contact Closure at Zero.

|                               |        |
|-------------------------------|--------|
| ES-172 12 Hour Clock          | \$125. |
| ES-174 24 Hour Clock          | \$125. |
| ES-370 100 Min. Up/Down Timer | \$180. |
| ES-570 60 Minute Timer        | \$125. |
| ES-572 12 Hour Clock/Timer    | \$150. |
| ES-574 24 Hour Clock/Timer    | \$150. |



Write, Wire or Call: (213) 674-3021  
505 1/2 CENTINELA AVENUE • INGLEWOOD, CALIFORNIA 90302

For More Details Circle (50) on Reply Card

BROADCAST ENGINEERING



## Products

Continued from page 82)

antages, including: (1) The ability to select one or more receive antennas to cover specific quadrants of interest; (2) The ability to rotate any antenna in either the 2 or 7 GHz band, or in both bands simultaneously; (3) The ability to obtain the best available gain by selection of the optimum polarization mode while rejecting other modes, thereby eliminating undesirable multipath effects resulting in fading or smearing.

For More Details Circle (137) on Reply Card

### 10½-Inch Reel Tape Recorder

Tandberg of America has a new 10½-inch, 3-head reel-to-reel machine available that they'll guarantee to have a minimum signal-to-noise ratio of 72 dB. Their 10XD machine combines the Tandberg field recording technique with the Dolby™ B system.

The 10XD also features electronic speed control, electronic logic controls (including photo effects), echo, sound-on-sound, and editing capabilities, and A and B

For More Details Circle (138) on Reply Card

### ENG Color Package

AV Industries showed their new 4800 series, half-inch EIAJ-1 color video system for electronic journalism.

The heart of the system is their E-800U color camera. With a zoom grip and lens, it weighs 8 pounds. It uses two electrostatic cathode ray/electromagnetic deflection tubes, one for luminance, one for chrominance.

The 4800 series recorder will record for 30 minutes on one reel of tape. Slow motion playback is available at speeds from ¼ normal to full stop.

The series also includes the E-40U AC power adapter, E-1 Battery Pack, KR-200U RF Converter, and a GA-20U Camera Adapter.

For More Details Circle (139) on Reply Card

### Delay Cartridge

A new delay cartridge, a competing product of Fidelipac recording, was introduced at the con-

vention.

Utilizing standard Model 300 (NAB "A" Size) and Model 600 (NAB "B" Size) bodies, the new cartridge features curved pressure pads and special reel lubrication to minimize tape wear and assure extended life.

Available in both 8 and 10 second lengths for use with cart machines having delay head configurations. These cartridges are available from Fidelipac Distributors world-wide.

For More Details Circle (140) on Reply Card

### Helical Program Computer

Convergence Corporation, Southern California designers and manufacturers of the ECS-1 "Joystick Videola" Editor and the SM-2 Joystick Search Module, has announced its new PC-3 Triple Function Program Computer.

The Convergence PC-3 provides automatic bi-directional tape search, continuous tape timing and insert duration timing—all programmable with a hand-held calculator.

(Continued on page 90)

**In AM-FM towers, second best is too expensive.**

To get the AM or FM tower you need, don't choose a manufacturer by price alone. You may get far less than top quality—and lose in the long run through excessive maintenance and repair costs.

Stainless prices are competitive, or we wouldn't have built as many AM/FM towers as we have over 25 years. We also maintain an unexcelled level of excellence in engineering, workmanship and materials, no matter how large or small the job. For you, this means minimal outlay for maintenance and repairs.

We're also well known for tall towers, but we take as much care with each detail of a 200 foot radio tower as we do for our 2000 foot TV towers.

That's why we have our reputation—and why you should call us for your next AM-FM tower.

**Stainless, inc.**  
 North Wales, Pennsylvania, 19454  
 Phone: 215/699-4871  
 TWX: 510-661-8097

For More Details Circle (52) on Reply Card



# PHILLYSTRAN®

... manufactured from  
impregnated aramid fiber

## GUYS THAT OUTLAST THE TOWER

- non-interference
- minimum stretch
- maintenance-free

If you are looking for guys that eliminate the usual problems of RFI ... and guys that never need to be replaced during the life of the tower, then PHILLYSTRAN is the answer.

Cable assemblies can be made to any length, terminated and proof-loaded.

Call or write for additional information.

® PHILLYSTRAN... proprietary resin impregnation process of Philadelphia Resins Corp.

VISIT US AT AFCEA BOOTH 157



**PHILLYSTRAN®**  
ROPES AND CABLES

PHILADELPHIA RESINS CORPORATION  
20 Commerce Drive, Montgomeryville, Pa. 18936, U.S.A.  
215/855-8450 • Telex: 846-342 • Cable: PHILRES MMLL

For More Details Circle (53) on Reply Card

## FCC Wants To Amend Non-Commercial Rules

The Commission has proposed amending its relating to noncommercial educational FM broadcast stations.

The action was in part based on a rulemaking petition filed by the Corporation for Public Broadcasting (CPB). Another petition, from Open Outreach, Inc., also dealt with one of the mentioned by CPB.

CPB sought a series of changes in the relating to the assignment and operation of noncommercial educational FM stations, and Open Outreach requested assignment of FM Channel (87.9 MHz) to Washington, D.C.

In this proceeding, the Commission said intended to examine a wide range of issues relating to the most efficient and effective use of the channels (201-220) reserved for noncommercial educational use. It noted that some of the points raised by CPB already were under study by the FCC, and would be taken into account in this proceeding.

Technical issues to be considered include standards governing the classes of educational stations, the facilities available to them and protection to be afforded them; interference to educational FM stations to reception of tele-

## Datametrics

The name for Precision Time Code Data Indexing and Retrieval Products

now announces

### SMPTE - TV EDIT TIME CODE GENERATOR AND READER



#### FEATURING

- Wide Dynamic AGC for amplitude variation frequency response.
- Error by pass for fail safe operation.
- Drop frame or black and white operation.
- Reader and/or generator models available.
- External or line synchronization.

Our application engineering group is at your prompt service to review your video editing problem and offer our optimum solution. Request Bulletin SMP-

## Datametrics

A subsidiary of **ITE Imperial** CORPORATION

340 FORDHAM RD., WILMINGTON, MASS. 01887 (617) 658-5411

For More Details Circle (54) on Reply Card

BROADCAST ENGINEER



6; the establishment of a new FM Channel and treatment of 10-watt stations on a priority basis.

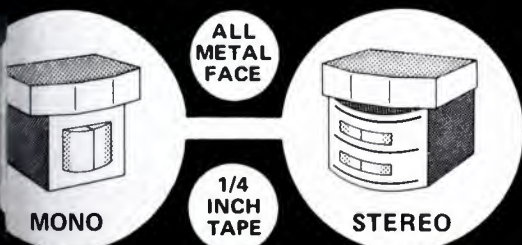
Technical issues to be considered include giving noncommercial FM stations to have a regular schedule of operation, and requiring them to demonstrate community needs. (On March 10, 1986, the Commission dealt in part on the latter point by adopting ascertainment procedures for noncommercial educational FM stations.)

The Commission said it hoped to be able to develop a system by which existing educational stations would be able to obtain more substantial protection, and to offer some protection for future stations.

It noted that some years ago it had examined a number of related questions as a part of the proceeding in Docket 14185. It said that proceeding was the adoption of a Table of Assignments for commercial FM stations as well as the resolution of a number of other issues relating to commercial FM stations. However, since most of the issues relating to educational stations still had not been resolved, the Commission said it would continue Docket 14185 and transfer those issues to the current proceeding.

**Table Treatment**

The two principal issues carried over are the establishment of an FM table for educational stations and the treatment to be given to 10-watt stations. (Continued on page 109)



- Scully** LETTER BAR MODIFICATION
- AMPEX** NON-POPPING GATE SPRING MODIFICATION
- Magnecord** FOR OLDER MODELS: POLE PIECES, CAPS W/GUIDES, REPLACEMENT HEADS

**DIRECT REPLACEMENT HEADS**  
MMI HEADS EQUAL OR EXCEED ORIGINAL EQUIPMENT SPECS.

**SEND US YOUR ASSEMBLY.** We will ultrasonically clean everything — install new heads if yours cannot be relapped — replace any worn or missing minor hardware — adjust — test — ship back PRE-PAID your assembly (not some other).

**36 HOUR SERVICE — LOANERS AVAILABLE**  
**INSTALL YOURSELF.** Buy MMI heads with complete written and pictorial instructions.



**saves you time,  
energy and money...**

check us for best buys in broadcast components — fast personal service



**Scully 280B** You know of its quality and reliability — now check us for our personalized service that saves you from frustrating concerns. Authorized distributor.



**Fidelipac—  
The Master Cart**

Perfect for your AM station today and your AM Stereo station tomorrow. CM sells this super cart in any quantity from a 6-pak to 6,000. Fast delivery.



CM is also distributor for



**Spotmaster Series 3000** CM is the franchise dealer for this rugged cart machine . . . you'll find we sell and service to save you time and energy.

**Phone us: (215) 437-0607** for more information.

Or, fill out the coupon and send to us with your specific requests on any broadcasting equipment need.

Name \_\_\_\_\_ Title \_\_\_\_\_  
 Firm \_\_\_\_\_  
 Address \_\_\_\_\_  
 City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
 Send me data on: \_\_\_\_\_

My phone number is: \_\_\_\_\_

**CM Communication Medias**  
Broadcast Component Distributors  
P.O. Box 54/ Allentown, Pa. 18105

# NAB Products

(Continued from page 87)

lator keyboard. Precision accuracy in the system is maintained by a unique "closed loop" system of counting control track pulses of normal videocassette tapes.

Convergence's PC-3 is designed as an add-on accessory to the Convergence ECS-1 Joystick Editor, and will be sold through Convergence's worldwide network of distributors.

For More Details Circle (158) on Reply Card

## Tunable Demodulator

**Telemet**, a Geotel Company, announced at NAB 1976 that their Precision Demodulators Model 4501A1 and Model 4501A3 are now available with a push-button channel selector for all VHF channels.

The Telemet Precision Demodulator can now be obtained for use as a back-up unit for multiple station operations or as an auxiliary off-air pick-up for network feeds.

Additionally, a CATV version of this tunable VHF demodulator Model 4502B1 is available for cable installations with a backup unit for all VHF stations plus the quality, performance and dependability broadcaster can expect from any demodulator bearing the Telemet name.

For More Details Circle (141) on Reply Card

## 2.5 KW AM Transmitter

The **Wilkinson Electronic** Model 2500B is a heavy duty 2.5 KW broadcast transmitter contained in a single cabinet requiring only 10 square feet of floor space.

All tuning and operating controls are on the front panel of the transmitter. After initial adjustment and tuning are completed, operation is simple and push buttons are used for normal operations.

The low voltage supplies, ladder, and timing circuits, as well as the RF exciter, are housed in a middle drawer which can slide out for ease of maintenance, cleaning and servicing.

The solid state modulator is located on the shelf beneath the modulator final. The modulator finals and the RF finals are incorporated (2) 4-1000A tubes are located in the main air compartment, and operation of these tubes is visible through a Lexan plastic window.

The high voltage power supply is located on the base of the transmitter along with the modulation transformer and modulator reactor. Access to these compartments can be achieved through the interior front panel doors or the interior rear door.

For More Details Circle (142) on Reply Card

## Peak Maximizer

The **QEI Peak Maximizer** is an all solid state peak limiter. It has been designed for the purpose of preventing overmodulation of the negative and positive peaks. The AM version, Model 100, prevents overmodulation on the positive peaks while maintaining maximum positive peak modulation.

(Continued on page 90)

- 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.

Rep inquiries invited.

## AMPRO CORPORATION

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



For More Details Circle (56) on Reply Card



# PEOPLE IN THE NEWS

**Douglas I. Sheer**, advertising and sales promotion manager of JVC Industries, Inc. has been elected to the Board of Directors of the National Audio Visual Association.....Recent nominations to the Institute of Electrical and Electronics Engineers, Inc. are **Dr. Robert M. Saunders**—president and **Robert D. Coleman**—executive vice-president.

**Kevin Electronics**, division of Apollo Lasers Inc., announces a reorganization in their Los Angeles office. **Donald T. Heckel**, formerly vice-president of marketing, has been promoted to vice-president and general manager, **Tom Miller**, previously sales manager moves into **Bob Milecki's** job as western regional sales manager. Mr. Milecki is now manager of special projects, a newly created position; **Bob Herring** steps into Mr. Miller's job as sales manager.

**Information, Inc.** reports the appointment of **Gary G. Elsaesser** as director of the firm's newly organized national sales department.....**Abid Farooq** joins the Coastcom staff as senior project engineer in charge of single sideband product development.....**Audiotek, Inc.** names **William R. Brock** manager of sales with responsibility for domestic sales of recording, broadcast, and sound reinforcement lines. **Michael Long** is now with General Cable Corporation as national sales manager.

**J. Murray** has been designated vice-president of public affairs for Warner Cable Corp. while **Infoc-Atlanta, Inc.** tells us of the appointment of **John R. Edwards** to the newly-created post of director of administration and operations.

**Micro Electronics Inc.** announces the appointment of **Bob Herring** as East Coast Sales Manager. Herring offices in BEI's Kansas City headquarters.

The position of sales supervisor for professional recording and broadcast markets at the Magnetic Audio/Video Products Division of the 3M Company will be filled by **James M. Hollon**.....**Micro Consultants, Inc.** adds to their staff with **George Grasso** as vice-president of marketing and **Brian Matley** as vice-president of engineering and chief technical officer.

**Chester P. Coleman** becomes the exclusive System 700 sales specialist at IGM, a division of Northwestern Technology.....The resignation of **Bill Mansfield**, a Datatron founder, as a full-time Datatron employee has been announced.

In the radio and television section of the industry, **Eric Hauenstein**, vice-president and general manager of radio station KDKB has been named program chairman for NRBA's National Radio Broadcasters Conference and Exposition.

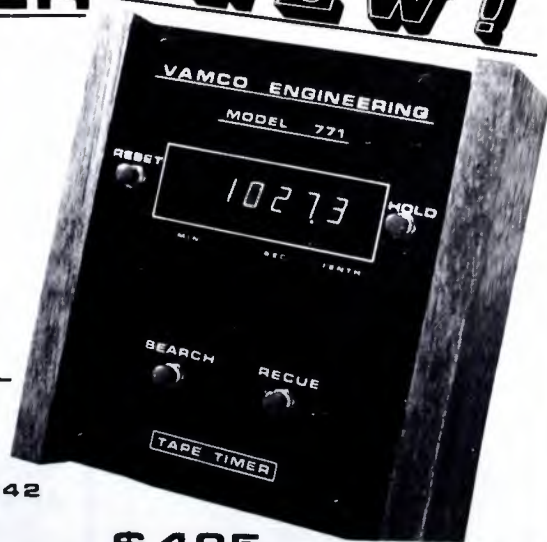
**KMPH-TV**, Tulare-Fresno assigns the position of national sales manager to **Gary J. Waller** while at **WTOL-TV** of Toledo, Ohio **Jack Sander** becomes their assistant general manager.....**Don Stafford** joins **KEVN-TV/KIVV-TV**, Rapid City, South Dakota as chief engineer and at the same station, **Jim Kozora** becomes assistant chief engineer.

**Bird Electronic Corp.** has established a regional sales engineering office in Pennsylvania for the eastern United States and a second office in California covering the western United States—**Richard Tanczos** is eastern regional manager and **George Churpek** will head the western office.....**United Systems Corp.** names **Richard Pitner** product manager for digital printers, thermometers and data acquisition systems and components.

## 2850 TAPE TIMER

# NEW!

- ▶ SLOW SEARCH & RECUE STD.
- ▶ OPTIONAL PRESET & SHUTTLE.
- ▶ PLUG COMPATIBLE BRIDGING INPUTS FROM MACHINE.
- ▶ SIMPLE, ACCURATE EDIT OPTION.



**VAMCO ENGR. BOX 7512**

**TULSA, OK! 74105 (918) 252-4142**

*"leadership through creativity in design"*

**\$ 495.**

For More Details Circle (48) on Reply Card



# QUARTZMATIC<sup>®</sup> STUDIO CLOCK

with the "instant" advantage



Accuracy to  $\pm 1$  minute a year

*Seth Thomas*

Makers of fine clocks since 1813

**Here's why the General Time Seth Thomas battery-powered Quartzmatic is the ideal clock for TV and radio stations and recording studios.**

Instant by instant, the accuracy is remarkable. No more timing problems due to electrical failures. No more "is-that-clock-right?" worries. The Quartzmatic is perfect for studios, control rooms, newsrooms, offices, you name it. Other advantages:

- Portable
- Big 12" diameter face with 1 and 1/2" numbers and red-sweep second hand make it a cinch to read, even from a distance
- Works on 2 "C" batteries
- White or tan face, charcoal numbers; with woodhue case.

**Price advantage, too! Only \$59.95**

With all its assets, it's a great bargain at \$59.95. Shipping included. Send check or company purchase order. Include local taxes. If you prefer, we'll send C.O.D. Specify white or tan. Batteries not included. Mail your order now to Dept. BE-5 at nearest service center.

**GENERAL TIME SERVICE**  
A TALLEY INDUSTRIES COMPANY

GENERAL TIME SERVICE

AKRON 819 E. Market St., OH 44305  
CHICAGO 206 N. Michigan Ave., IL 60601  
DALLAS 400 S. Ervay St., TX 75201  
LOS ANGELES 5404 Wilshire Blvd., CA 90036  
NEW YORK 150 E. 47 St., NY 10017  
PHILADELPHIA 1214 Walnut St., PA 19107  
PHOENIX 2047 E. Camelback, AZ 85016  
QUEENS 170-08 Jamaica Ave., NY 11433  
SAN FRANCISCO 540 Mission St., CA 94105  
SEATTLE 1510 Sixth Ave., WA 98101  
WHEELING 599 S. Wheeling, IL 60090

For More Details Circle (58) on Reply Card

## NAB New Products

(Continued from page 90)

Positive peak enhancement is switch selectable and adjustable for various percentages of asymmetry. Circuitry is included to keep the greater modulation peak positive, thus raising the average modulation level.

The Peak Maximizer is manufactured in a standard 3 1/2 x 19 inch rack mount. Input, output and release time constant controls are located on the front panel. Positive peak switch and control, power cord, fuse and terminal block are located on the rear panel.

All QEI Maximizers have individual input and output level controls. Each control has a knob with a logging scale behind it. This feature gives the operator a memory device for setting the controls if they were disturbed for any reason.

The dynamic attenuator that controls the gain of the maximizer has a connection brought out on the rear terminal strip. This allows the operator to gang two mono Maximizers for stereo operation.

An FM station that has changed from mono to stereo operation can update his audio processing equipment by obtaining additional mono maximizers and ganging them for stereo with this feature. A single wire connection between two mono maximizers provides stereo operation.

For More Details Circle (143) on Reply Card

### Studio Audio And Furniture

A totally new complete audio facility including furniture and components has been introduced by **Ampro Corporation** at the recent audio equipment convention. This studio turnkey package can be tailored to meet a station's needs with the professional audio console, turntables, tape machines and other equipment wired for easy installation on sturdy modular furniture.

The furniture, constructed of heavy duty 3/4" and 1 1/2" materials and laminated with formica, is available in turntable cabinet, rack and console table configurations. Custom versions to order.

In addition, Ampro introduces the SRC-1 Digital Sequencing Remote Control for up to 6 cartridge reproducers. Operating 6 individual remote start switches, the desk mount unit has individual LED status readouts and independent programming switch to allow automatic operating sequence for sequential playback or cluster as 3 and 3, 4 and 2, etc. An automatic skipover is also provided which will play only the "ready" reproducer within the sequenced program.

For More Details Circle (144) on Reply Card

### Digital Antenna Monitor

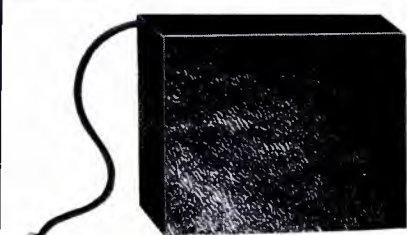
**Delta Electronics** showed the DAM-1 digital antenna monitor that has been type approved by the FCC. The unit gives true readings and exhibits good stability with modulation.

The DAM-1 will work with six towers DA-2 Standard towers with an extension universal base current adapter is available.

Delta also manufactures a digital antenna monitor called the AAM-1. It works with up to six towers DA-2.

The company also introduced a new antenna current measurement system. It has dual ranges for

## Nickel Cadmium BATTERIES for ENG.



**ALEXANDER BP-20A**

**REPLACES SONY  
LEAD ACID BP-20A**

**FITS MODEL NO.  
TAPE RECORDER VO 3800  
CAMERA NO. DXC 1600**

**CAN BE  
MODIFIED TO  
FIT AKAI**



Write Wire or Phone

**ALEXANDER manufacturing co.**

Box 1645 Mason City, Iowa 50401  
Phone (515) 423-8955

For More Details Circle (59) on Reply Card



light power changes, and it separate meter with lightning on switch.

More Details Circle (145) on Reply Card

**Audio Cart Replacement Heads**

Beaucart Division of UMC Electronics introduced a new line of replacement audio heads. You'll find that in recent months we have expanded our expansion into audio machines.

These replacement heads are available from stock and may be used with most popular machines. Previous models include mono stereo record and mono and stereo layback.

More Details Circle (146) on Reply Card

**VHF Solid State Field Strength Meter**

Continac Instruments' new field strength meter—the FIM-71—is a portable test instrument of laboratory quality. A quick look reveals it was designed for the field use.

Featuring a dipole and a highly accurate tuned voltmeter with a sensitivity of 140 dB, this instrument is suitable for practically all types of field strength measurements in the 45 MHz to 225 MHz frequency range.

Depending upon the characteristics of the signal measured, the user can switch select narrow bandwidth, peak or average value for pulse modulated signals, FM demodulation, and a dynamic range of either 20 or 40 dB.

More Details Circle (147) on Reply Card

**Line-By-Line Auto Equalizer**

Computer Magnetics Corp., which specializes in Video Discs and the refurbishing of video and audio heads, has introduced a line-by-line Auto Equalizer during this convention. The Auto Equalizer will update the VR-2000's and VR-100's to obtain full automatic line and channel by channel level adjustment.

Therefore, the Auto Equalizer enables a user to improve the picture quality from a poorly recorded video tape, and to prolong the life of the tape by eliminating the wear of heavy female guide rollers.

More Details Circle (148) on Reply Card

**ALL SOLID-STATE AURAL STUDIO-TRANSMITTER LINKS**



■ MONAURAL AND COMPOSITE VERSIONS

OPERATION IN ALL STL BANDS — 890-960 MHz

- 450-470 MHz • 300-330 MHz
- 200-240 MHz • 148-174 MHz

All solid-state aural STL's to fulfill almost every requirement. Moseley Associates has pioneered many STL concepts — solid-state systems, true direct FM modulation, and composite operation (FM stereo on a single link)...just to name a few. Front-panel metering of all important parameters is included on all Moseley STL transmitters and receivers. Subcarrier capability enables wireless remote control, secondary program service, or intercom service.

**TRANSMITTER REMOTE CONTROL SYSTEMS**

Analogue



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

Digital



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

**REMOTE PICKUP LINKS**

Models RPL-3 and RPL-4 Remote Pickup Links provide unsurpassed audio performance for remote broadcasts. Two full-time microphone and high-level line audio inputs are standard.



For 148 to 470 MHz operation

The RPL-3 and RPL-4 Transmitters are only 4 inches high and weigh a mere 16 pounds—complete with audio mixing and AC/DC power supplies.

**OTHER MOSELEY PRODUCTS . . .**

- FM Subcarrier Generators and Detectors ■ Stereo Generators
- STL Accessories ■ Remote Control Accessories

Please contact us for further information.



MOSELEY ASSOCIATES, INC.  
SANTA BARBARA RESEARCH PARK  
111 CASTILIAN DRIVE, GOLETA, CALIFORNIA 93017  
Telephone (805) 968-9621 / Telex 658448 / Cable: MOSELEY



# FIRST CARTRIDGE

with full internal guidance  
with reel-to-reel fidelity  
(20 Hz to 15 kHz)

with FM bdcst. phase stability  
(better than 90° to 12.5 kHz)

with engineering plastics

with a replacement guarantee  
against any performance  
failure within advertised  
specifications on properly  
aligned equipment.

# &

STILL THE ONLY CARTRIDGE  
INDIVIDUALLY CHECKED FOR  
PHASE, FREQUENCY RESPONSE  
AND OVERALL PERFORMANCE



## ARISTOCART

THE CARTRIDGE FOR PEOPLE  
WHO CARE HOW THEY SOUND

DISTRIBUTORS IN ALL MAJOR U.S. MARKETS

For the one nearest you, contact

ARISTOCART DIV. WESTERN BROADCASTING LTD.  
505 BURRARD ST., VANCOUVER, CANADA V7X 1M6  
TEL (604) 687-2844 TELEX 04-54639

DISTRIBUTORS: CANADA — McCurdy Radio Industries Ltd. Toronto, Ont. — L. A. Varah Ltd., Vancouver, B.C. GREAT BRITAIN — Selkirk Communications Limited, London, Eng. AUSTRALIA — Syntec Electronic Distributors, Pty., Castle Cove, N.S.W.

For More Details Circle (61) on Reply Card

### TV Sound Production

Rupert Neve Incorporated exhibited at NAB a large standard TV sound production console of which several have been built for a major U.S. network.

The 5305 system was designed for studio and on location or remote applications. A number of custom modifications are available to cover almost every sound production need.

For More Details Circle (149) on Reply Card

### TV Audio Control Center

Ward-Beck Systems exhibited the Olympic designed WBS 75046 mobile audio control center. Four of these units will be used by the CBC for the Summer Olympics.

The control center includes a massive patch panel, several level meters, slide controls, integral mixing, switching, distribution, and monitoring facilities.

The center even includes two video monitors and monitor speakers.

For More Details Circle (150) on Reply Card

### Refurbished Quad Heads

Videomax has announced that it can now refurbish the Mark XV. This raises the Videomax capability to the RCA high band and low band video heads and the Ampex Mark III, Mark X, and Mark XV heads.

For More Details Circle (159) on Reply Card

### Production Switcher

Vital Industries showed their VIX-114 series video switching system. This design offers the operator a choice of over 80 patterns, patterns such as star, heart, binoculars, keyhole, and rotary clock-wipe.

The system also features Vari-key, for soft, hard, shadow, or see-thru key. In addition, it offers a digital quad split that allows the operator to wipe or dissolve in each quadrant! Also, there's electronic vignette for adjustable soft pattern edges, and it uses digital edge keying for border, shadow, and outline.

The VIX-114 has a new digital, drift-free and jitter-free proc amp on output. The unit comes ready to interface for computer operation.

For More Details Circle (160) on Reply Card

### Professional Portable Console

Television Research International, Inc. introduced a professional portable production console convention.

The PPC-I System includes 5-inch color trinitron monitor program monitoring, two monitors for multi-camera program monitoring, a high-quality six vertical interval switcher, a input audio mixer, sync generator and all necessary intercomifiers, pulse distribution amplifier etc.

The two preview monochrome monitors and single trinitron monitor are positioned for operator's viewing and are shielded by a neutral density shade filter to allow glare free operation in sunlight. The broadcast vertical interval switcher features the solid state cross-points, pulse clamping, mixing amplifiers, and duty fader bars, Clare-P switches and modular electronic construction. The two-bus, six switcher features build-in line burst and top quality insert keyer for insertion of titles, etc. The switcher is capable of dissolve and from inserts. The key menu is selectable between mix, insert and mat.

The PPC-I is totally self-contained in a rugged "3 suitcase" it may be AC powered for field operation or easily handled and transported in car, airplane or by other convenient transportation means.

For More Details Circle (151) on Reply Card

### Sony's New Broadcast Line

Sony Corporation of America introduced ten new products, specifically for the broadcast market, at the opening of the 1976 National Association of Broadcasters Convention at McCormick Place. The products, including video taping equipment and recording items, represent the largest production of equipment by a company in recent years.

Among the new products are the following:

A new portable U-matic recorder and a new U-matic system, both capable of S.M. code generation signals when



G-101 signal generator, also for the first time. Other models include a portable 3-tube E.N.G. camera, a time corrector and a new editing timer. Noteworthy too is the G-100, a new 1-inch compact scan video tape recorder which permits broadcasters and/or production companies to achieve professional recording capability never offered previously in larger studio equipment. Rounding out the product line shown are monitors for both studio and mobile unit installation. Series of the new equipment begin in early summer.

For More Details Circle (152) on Reply Card

### Ten Channel Stereo Console

The new S-20 is the sixth in the LPB console line. This 10-inch version features step attenuators, 30 switched stereo program channels, and a mixdown is available.

The S-20 has all-transformer stand output, and it uses solid state electronic modules. It includes telephone-type switches and an external cue and monitor outputs.

The frequency response is  $\pm 1.0$  dB from 20 Hz to 20 kHz. Distortion is below 1% from 20 Hz to 20 kHz. Noise is at least 74dBm, with reference at the input level.

The S-20 also has muting and muting relays on the first three channels.

For More Details Circle (153) on Reply Card

### FM Transmitter

Howard Gelman, Vice-President and General Manager has announced that the Federal Communications Commission has issued acceptance on new CSI Electronic Inc., FM transmitters. The transmitters include models with output powers of 3, 5, 12 and 25 watts.

The transmitters exhibited at the show include design features such as increased efficiency, high reliability, and low maintenance.

Robust construction is used throughout with all RF components in shielded compartments. All conductive circuitry is low voltage AC for safety, provision for re-

mote control is standard, and all relays are front panel mounted for easy adjustment and maintenance.

The FCC accepted FM transmitters feature phase lock loop exciters and grounded grid triode output stages for stability without neutralization. All tuning and loading adjustments are made from the front panel, and output power is directly adjustable with a drive control without changing the loading.

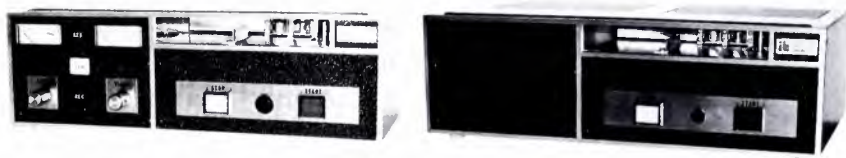
For More Details Circle (154) on Reply Card

### Stereo Control Center

Technics by Panasonic Professional Series audio equipment was introduced at the National Association of Broadcasters convention at McCormick Place; showcased were the new SP-10Mk2 turntable, stereo control center, stereo amplifier, and universal frequency equalizer.

Model SP-10Mk2 is a quartz-controlled, direct-drive turntable without arm for professional and semi-professional applications. It is

# it bench mark cartridge machines



## Measure all others against us

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



**INTERNATIONAL TAPETRONICS CORPORATION**  
2425 SOUTH MAIN ST., BLOOMINGTON, ILLINOIS 61701

Marketed in Canada exclusively by McCurdy Radio Industries Ltd., Toronto, Ontario  
Form 112-0006

© 1975 by ITC

For More Details Circle (60) on Reply Card





"Presented to

**RADIO STATION WMUU**  
**Greenville, S.C.**

*for outstanding and meritorious ability and intelligence demonstrated in the decision to install Aural Studio-Transmitter Link equipment and the high degree of knowledge exercised in making the equipment selection."*

#### Why STL?

1. No "lost air" time due to cut, wet or electrically charged telephone lines.
2. Better Sound Quality Than a Class AAA telephone line.
3. **EVENTUAL COST REDUCTION** in operating expense.
4. Complete control of entire broadcast system.

#### Why Dual Channel?

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

#### Why MARTI?

1. Channel Separation more than 65 db.
2. Channel Response matched to 0.25 db.
3. Distortion less than 0.5%.
4. All Solid State.
5. A Simple, True Direct FM **Plug-in** Modulator.
6. Complete accessibility to Modules without removal from rack.
7. The Marti System Delivers Top Performance with Transmitter manufacturer's Stereo Generator.
8. Marti STL Systems Log over **TWO MILLION (2,000,000)** Broadcast Hours each Year.
9. **AVAILABLE FROM STOCK.**

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

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


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

**MARTI Electronics, Inc.**  
Box 661 • Cleburne, TX 76031 • 817-645-9163

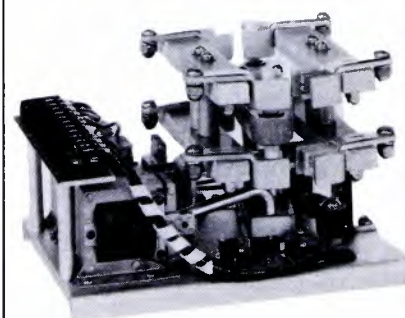
the successor to the Technics first direct-driven model, the hand-crafted SP-10, which is already one of the most prestigious and widely-used turntables in quality FM broadcast applications.

The SP-10Mk2 truly heralds a "new generation of turntables," chiefly because of its **quartz-controlled, phase-locked servo circuit**, adapted to maintain extremely constant, drift-free speed. The oscillation of a quartz crystal supplies a reference frequency against which the turntable's revolution speed is compared and, whenever necessary, instantly controlled.

Model SU-9600P is a solid state stereo control center with pre-amp. It provides an abundance of signal switching, control and connection functions which make it a veritable brain center for an audio system. Features include push-button input selectors, 4-stage direct coupling, 2 phono inputs with sensitivity/impedance adjustment, ultra-wide dynamic range in the phono equalizer for overload safeguard and 18dB/octave high/low filters with selectable turnover frequency.



**NEW GCR-201B CONTACTOR**



- Phosphor bronze spring contacts ensure good connection and long life.
- Oilite bearings guarantee smooth action and no sticking or jamming.
- Identical hookup wiring & contact position to original GCR-201, and E. F. Johnson contactor. Will replace either one.
- Only two moving parts in solenoid linkage.
- The GCR-201B is the lowest priced of any contactor used in Phasing Systems or antenna changeover.

**GELECO ELECTRONICS LIMITED**  
2 Thorncliffe Park Dr., Unit 28  
Toronto, Ont. M4H 1H2  
(416) 421-5631  
**Electronic Equipment Manufacturing**

It also has separate rig stepped bass and treble controls, bass/treble defeat and tuning frequency selectors, calibrated attenuator-type volume switch and rack mounting design.

For More Details Circle (155) on Reply Card

#### 1-Inch Leddicon Camera Tube

The introduction of the P8022 series of one-inch con camera tubes was made a convention by **English Electric Valve Company, Ltd.**

Sharing many of the features that have made the 30mm Leddicon widely used throughout the world, the new one-inch tubes are available as replacements for the Plumbicon®. The P8022 comprises one-inch diameter camera tubes of separate construction with lead oxide cathode and conductive layers.

They feature very short lag, high sensitivity, low dark current and are interchangeable with one-inch diameter mesh vidicon tubes. The P8022 series is identical to the P8021, with the addition of internal lighting to improve difficult lighting condition operation. Separately available in either series, are available in monochrome camera, luminescent channel, blue channel, green channel and red channel of cameras.

Extended red versions are available shortly.

For More Details Circle (156) on Reply Card

#### Video Tape Cleaner-Evaluator

A major cause of cassette tape maintenance—head clogging—can be substantially reduced. The new video cassette cleaner/evaluator machine will evaluate tapes, identify tapes with edge or print damage without adversely affecting the recorded image.

The machine will clean and evaluate a one-hour cassette in less than a minute. The wiping and honing tape cleaning technique will reduce video head powder problems.

For More Details Circle (157) on Reply Card



# CABLE ENGINEERING



# ***NCTA Still Committed To Equal Employment Opportunity***

The National Cable Television Association's Board of Directors has unanimously approved a resolution reaffirming its commitment to equal employment and ownership opportunity in the cable television industry and establishing an EEO industry committee to formulate a plan to meet EEO objectives.

The action followed a discussion of EEO status within the CATV industry at the board's meeting during the national association's 25th annual convention here.

The resolution stated that the Board recognizes the industry's legal and moral obligation to achieve equal employment and ownership opportunities within the industry with all deliberate speed, and directed the Chairman of the Board to establish a committee to prepare a program.

NCTA Board Chairman Burt I. Harris stated that the committee is in the process of being established and that a further announcement

would follow in the near future.

Following is the full text of the Board resolution:

"The Board of Directors of the National Cable Television Association reaffirms its commitment to equal employment and ownership opportunities in the cable television industry. The Board recognizes the industry's legal and moral obligation to achieve these goals with all deliberate speed, and accordingly directs the Chairman to employ a committee to formulate a program to meet these objectives."

## ***NCTA Present Annual Awards***

Daniel Aaron, vice president of Comcast Corp., Bala Cynwyd, Pa., has received the National Cable Television Association's Outstanding Committee Chairman Award for 1975-76.

Aaron received the award at luncheon ceremonies at the NCTA's 25th annual convention at the Dallas Convention Center. The award is presented annually to a member of NCTA who has contributed to the advancement of the association and industry through outstanding leadership of one or more of NCTA's 20 special or standing committees.

Aaron, who was elected vice-chairman of the Association in February of this year, was singled out for his outstanding performance during the past year as chairman of NCTA's Presidential Selection Committee and the Ad Hoc Committee on Multipoint Distribution Service (MDS). He was also lauded for his role in establishing and leading the activities of the Association's important Project 77 Committee in 1974-75.

During his years of involvement with NCTA, Aaron has also served

on NCTA's Legislative, Public Utilities, Public Relations and Community Services Committees. He was elected to the NCTA Board in 1973.

Aaron is vice-president and co-founder of Comcast, Corp., a Pennsylvania based owner and operator of CATV systems. Before joining Comcast, he was associated with Jerrold Electronics Corp., where he headed that firm's cable operations division.

Aaron holds a BA degree from Temple University and an MA in Economics from the University of Pennsylvania. He and his family reside in Elkins Park, Pa.

### ***Boggs Award***

Alfred R. Stern, senior vice president of Warner Communications, and a past NCTA Chairman, has been named winner of the Larry Boggs Award, the highest honor presented to a member of the cable television industry.

Stern received the award in ceremonies at the 25th annual convention of the National Cable Television Association. The Larry Boggs Award is presented by NCTA to an

individual who over the year made outstanding contributions to the advancement of cable television.

Stern has been involved in cable affairs for more than a decade. He was first elected to the NCTA Board in 1964 and later served as Chairman of the Association in 1966-67. He has more recently served as chairman of the Copyright Committee, and in 1974 was elected treasurer of the Association.

Stern received NCTA's Outstanding Committee Chairman Award in 1969 and the industry's first recognition for "Outstanding Achievement in Inter-industry Relations" in 1971.

Formerly chairman of the Board or chief executive officer of Warner Cable Corp., a wholly owned subsidiary of Warner Communications Inc., Stern is currently senior vice president, corporate affairs, Warner Communications Inc. and is a member of the board of directors and executive committee of Warner Prior to founding WCC's predecessor company, TeleVision Communications Corp. (TVC), in 1964, Stern was with the National



Company (NBC) from 1952-  
various executive capacities.  
is a trustee of Kirkland  
Clinton, New York; vice-  
man, Mt. Sinai Medical  
chairman of the board of  
Phoenix Theatre; a member of  
boards of directors of the  
Museum of Natural  
the Starwood Corporation,  
Greve Corporation, and the  
of Overseers, Center for New  
ity Affairs, New School for  
research.

### Beisswenger Award

V. Schneider, CATV Vice  
President for the Times Wire &  
Company, Wallingford,  
has received the Robert H.  
Beisswenger Memorial Award.  
The award was presented during  
ceremonies here at the 25th annual

convention of the National Cable  
Television Association. The Beiss-  
wenger Award is made annually by  
NCTA to an associate member who  
most typifies the "insight and  
counsel and inspiring direction"  
demonstrated by the late Robert  
Beisswenger. Beisswenger, who died  
in 1974, was NCTA national chair-  
man from 1968 to 1969.

Schneider was cited for his spirit  
of total involvement in and com-  
mitment to the cable industry and  
for his high standards of excellence  
in aiding in its growth and develop-  
ment for almost 25 years.

Schneider has been active in the  
cable industry since 1952 when he  
became system manager for the  
Williamsport (Pa.) Cable Co. Two  
years later he was named vice  
president and general manager of  
the system.

## Pole Attachment Hanging On

The pole attachment issue has  
before the FCC for over a  
year but the most recent phase  
of the controversy began in 1973  
when California telephone compa-  
nies announced plans to double its  
rate from \$3 to \$6 per con-  
sumer year.

In 1975, NCTA and AT&T  
reached an interim understanding  
on pole attachment rates charged  
by telephone system companies. How-  
ever, in the meantime, the problem  
has become complicated as electric  
utilities and independent tele-  
phone companies attempted to  
justify rate increases for use of

their poles in an effort to generate  
new sources of revenue.

Cable TV systems use more than  
9 million telephone and utility poles  
in the U.S. More than \$31 million  
is involved at current fee levels.  
Pole attachment fees are the "rent"  
cable systems pay to telephone and  
utility companies for the use of  
their poles to string coaxial cable to  
subscribers' homes. Use of poles  
has been standard procedure since  
the installation of cable TV by  
other means is prohibitively ex-  
pensive and some communities ban  
the erection of additional poles  
specifically for CATV use.

AT LAST . . .

# EIAJ CONNECTORS

for Sony, Panasonic, JVC,  
Sharp, Sanyo and Hitachi-  
Shibaden VTR/CCTV  
equipment



Now available for immediate ship-  
ment from our stock.

|                           | Cat. No. | 1-4  | 5+   |
|---------------------------|----------|------|------|
| EIAJ 8 pin plug (male)    |          |      |      |
| cable end                 | E8P      | 4.83 | 4.34 |
| chassis/panel             | E8PCM    | 1.82 | 1.63 |
| EIAJ 8 pin jack (female)  |          |      |      |
| chassis/panel             | E8JCM    | 1.71 | 1.53 |
| EIAJ 10 pin plug (male)   |          |      |      |
| cable end                 | E10P     | 8.75 | 7.87 |
| chassis/panel             | E10PCM   | 7.70 | 6.93 |
| EIAJ 10 pin jack (female) |          |      |      |
| cable end                 | E10J     | 9.76 | 8.78 |
| chassis/panel             | E10JCM   | 7.28 | 6.55 |

Minimum order \$20

(Dealer Inquiries Invited)

Enclosed is my check  
(We pay the freight when payment  
accompanies order.)

Please send me your  
Video Supply Center Catalog  
and put me on your mailing list.

Name \_\_\_\_\_  
Title \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_  
State \_\_\_\_\_ Zip \_\_\_\_\_  
Phone \_\_\_\_\_

**Comprehensive**  
SERVICE CORPORATION  
18 West 61st Street, New York, N.Y. 10023  
(212) 586-6161 — Out of State call (800) 223-5460

For More Details Circle (43) on Reply Card

**PUT YOUR  
BEST FOOT  
FORWARD  
in the March of Dimes  
WALKATHON**

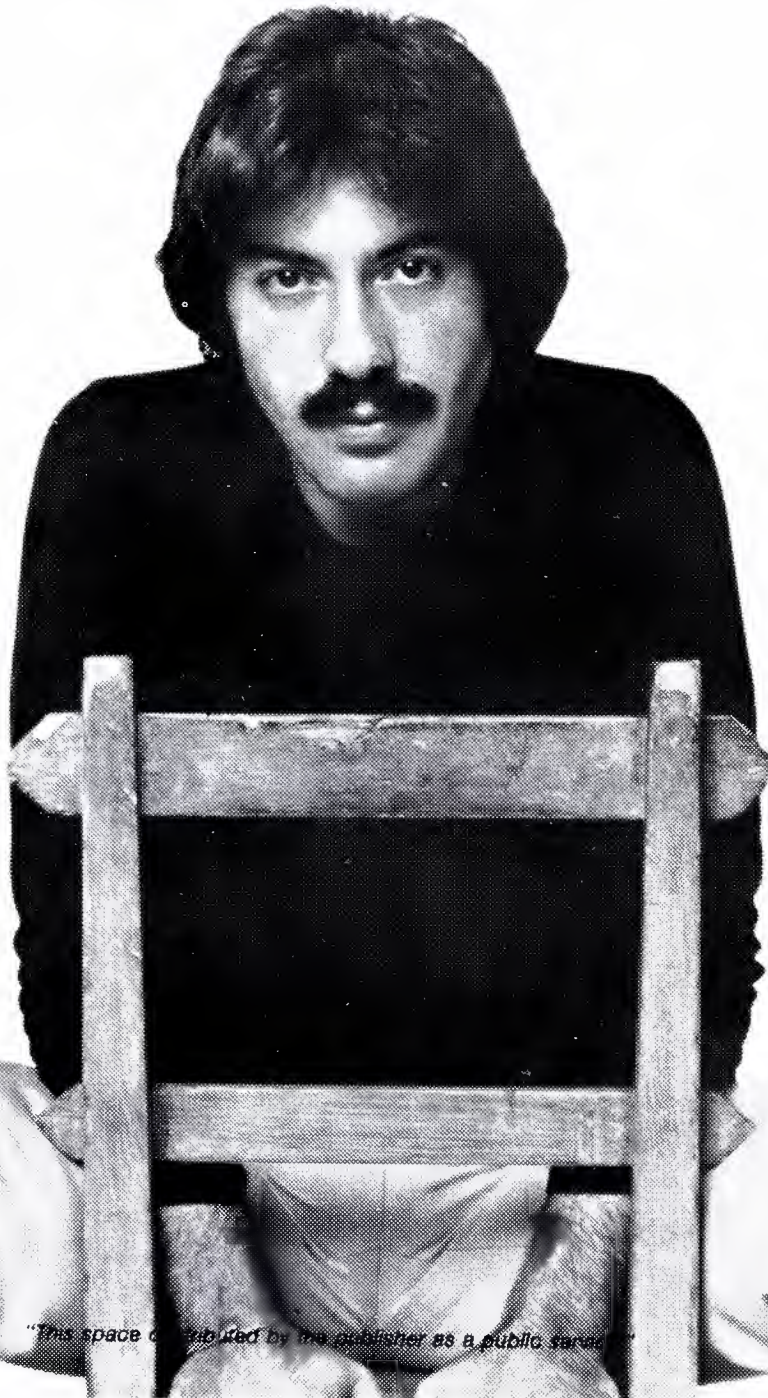
CONTRIBUTED AS A PUBLIC SERVICE BY THE PUBLISHER

**Mental retardation is not  
a household word.**

**And we don't want it to  
become one.**

**Only you can prevent  
mental retardation in your  
family. We'll give you  
the facts.**

**Write me . . .** at the National Association  
for Retarded Citizens, P.O. Box 6109, Arlington,  
Texas 76011

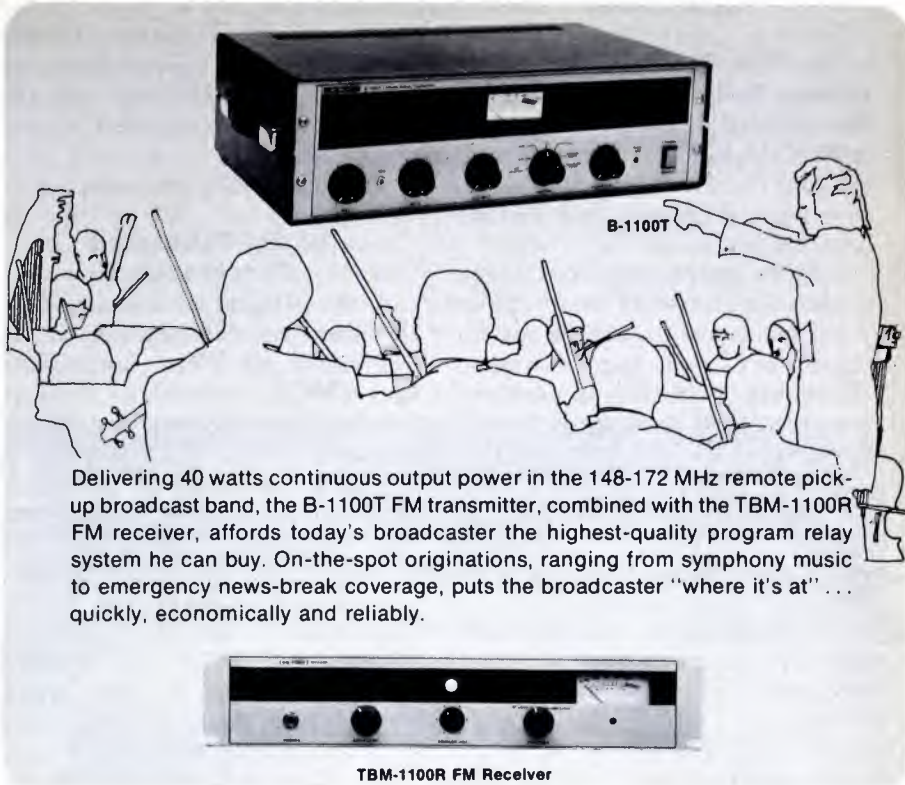


Tony Orlando  
National Prevention  
Chairman

*"This space contributed by the publisher as a public service."*



# remote pickup broadcast systems



Delivering 40 watts continuous output power in the 148-172 MHz remote pickup broadcast band, the B-1100T FM transmitter, combined with the TBM-1100R FM receiver, affords today's broadcaster the highest-quality program relay system he can buy. On-the-spot origination, ranging from symphony music to emergency news-break coverage, puts the broadcaster "where it's at" . . . quickly, economically and reliably.

TBM-1100R FM Receiver

**McMartin**

4500 South 76th Street • Omaha, Nebraska 68127 • (402) 331-2000 • telex 048-485

For More Details Circle (63) on Reply Card

## OMNIDIRECTIONAL ANTENNAS

2-7-13 GHz

### FEATURES:

- 360° Coverage
- Circularly Polarized to Eliminate Multipath Signals
- Suitable for Tower, Mobile or Helicopter Mounting
- Usable for Transmitting or Receiving Applications

NURAD MODELS 20 CO1, 70 CO1, 130 CO1

These circularly polarized omnidirectional antennas are designed to be employed in either transmit or receive operations. Their gain is 6.0 dB referenced to a like polarized isotrope. Coverage is a full 360° in azimuth and 19° in elevation at the half-power level.

Now through the use of Nurad's circularly polarized antennas, multipath signals that cause "ghosting" or "smearing" are greatly reduced or eliminated entirely.

**nURAD, inc.**

2165 Druid Park Drive  
Baltimore, Md. 21211 • 301-462-1700

For More Details Circle (64) on Reply Card

## Products

Article begins on page 46

### Laser-Optical TV Recorder

A new method of high-density recording that combines laser optical technologies to make it possible to store as many as 10,000 pictures on a single, 12-inch disc as unveiled by RCA for TV broadcasters.

The demonstration was described in a technical progress report on advanced recording techniques that initially could bring about drastic savings in TV studio operations.

Company officials said the method demonstrated was distinct from RCA's "SelectaVision" Videocassette system which uses a capacitive pickup technology especially developed for in-home use.

At the convention RCA engineers showed laboratory-built equipment that uses mini-computer control to allow the stored TV pictures to be randomly accessed and played in a fraction of a second. The demonstration recordings used a one-inch band on the disc.

Mr. Vander Dussen, Division President, RCA Broadcast Services, said the developmental system can store one frame of TV origination in only three-thousandths of a square inch. This system tracks on the disc for TV pictures occupy space only one-tenth as wide as a human hair.

While the demonstration covered only still pictures, Mr. Vander Dussen said the RCA technology was capable of recording motion pictures, from film, video tape or other sources. "It is conceivable some years in the future a TV station could broadcast an entire program from disc recording," he said.

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

For More Details Circle (165) on Reply Card



**Solid State  
Quad-Stereo  
Exciter**

The Phase 4 exciter produced by **Collins Radio Group, Rockwell International Corporation** not only delivers high-fidelity stereo sound, but also has the inherent capability of accepting discrete four channel broadcasting.

Collins guarantees that inter-modulation distortion in the Phase 4 exciter is only 0.5% or less in stereo, and half that in mono. Harmonic distortion is normally less than 0.25% in stereo and 0.12% in mono.

Collins' Phase 4 exciter will accept a composite studio transmitter link (STL) input and will accept any of the proposed discrete quad systems.

The Collins unit was used last year in discrete four channel broadcast field tests supervised by the Electronics Industry Association (EIA).

Stereo separation typically runs 50 dB or more at midband, when measured with a properly calibrated monitor.

Collins' Phase 4 is a direct FM exciter employing a phase locked loop Automatic Frequency Control (AFC) to provide typical frequency stability of  $\pm 100$  Hz at any modulation level regardless of program material.

For More Details Circle (166) on Reply Card

**Digital Framestore  
Synchronizer**

A new Digital Framestore Synchronizer was demonstrated at the Convention by **Micro Consultants, Inc. (MCI)**, exclusive Western Hemisphere distributors of the product. Called the DFS-3000, the new unit is capable of storing 2 complete fields of video, and can synchronize any video source including VTR inputs. The source may be local or remote, fed by line or satellite.

The complete system occupies only 8.75 inches of rack space, weighs less than 60 lbs., and dissipates only 250 VA.

A number of options for the DFS-3000 were also demonstrated, all of which can be "plugged-in" to the basic system. These include an

Infinite Window Time Base rector that provides correction helical scan or quad VTRs, p sing either direct or heter color; a Video Compressor reduces the picture to 1/4 sta size and positions it in any c four quadrants on the scre Joystick Control that moves; compressed image; Frame Field Freeze; and a Remote C Panel.

For More Details Circle (167) on Reply C

**Discassette**

**Arvin Echo** demonstrated new color frame stor<sup>TM</sup> that tronicly stores 400 slides-on-line—or, with the additi seven Discassette records, slides.

Each Discassette flexible r can store 400 frames. At \$ record, that's 20 cents per Arvin Echo also offers ext DOC.

Called the EFS-1 Framestor unit has record and play capability.

For More Details Circle (168) on Reply C

# Price & Performance that can't be matched!

DigiTec's full-function Universal Counter/Timers and Frequency Counters supply extended frequency ranges at a ratio of price to performance that can't be matched.

Outstanding features include dual input channels with independent controls, high input sensitivity, oven controlled crystal, and full 9 digit LED display with autoranging.



- 50 MHz ... Universal Counter ..... 8510A
- 150 MHz ... Frequency Counter ..... 8720A
- 150 MHz ... Universal Counter ..... 8520A
- 500 MHz ... Universal Counter ..... 8530A
- 600 MHz ... Frequency Counter ..... 8730A
- 1 GHz ... Frequency Counter ..... 8740A
- 1 GHz ... Universal Counter ..... 8540A

**DigiTec** **UNITED SYSTEMS CORPORATION**

918 Woodley Road, Dayton, Ohio 45403  
(513) 254-6251, TWX (810) 459-1728

*DigiTec: precision measurements to count*

*These instruments available under  
GSA contract GS-00S-27741.*



**VTR Head Refurbishing**

Computer Magnetics Corp. is prepared up to refurbish Mark I video head assemblies. The company offers one week turnaround on Mark III, Mark X, Mark XV, and Mark XX video assemblies. In addition, they repair audio stacks for VTR's. They also refurbish video discs and heads for slo-mo, and offer immediate shipment. For more details Circle (169) on Reply Card

**Video Processing Amplifier**

Industrial Sciences, Inc., ISI, offers their model 550 video processing amplifier that was designed to improve quality to poor video pictures.

The 550 is a modular amplifier that removes hum and tilt. It also corrects new sync, while blanking color burst give a completely new blanking interval with remote controlled blanking level.

Adjustable threshold white clip and level adjustments are provided. The horizontal timing control allows the output to be phased with the incoming video signal.

Color and white stretch modules are available options. For more details Circle (170) on Reply Card

**Portable TV Camera**

A studio version of the IVC-7000 portable television camera has been introduced by International Video Corporation.

Donald H. Fried, IVC President and Chief Executive Officer, said the new version features a special mounting configuration that includes a seven-inch viewfinder for close-up. The camera head can be attached easily to the standard field camera.

The IVC-7000P camera uses seven-inch Plumbicon™ tubes, with performance identical to the IVC-7000 studio camera which has a resolution of 51dB.

To convert the studio camera to portable model the camera is detached from its mount, lens and viewfinder, and fitted with a remote control and small viewfinder in less than three minutes. For more details Circle (171) on Reply Card

**Miniature Hand-Held Camera**

A tiny hand-held electronic camera smaller and lighter than the traditional film cameras used in television newsgathering was shown for the first time at NAB.

Developed by Thomson-CSF Laboratories, Inc., in cooperation with the CBS Television Network, the portable camera—called Micro-cam because of its micro-miniature electronics—weighs eight pounds. A

companion three-pound electronic hip pack, which can be worn around the waist, makes it possible to operate the camera in any situation, such as fast-breaking news events, to beam high-quality color TV pictures. The camera's low power consumption of 20 watts enables it to operate on standard flashlight batteries in an emergency.

For More Details Circle (172) on Reply Card

**LISTEN!**  
there is a difference...

**MULTIlimiter™**

the all new limiter system from Pacific Recorders is a genuine Multi-Purpose limiter with selectable pre-emphasis for **FM, FM Dolby™** and **TV**; automatic polarity correlator™ and asymmetry adjustment for **AM**, independent adjustment of RMS and Peak limiting, and the Pacific Recorders' mark of quality: *the important difference!*

Dolby™ and the double-D symbol are trade marks of Dolby Laboratories Inc

**Hear it today! Call, write or Telex—**

 **PACIFIC RECORDERS AND ENGINEERING CORPORATION**  
11100 ROSELLE ST., SAN DIEGO, CALIFORNIA 92121  
TELEPHONE (714) 453-3255 TELEX 695008

For More Details Circle (44) on Reply Card



## ENG Signal Processor

Microtime, Inc., a subsidiary of Andersen Laboratories, Inc., of Bloomfield, Connecticut introduced a new development for processing and improving the video signal of helical VTR's.

Lower cost helical VTR's, particularly the popular U-Matic cassette machines, have enjoyed wide spread use by broadcasters, mostly

in Electronic News Gathering (ENG) applications. Expanded use, however, has been limited by signal to noise levels and picture "softness" when compared to traditional, but more costly VTR's. Annoying picture breakup caused by tape deck movement during recording has also been a problem.

Microtime's new unit, called Model 2020 Electronic Signal Processor, compensates for the

U-Matic picture limitations, as providing time base correction for house-locked NTSC playback capstan-servo'd VTR's.

The 2020 eliminates picture breakup, caused by moving recording deck, making use of new, integral AUTO-TR feature.

The correction range of the unit is  $\pm 2H$  lines, approximately greater than prior units.

In addition, drop-out correction and line by line velocity correction functions are available as plug-in options, for those speed helical formats requiring additional refinement.

The picture improvement provided by Microtime's 2020 applies to all non-segmented helical formats.

For More Details Circle (173) on Reply Card

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

**BELAR**  
AM MODULATION MONITOR

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

For More Details Circle (69) on Reply Card

## DJ's Sportscasters

### Eliminate Off-Mike Problems With The Sportscaster Headset

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

The headset has a

- Dynamic boom microphone: 400 ohms, frequency range 50-15,000 Hz. Sensitivity 2mV (loaded) for close speech.
- Double headphones: independently wired, 200 ohms each 50-15,000 Hz. Single 'phone version available.
- Ventilated foam cushions eliminate perspiration and let you hear ambient sound and are interchangeable with ear-enveloping cushions.
- Weight: 8 ounces. Practically unbreakable components. Optional cough switch.

*Single Phone..... \$73.00*  
*Double Phone..... \$86.00*  
Delivery from stock.  
Ask for literature on practically unbreakable headphones.  
Dealer inquiries invited.

*Television Equipment Associates, Inc*  
Box 1391 • BAYVILLE, N. Y. 11709  
516 • 628-8068 BILL PEGLER

For More Details Circle (135) on Reply Card

## BUILD A BETTER STUDIO

Call Aderhold Construction Company. A complete construction management team of architects, builders, engineers and designers. No problem too large or too small. 404/233-5413.

### Aderhold Construction Company

3384 Peachtree Rd. NE / Atlanta, Georgia

For More Details Circle (162) on Reply Card



# THE NEW STANDARD

COVERS AM BAND PLUS HARMONICS TO 5 MHz



The Model FIM-41 Field Strength Meter has many more features —

- Measures Harmonics to -80 dB
- High Adjacent Channel Rejection
- Ganged Oscillator/Receiver Tuning
- Stable Operation over wide Temperature Range
- Low Battery Drain Circuits
- Front Panel Speaker
- Large illuminated Meter and Tuning Dial
- Indicates field strength accurately down to 10  $\mu$  volts/M
- RF input jack for tuned voltmeter applications

CONTACT US NOW FOR COMPLETE DETAILS ON OUR LINE OF FIELD STRENGTH METERS

## POTOMAC INSTRUMENTS

932 PHILADELPHIA AVE.  
SILVER SPRING, MARYLAND 20910 (301) 589-3125

For More Details Circle (71) on Reply Card

program and 55 dB on monitor. The program frequency response is  $\pm 0.5$  dB, 20 Hz to 20 kHz. Harmonic distortion is 0.5%, 20 Hz to 20 kHz at 14 dBm.

For More Details Circle (175) on Reply Card

### Oscilloscope Battery Pack

A new Philips universal battery pack—PM8901—has been introduced by Philips Test & Measuring Instruments, Inc., a subsidiary of North American Philips Corporation.

The new battery pack, the PM8901 can be used with almost any of the company's range of oscilloscopes, in 'free from line' situations.

Both high and low output are available, nominally 24 V and 180 V DC. The 'low' output is derived directly from the sealed lead-acid batteries, while the 'high' output is produced via the high-efficiency DC-DC converter.

This unit is fully protected against excessive input voltage, short-circuit and excessive dis-

## NEW FM AND TV FIELD STRENGTH METER FIM-71

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



CONTACT US FOR DETAILS.

## POTOMAC INSTRUMENTS

932 PHILADELPHIA AVE.  
SILVER SPRING, MD. 20910  
(301) 589-3125

For More Details Circle (72) on Reply Card

Model 1020, the Julian Clock, displays and outputs time in terms of Year-of-Year, Hours, Minutes, and Seconds. The Day Clock, Model 1000, displays and outputs time in standard day format—Hours, Minutes, and Seconds.

For More Details Circle (174) on Reply Card

### Reel Tape Switcher

Model 1020, the Julian Clock, displays and outputs time in terms of Year-of-Year, Hours, Minutes, and Seconds. The Day Clock, Model 1000, displays and outputs time in standard day format—Hours, Minutes, and Seconds.

Model 1020, the Julian Clock, displays and outputs time in terms of Year-of-Year, Hours, Minutes, and Seconds. The Day Clock, Model 1000, displays and outputs time in standard day format—Hours, Minutes, and Seconds.

Model 1020, the Julian Clock, displays and outputs time in terms of Year-of-Year, Hours, Minutes, and Seconds. The Day Clock, Model 1000, displays and outputs time in standard day format—Hours, Minutes, and Seconds.



charge and cannot be overcharged.

Connection to any of the Philips oscilloscopes (PM3232/3233, PM-3240, PM3240X, PM3244, PM3261 and PM3265) is achieved without previous oscilloscope modification. This facility is of special advantage to multiple oscilloscope users since it avoids tiresome pre-purchasing decisions and the extra costs of modifying individual units.

This 'high' output can be discharged into loads of 5 to 55 W. Typically, a 20 W load will provide 6.5 hours operating time. The 'low'

output can be discharged at rates up to 3 amperes. A discharge rate of 0.75 A will give 9 hours operating time.

Charging time of the pack (from a fully discharged condition) is 8 hours or less, to 90% rated capacity and 10 hours or less, to 100% capacity.

For More Details Circle (176) on Reply Card

### Mono/Stereo Consoles

The new **Spotmaster® 4006** slide-mod is a complete, versatile, totally modular console for the broadcaster.

It accepts up to ten input and two remote modules (a total of 26 inputs) or 12 input modules (a total of 24 inputs). Each input module accommodates two high or low level (switchable) sources. In stereo modules, left and right channels of each input are individually level selectable. All inputs are balanced and specially RFI protected.

Each module is completely enclosed and shielded. Each module also contains its own voltage regulator to eliminate cross-talk and

externally generated noise "live" switching is performed fast, low-noise reed relays for and distortion-free operation mix-buss output of each mod balanced to eliminate the possibility of unwanted noise pick-up, talk, or ground loops.

The Slide-Mod consoles four muting/control relay miniature switch matrix and in 2 of the 10 input modules any relay to be programmed function when any combination of inputs and mix-busses are active (16 combinations for each module!). Monitor output relay contacts are brought out each relay.

For More Details Circle (177) on Reply Card

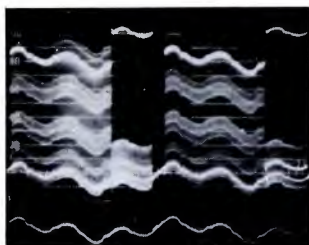
### ENG Camera

Following their FP3030 and 70 ENG cameras, **Hitachi Shiloh** added to their line with an all lightweight color camera designed for ENG applications.

Totally self-contained, the S should be of interest to the ENG station.

For More Details Circle (178) on Reply Card

## STOP GROUND-LOOP HUM!

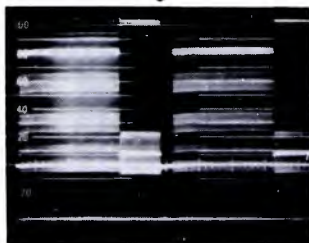


\$140  
F.O.B. N.Y.

NEW!



NEW!



VIDEO HUM STOP COIL

HSC 1

Will ELIMINATE HUM and other INTERFERENCE in Video Lines caused by differences in Ground Potential

- For Color and Black and White.
- FLAT-DC to 6.5 MHz.
- No Low-Freq. or Hi-Freq. Roll-off.
- No Differential Phase Distortion.
- No Differential Gain Distortion.
- No Envelope Delay.
- Passive Device - Failure Free-Low Price.
- Small Compact Package 4" x 4" x 2-1/4".

#### ELIMINATES HUM AND INTERFERENCE:

- |                                |                                    |
|--------------------------------|------------------------------------|
| <b>IN STUDIO</b>               | <b>IN FIELD</b>                    |
| Between Buildings              | Between Remote Truck and Telco     |
| On long runs in Buildings      | Between Remote Truck and Microwave |
| Between Studio and Transmitter | For Intertruck Hookup              |
| On Incoming Telco circuits     | For VTR Units                      |
| On Outgoing Telco circuits     | For Monitoring Lines               |

Available on 10 day free trial

**AUDIO-VIDEO ENGINEERING COMPANY**  
65 Nancy Blvd., Merrick, N.Y. 11566  
Tel. (516) 546-4239

For More Details Circle (65) on Reply Card

## A "SOUND" COMPETITIVE EDGE

The **STE-100 STEREO PHASE ENHANCER** . . . can minimize "Phase nulling" in "Mono-sum" signals, and ensure your "Sound quality" in today's competitive markets



GARRON ELECTRONICS, 1216 Kifer Rd, Sunnyvale, CA, 94086, Call (408) 736-3700

For More Details Circle (73) on Reply Card

## Mark IV-T Weatherminder

The original weather console designed especially for radio station local programming. Although many have tried to copy it for the last 20 years we can and will, on request, send you a list of hundreds of radio stations that still use and prefer the Mark IV. Real professional equipment at a modest price.

**Texas Electronics, Inc.**  
P. O. Box 7225B  
Dallas, TX 75209 ■ (214) 631-2490

For More Details Circle (74) on Reply Card

**Wind Direction & Speed  
Barometric Pressure  
Remote Temperature**

Also, a complete line of other instruments, recorders, sensors, controllers, etc. for Sheet BW-72.





## ENG

### Image Enhancer

television image enhancer for field cameras and portable tape recorders has been introduced by **Corning Glass Works.**

The Series 6100 ENG (electronic gathering) unit is designed for even minimal picture information content is available at sub-carrier frequency, a common circumstance at remote locations, being said. If presently available cameras are used, noise adversely affects the picture, the company

also said that, like its other image enhancers, the Series 6100 ENG unit offers an excellent signal-to-noise ratio.

For More Details Circle (179) on Reply Card

### Portable ENG Test Generator

E. G. news crews and engineers at remote locations can quickly and conveniently set up cameras, tape recorders, microwave and other equipment with a new lightweight signal generator manufactured by **Lab, Inc.** and distributed by

T.E.A., Bayville, New York.

The five-lb. generator, powered by eight C cells, supplies the NTC-7 composite test signal comprising a five-step Stair Step with color sub-carrier, a 2-T Sine Squared Pulse, a 12-T Chrominance Pulse, and a T-Window. It has its own digital color sync generator and video output meter.

To conserve batteries, the "power on" switch has an automatic shutdown which is internally adjusted.

For More Details Circle (180) on Reply Card

### Helical VTR

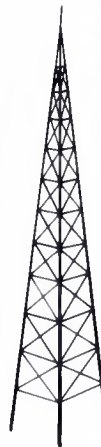
**Video Memory**, a wholly owned subsidiary of **Recortec, Inc.**, introduced the VM-1000, a high band helical scan VTR, featuring servo controlled tape tension with vacuum chamber buffers. The VM-1000 video tape recorder is a new generation transport design which has a single capstan drive system with vacuum chambers and servo tape tension control that eliminates the belts, brakes, clutches and retrievable guides commonly associated with older generation video tape transports.

## Everything the Professional Broadcaster Needs...

### BROADCAST SPECIALTIES

You can contact more than 30 manufacturers of broadcast equipment through one call to Broadcast Specialties. Carrying transmitter tubes in stock, Fidelipac and Audiopac cartridges, complete automation systems and transmitting plants. With the lowest cart rebuilding prices anywhere...starting as low as 90 cents!

Interested in audio equipment? Broadcast Specialties handles cart machines, consoles, pre-amps, turntables and tonearms. As well as monitoring and EBS equipment.



Broadcast Specialties represents the following manufacturers: Amco, Ampro, Audiopak, Belar, Pulse Dynamics, QRK/CCA, Russco Electronics, Shure, Spotmaster, Telex and more.

Phone Collect Day or Night  
...206/577-0330

**BROADCAST SPECIALTIES**  
3163 Ocean Beach Highway  
Longview, WA 98632

Dealers for Over 30 Manufacturers

For More Details Circle (75) on Reply Card

# R-MOD AUTOMATES YOUR OLD VTR

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

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

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

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

**RECORTEC, INC.** 777 PALOMAR AVE., SUNNYVALE, CA 94086 TEL: (408) 735-8821 TELEX: 910 339 9367

For More Details Circle (76) on Reply Card



The VM-1000, one-inch VTR achieves interchangeability with other "omega" format helical scan VTR's. The signal quality of the 7-10 MHz high band signal system in the VM-1000 falls mid-range between the high performance 2-inch quad and helical machines and the lower performance one-inch and 3/4-inch video tape recorders. The VM-1000 boasts exceptionally low S/N ratio and reduced moire to provide post-production capabilities with multiple generations.

The VM-1000 claims excellent vertical interval editing and features independent audio and video editing with insert and assemble capability. The built-in remote control capability for all primary operating controls insures plug-in compatibility with all Recortec micro-processor-based VTR controllers.

For More Details Circle (181) on Reply Card

### Lock-Down Reel Retainer

The VIF 1000, a brand new reel lock-down retainer, has been de-

veloped to provide a quick-loading, highly reliable method of securing both NAB and RETMA tape reels in place. This precision designed retainer, which works with either 1/4" or 1/2" reels on both rack and console mounted recorders, will stand up to the roughest handling and give years of trouble-free service.

When used with NAB reels, the VIF 1000 retainer can be permanently locked on the shaft. To secure the reel in position, simply align the retainer's protruding lobes, place the reel over the retainer onto the turntable, then lift and rotate the upper half of the retainer 60° in either direction, thereby locking the reel firmly in place.

For More Details Circle (182) on Reply Card

### Font Compose System

The Thomson-CSF Font Compose System gives Vidifont IV users the electronic capability of developing their own distinctive video graphics.

This system enables TV stations and networks to generate, at their own facilities, any log other special graphics desired any alphanumerical characters any type face. The Graphics Processor automatically incorporates characters into an existing graphic repertoire.

All of the artwork set-ups electronic graphics composition performed by using the Remote Control Panel and Imaging Fixture. The Processor itself can be mounted with the Vidifont System equipment.

In the Set-up Mode, either original artwork or a reproduced image is placed on the Imaging Fixture and copied by the monitor chrome copying camera. Monitor A is used for initial set-up and focusing. Monitor B displays the digitized version "seen" in the Processor memory. Superimposed on Monitors A and B is a reference frame grid which allows the user to define the final height, width, baseline parameters of the graphic to be captured. Once these variables have been defined, the final magnification ratio can be varied over a 10 to 1 range to accommodate the artwork being displayed.

When this initial set-up is complete in the factory, the Processor is placed in the Edit Mode, and the video is captured in memory. A significant feature of the System is its ability to modify any part of the captured video by means of an X-Y coordinate display positionally controlled by means of a joystick, which is located on the Remote Control Panel. This feature, with the aid of an optional lightpen, even allows "scratching" without using any camera at all. Since the display magnification on Monitor B can be 10X in size, it is easy to work with individual video elements 4 lines wide by 1 scan line high, which enlarged to 450 ns x 10 scan lines high.

For More Details Circle (183) on Reply Card

## STAY A STEP AHEAD!



*Shallco*

Shallco step attenuators assure you of reliable control of your audio. Always re-settable to your selected level.

Request catalog 102

Shallco, Inc. P. O. Box 1089  
Smithfield, N. C. 27577  
919/934-3135

For More Details Circle (78) on Reply Card

**\$45** YOU CAN GET  
3M 400  
1/2 HOUR  
MASTER QUALITY  
2" VIDEO TAPE  
ea.

**CLEANED, EVALUATED  
AND REPROCESSED**

**FOR ALL YOUR VIDEOTAPE NEEDS:**

Call Nancy:  
212-977-9330  
630 9th Ave.  
New York, N.Y. 10036

Call Renée:  
(213) 466-8101  
6424 Santa Monica Blvd.  
Hollywood, Ca. 90038

## Studio Tape Exchange Inc.



QUALITY & SERVICE AT THE LOWEST PRICES

For More Details Circle (77) on Reply Card

### FREE CATALOG

#### HARD-TO-FIND PRECISION TOOLS

Lists more than 2800 items: pliers, tweezers, wire strippers, vacuum systems, relay tools, optical equipment, tool kits and cases. Also includes ten pages of useful "Tool Tips" to aid in tool selection.

**JENSEN TOOLS**  
4117 N. 44th Street, Phoenix, Ariz. 85018

For More Details Circle (161) on Reply Card

BROADCAST ENGINEERING



## Video

(Continued from page 78)

in mix machines such as and RCA quads with IVC- and Sony U-Matics. Remote switchers and synchronous recorders can also be inter- and all control functions are ed over a single twisted pair CMX, of course, was not in exhibiting complex time ctors.

RCA and Ampex offered packages which were combina- their own manufacture and supplies such as EECO and RCA claimed the first quad (0) with built-in microproces- which could perform all edit tions with great precision. AE-600 editing system also ed on PROMs\* to do its ed editing in both manual automatic modes, controlling 2 devices. Ampex offered the M, an artistic editing system mbined a floppy disc me- with a computer controlled air and interfaces for up to udeo, audio or disc recorders. Datatron had a whole new line of ar equipment, called Tempo which used microprocessors in control center and which per- starting with a pulse count at a relatively low price (0) then upgrading to SMPTE ode editing by the addition of rriate generators and readers. wn previous Datatron systems, nrol console was of very design and relatively easy to

non-time code editors were evidence all around the Recortec's Edimatic 100, EA-5, and Convergence ration's ECS-1 and others o a wide range of broadcast on-broadcast applications er simplicity and low cost are ain goals. However, even these re becoming more sophisti- in handling the pulse count ach. Recortec's unit can



# VALUE

... LPB's S-15, 8-Channel, Dual-Output Mono Signature Line Audio Console with 19 inputs (shown) is one giant value. So is LPB's S-14, 5-Channel, Dual-Output Console with 15 inputs. In addition to moderate prices and excellent performance, both consoles feature:

- Step attenuator mixers.
- Plug-in fiberglass printed circuits.
- Individual plug-in program, 12-watt monitor, cue and headphone amplifiers.
- Remote line talkback.
- Input transformers.

There are many other plus features you'd expect to find only in higher priced units. And, speaking of price, other LPB consoles start in the low hundreds!

LPB offers a complete line of broadcast audio equipment. Call or write us for all your audio needs, from tape recorders to frequency and modulation monitors.

## LPB<sup>®</sup>

LPB Inc.  
520 Lincoln Highway, Frazer, PA 19355  
(215) 644-1123

Reader  
Service  
Card  
This  
Issue  
Is Good  
For  
3 Months

## Reduce your replacement costs with Beau audio heads.



Stereo Heads: \$69.50



Mono Heads: \$19.00

From the maker of Beau motors and Beaucart cartridge tape machines comes a broad new line of long-life audio replacement heads. Cost savings techniques and quantity production permit the introduction of moderately priced, quality audio heads to the replacement market. Remember: These tape heads fully meet all applicable NAB cart machine standards.

Beau audio heads are available from stock and may be used in Ampro, ATC, Beaucart, Collins, Garron, Gates, ITC, RCA, Sono-Mag, Sparta, Spotmaster, and other popular machines. Order as follows:

| Mono Heads: \$19.00 |          |                |          | Stereo Heads: \$69.50 |          |
|---------------------|----------|----------------|----------|-----------------------|----------|
| Nortronics P/N      | Beau P/N | Nortronics P/N | Beau P/N | Nortronics P/N        | Beau P/N |
| 2003                | BH 2001  | 2051           | BH 3002  | 5701                  | BH 5001  |
| 2053                | BH 2002  | 2057           | BH 3003  | 5703                  | BH 4001  |
| 2002                | BH 2003  | 2052           | BH 6001  | 5751                  | BH 5002  |
| 2001                | BH 3001  |                |          | 5753                  | BH 4002  |

Prepaid shipment if check accompanies order

Other models available. For further information and electrical specifications, please contact the factory directly at (203) 288-7731.

## UMC BEAUCART DIVISION

### UMC ELECTRONICS CO.

460 Sackett Point Rd. North Haven, CT 06473

For More Details Circle (119) on Reply Card

**CATALOG & AUDIO APPLICATIONS**

CONSOLES  
KITS & WIRED  
AMPLIFIERS  
MIC, EQ, ACN,  
LINE, TAPE, DISC,  
POWER  
OSCILLATORS  
AUDIO  
TAPE BIAS  
POWER SUPPLIES

**AMP LABS, INC.**  
100 S. BROADWAY AVE.  
LOS ANGELES CALIF. 90038

For More Details Circle (163) on Reply Card

976



# Save Your AMPEX



for as  
little as  
**\$70000**

Why spend \$3,000 to \$4,000 on a new recorder when \$700 to \$1400 makes a new recorder out of your dependable Ampex?

Replace your old, tube type amps with Inovonics' Model 375 Tape Recording Electronics. Features solid-state circuitry, plug-in options, and exceeds recording studio specifications.

For complete data, call (408) 926-3588 or write:



**sound  
dynamics, inc.**

P.O. Box 61345, Sunnyvale, CA 94088

For More Details Circle (80) on Reply Card

# Heart Transplant



## Tape Recording Electronics

Modern recording capability for new or old recorders. 2-speed EQ, separate EQ for optional SYNC amp. "Linearized" record amp and phase-corrected reproduce circuitry. Fully remotable. Pin-compatible with most Ampexes, adaptable to many others.

**Model 375, \$690.**



1630 Dell Avenue, Campbell, CA 95008 (408) 374-8300

For More Details Circle (81) on Reply Card

# NAB Video

(Continued from page 105)

memorize 10 edit points and is applicable to helicals or quads with frame accurate precision. TRI continue to offer their EA-5 pulse count editing console which interfaces with most helical machines; but they also have developed a "SUN" television time code system which puts the address code into the video signal train without using up the audio or cue track. Peripheral accessories include portable time code generators (Porta-Sun), code readers SUN III and a tape search unit (TSC-1).

Convergence Corporation, a more recent entry into the editing field displayed a very compact console editor that interfaces with most helical recorders. However, their major application seems to be in the 3/4" cassette VTR field. A unique feature of their ECS-1 "Joystick Videola" editor is the pair of levers that permit easy manipulation of the VTR's to a particular frame through manual jogging in either direction.

The range editing equipment available covered virtually every level of operational complexity desired at prices that encompassed a \$5,000 to \$150,000 spectrum. For the studio or TV station needing an edit capability, it was only necessary to define it and select the price/performance package that applied.

## Digital Time Base Correctors

Digital techniques in television signal handling saw their first major acceptance in the time base correction field. It seems hard to realize when looking at the wide assortment of TBCs now available that the Emmy given to CVS for this technical achievement is only five years old.

The NAB show hosted 12 different TBC's using digital techniques which were designed to stabilize video signals from quads, helicals and video discs. Three of the oldest manufacturers in the field - CVS, Quantel and TMI - had a few surprises to offer. Sony also entered this product line with a stand alone unit and Ampex, RCA, Digital



## complete supplies for reel to reel audio recording

### TAPE

AMPEX and Scotch  
all professional grades  
on reels or on hubs

### EMPTY REELS

all sizes, widths  
and hub types

### BOXES

for all reels, in various

### LEADER-,TIMING-& SPLICING TAPES

Top Quality Competitive Pricing  
Immediate Shipment  
Call or Write for our Catalog



**recording supply co.**  
1291 RAND RD -DES PLAINES, IL  
312/297-0955

For More Details Circle (82) on Reply Card



## TV LIGHT METER By GRAFIKON

Now an inexpensive light meter designed for two-fold use in television studios. The high range is calibrated to read TV raster light for adjusting white levels on color and monochrome monitors.

The lower range is calibrated for light and is intended for general studio use.

Non-magnetic construction.  
No battery or power supply.  
Automatic meter damping.

Scales: 0 to 10fL continuous light  
0 to 50 fL TV raster light  
Weight 10 1/4 oz.

**POWER-OPTICS, INC.**  
1055 W. GERMANTOWN PIKE  
FAIRVIEW VILLAGE, PA. 19409  
Telephone: 215-539-5300

For More Details Circle (83) on Reply Card  
BROADCAST ENGINE



KSN and others continue to use their standard TBC pro-

CVS-504 was augmented this with a pair of new TBC's that cover both the lower and higher end of the price scale. Their \$10,500 model is a low cost digital TBC (\$6,000) and was aimed at the non-broadcast market. The features in this unit are scaled down to include a 6 MHz correction window and a 6 MHz sampling at 4 times subcarrier. It handles heterodyne color and black and white VTR's. The model CVS-504 at a higher price (under \$10,000). It included 9 bit 4 times subcarrier PCM sampling, line by line velocity correction, automatic tracking between direct and heterodyne color and access to the video signals through a rear panel connector. The packaging of the units was attractive with an easy sliding strip that covered the revealed screw-driver adjustment for setup purposes.

Television Microtime's display showed some notable innovations in their model 2020 digital TBC which was demonstrated to show the elimination of inertia problems encountered with portable cassette VTR used in ENG. Playing back a tape obviously made when the recorder was under-going severe physical movement, there was no indication of streaking or breakup. TMI also added an option for color signals which provides image movement and a 3 dB signal-to-noise ratio improvement to the video signal. An internally adjustable switch allows for group delay precision in 50 nano second steps, useful for multi-generation dubs. The Ampex stand alone TBC (model 800) is also available for Ampex VTR's and was being marketed on 3/4" cassette units. It can be fitted with extra options

(Continued on page 108)

**Genieux** service corporation of california  
 SERVICE CENTERS  
 PARTS  
 ACCESSORIES  
**Genieux** service corporation of new york  
 More Details Circle (185) on Reply Card

**Reader Service Card In This Issue Is Good For 3 Months**

## TENTEL TENSION GAGE SOLVES YOUR VIDEO PROBLEMS\*

(\*And avoids future problems)

THE TENTEL TAPE TENSION GAGE accurately diagnoses your video tape transport problems. Whether your machine is a 1/2" EIAJ, U-matic, 1" Ampex, 1" IVC or even a 2" quad, the Tentel Tension Gage will help you solve problems vital to:



- **INTERCHANGEABILITY** (Can you record on machine A and playback on machine B?)
- **HORIZONTAL TIME BASE STABILITY** (Will recordings "hook" or "flag" when played on another machine?)
- **TAPE DAMAGE** (If your supply tension is too high or your take-up tension is too low, your tape may jam, wrap around the capstan or misguide, causing edge damage!)

Tentelometers have been approved by leading manufacturers of quality tape recording equipment...including Ampex, IVC and Sony. Schools, universities, CATV and other closed-circuit communications users throughout the world have found the Tentelometer to be an invaluable troubleshooting tool.

Send for your FREE copy of the new TAPE TENSION INSTRUCTION BOOKLET providing tape tension information for U-matic, Ampex and IVC video tape machines.

Tentelometer, including carrying case, from \$179.



50 Curtner Avenue  
 Campbell, CA 95008  
 (408) 377-6588

For More Details Circle (84) on Reply Card

The best by far...  
 because Revox delivers what  
 all the rest only promise.

Please tell me where I can see and buy Revox  A77  
 Revox  Good used machines\*

Name..... Address.....

\*As and when available from our dealers

Revox Corp.  
 155 Michael Drive  
 Syosset, N.Y. 11791

SBF



## Congratulations!

We are happy to award a Beucart splice finder to the following winners in our NAB Show drawing:

**N. F. Bodl**, WVKO, Columbus, Ohio  
**Jim Buther**, KFMZ, Columbia, Missouri  
**Chris Cain**, WISM, Madison, Wisconsin  
**Dan Clayton**, WBBF, Rochester, New York  
**Gary Gabryel**, WCYC, Chicago, Illinois  
**Bill Loveless**, KSL, Salt Lake City, Utah  
**W. R. Onn**, CKEY, Toronto, Ontario  
**J. B. McPherson**, WMAL, Washington, D.C.  
**William Rugg**, KTEP, El Paso, Texas  
**B. Townsend**, WHTB, Talladega, Alabama

**UMC**  
**BEUCART DIVISION**  
**UMC ELECTRONICS CO.**

460 Sackett Point Road  
 North Haven, Connecticut 06473

For More Details Circle (85) on Reply Card

## Help!

Anytime you have a question about your subscription to **Broadcast Engineering**, please include a mailing label to insure prompt service on your inquiry.

### Change of Address

If you're about to move, please let us know approximately four weeks before the move comes about. Simply affix your present label here, and carefully print the updated information below.

**AFFIX LABEL HERE**

### Please Help Us to Serve You Better

**Broadcast Engineering**  
 1014 Wyandotte Street  
 Kansas City, Mo. 64105

Name \_\_\_\_\_  
 (Please Print)

Employer \_\_\_\_\_

Address \_\_\_\_\_

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

such as a sync pulse driver, velocity compensation and an FCC sync standard.

The Quantel 2200 (represented by IVC in the USA) was shown in its own booth and has the capacity to handle any type of VTR output including noncapstan servoed machines and produce a phase locked signal output that is held within  $\pm 2.5$  nano seconds. With a 3H correction window and a 5 line store, the Quantel TBC can cope with the gross errors produced by small VTRs used in ENG. Standard features on this unit include dropout and velocity compensation, sync pulse generation and genlock.

Digital Video Systems (formerly Digital Video Labs) showed their TBC equipped with a special digital interface that permitted unusual manipulation of the reproduced image. Their DVL 2002 could not only stabilize jittery signals by analog to digital conversion, but could also produce special effects that looked like the image was on a plane that was moving like a door opening and closing or turning over. According to John Lowry, the developer of this TBC, the potential manipulative possibilities for the digitized image signal are endless.

### Digital Techniques

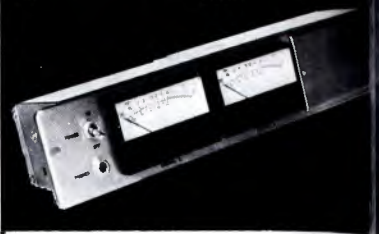
Digital techniques were also in evidence on a number of products other than TBC units, switchers, frame store synchronizers, disc recorders and standards converters to name a few.

The CDL 480 video switcher used digital conversion to provide image manipulation during switching that gave a 3D effect to the viewer. Their Sequential Effects (SFX) amplifier was claimed to be superior to a triple mix switcher and certainly attracted SRO audiences when they put on their show every 20 minutes.

If storing a frame is your game, then the RCA, Quantel (Micro Consultants) or CVS units could serve as synchronizers to any input NTSC signal providing mix capabilities between studio and all remote feeds. Options on these units allow for compressed images which can be positioned anywhere on the screen, multiple multiplexing of several non-synchronous remote

## ASCO MODEL 44

### TWO CHANNEL REPRODUCE ONLY ELECTRONICS



The ASCO-445 is a professional, high quality, two channel reproduce only electronics equally suited to new installations as well as updating existing systems.

Features include:

- Built in power supply that provides transport power via a rear panel connector.
- Dual EQ settings and remote EQ access for properly wired transports.
- Uses plug-in, 440-style cards.
- Available with or without meters.

Price:

\$695 with meters \$595 without meters

Send for our illustrated catalog with prices and used equipment listings.

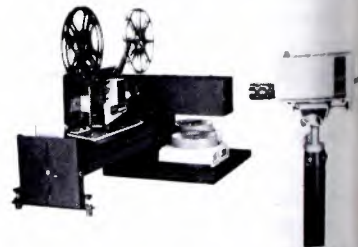


ACCURATE SOUND CORPORATION  
 114 5th Avenue,  
 Redwood City, CA 94063  
 415/365-2843

For More Details Circle (86) on Reply Card

## BUHL

### A FILM CHAIN WITHOUT A DEDICATED CAMERA



### MOBILE MULTIPLEXER

Save the high cost of an extra color camera. Studio camera adapts to film chain use in seconds.

Use standard TV zoom lens  
 Input: Two 35mm slide projectors in dissolve mode plus 16mm or Super-8  
 Mobile Multiplexer saves studio space.  
 At \$975.00 outperforms units at twice the price!

For complete technical details...

Contact Buhl.  
**BUHL OPTICAL**  
 1009 Beech Avenue  
 Pittsburgh, Pa. 15233  
 Phone: 412 321-0076



For More Details Circle (117) on Reply Card



## Non-Commercial Rules (Continued from page 88)

the Commission pointed out. the establishment of such a table did not feasible, the FCC said it would consider any tion that could show that a Table of Assign- for noncommercial stations was in fact

Commission pointed out that it previously proposed several possible ways of treating stations, but said a different approach was as the earlier ones were premised on the tainment of a noncommercial FM Table of gments.

The Commission agreed to consider CPB's proposal that noncommercial stations should be protection in terms of coverage areas so that would be able to improve their facilities and er more efficient coverage. To do this, the FCC read a willingness to consider several possibili- bringing from protection of stations to the

maximum facilities for their class, alteration of the present classes of stations, or changes in the facilities available to the stations of the various classes.

It expressed concern that the current pattern of usage by 10-watt stations offering only limited service could reduce or even prevent the opportunity for the establishment of more powerful stations able to reach larger audiences.

### The Need For Standards

While recognizing the argument that some 10-watt stations were engineered so as to have no significant preclusive effect, and that others are used to provide a needed service to a locality or neighborhood, the FCC decided that standards needed to be established that could provide the most efficient usage for all noncommercial FM stations.

## Video Article starts on page 20

that can be shown on the screen in a split or quad and a non-destructive read-freezing a field or a frame. quantel unit is even small to carry in a standard tote

Marconi Communications included digital intercon- version equipment which permits 525/60 NTSC standards translated into 625/ PA or SECAM and vice-versa. of the programs seen in America direct from Europe (mics, etc.) and conversely, rns originating in the USA ly or delayed transmission in (space shots, etc.), go such digital standards con- ter to make the video signals in the recipient country.

If you can't make the best picture possible at the output of your device, then maybe it can be improved by synthetic means. A wide variety of image enhancers were on display covering various types of origination or reproduction units from cameras to VTR's. Corning, Dynasciences, 3M, TRI and Yves Faroudja, Inc. were among those offering enhancers for different applications and at various levels of performance and price.

Corning's enhancers were directed mainly toward the camera end. Their Series 6200 RGB unit uses the signal from the green channel which has the best resolution to generate contour signals added to the red and blue channels. They also had in line composite enhancers on display. Dynasciences had a wide range of enhancers for

both RGB signal sources (contours from green) and for encoded signals in which comb filtering and vertical aperture correction is used to improve apparent image sharpness.

Two new enhancers designed specifically for "color under" VTR's such as the Sony U-Matic were being shown by TRI and Yves Faroudja, Inc. The CRISP-MATIC unit made by YFI combined four functions to improve U-Matic type signals, edge enhancement by frequency synthesis, noise reduction through coring techniques, color crosstalk elimination with comb filtering and chroma delay correction that could be set to match the recorder being used. Stand alone enhancers range in price from approximately \$1500 to well over \$5000, depending upon their application and internal complexity. □



## ANOTHER NEW COX BOX!

- Stand Alone System - 4 inputs - 1 output
- Independent Control of Upper & Lower Split
- Independent Width Control for Each Border
- Master Width Control for All Borders
- Input Provided to Colorize Borders with Station Color Generator or Optional Colorizer
- 1 3/4" Rack Unit
- 4 3/4" x 8 1/4" Control Panel

Call or write for complete details and prices.



**roadcast video systems Ltd.** 1050 McNICOLL AVE. UNIT 9, AGINCOURT, ONT. M1W 2L8  
(416) 497-1020 TELEX 06-22439

For More Details Circle (184) on Reply Card



# advertisers' index

|   |              |
|---|--------------|
| Accurate Sound Corporation                    | 108          |
| Aderhold Construction Company                 | 100          |
| Alexander Manufacturing Company               | 92           |
| American Data Corporation                     | 7            |
| Ampex Corporation                             | 30,31        |
| Ampro Corporation                             | 90           |
| Andrew Corporation                            | 65           |
| Angenieux Corp. of America                    | 107          |
| Aristocart Div. of Western Broadcasting Ltd.  | 94           |
| Arvin/Echo                                    | 55           |
| Audio Designs & Manufacturing, Inc.           | 37,75        |
| Audio Video Engineering                       | 102          |
| Belar Electronics Laboratory, Inc.            | 100          |
| Broadcast Engineering                         | 61,108       |
| Broadcast Specialties                         | 103          |
| Broadcast Video Systems Ltd.                  | 109          |
| Buhl Optical                                  | 108          |
| CMX Systems                                   | 11           |
| CSI Electronics, Inc.                         | 85           |
| Canon Video                                   | 29           |
| Capitol Magnetic Products                     | 63           |
| Central Dynamics                              | 19           |
| Communication Medias                          | 89           |
| Comprehensive Service, Inc.                   | CE-3         |
| Computer Magnetics Corp.                      | 70           |
| Consolidated Video Systems                    | 51           |
| Continental Electronics Mfg. Co.              | 41           |
| Datametrics, Inc.                             | 88           |
| Delta Electronics                             | 10           |
| Dynair Electronics, Inc.                      | 42           |
| ES Enterprises                                | 86           |
| Econco Broadcast Service, Inc.                | 71           |
| Electro-Voice, Inc.                           | 33           |
| English Electric Valve North America          | 12           |
| Farinon Electric                              | 73           |
| Fidelipac                                     | 56           |
| Garron Electronics                            | 102          |
| Geleco Electronics Limited                    | 96           |
| General Time Service                          | 92           |
| The Grass Valley Group, Inc.                  | 3            |
| Harris Corporation                            | 13,47        |
| Hitachi Shibaden Corp. of America             | 39           |
| Houston Photo Products, Inc.                  | 67           |
| Ikegami Electronics USA                       | 43           |
| Inovonics, Inc.                               | 106          |
| International Tapetronics Corp.               | 95           |
| International Video Corporation               | 26,27        |
| JVC Industries, Inc.                          | 1            |
| Jampro Antenna Co.                            | 77           |
| Jensen Tools and Alloys                       | 104          |
| Low Power Broadcast, Inc.                     | 105          |
| McCurdy Radio Industries, Inc.                | Cover 3      |
| McMartin Industries, Inc.                     | 45,97        |
| Marti Electronics, Inc.                       | 96           |
| Microtime                                     | 24           |
| Minneapolis Magnetics, Inc.                   | 89           |
| Monroe Electronics                            | 82           |
| Moseley Associates, Inc.                      | 93           |
| Nurad, Inc.                                   | 97           |
| Opamp Labs, Inc.                              | 105          |
| Pacific Recorders & Engineering Corp.         | 99           |
| Parasound, Inc.                               | 66           |
| Philadelphia Resins Corp.                     | 88           |
| Philips Audio Video Systems Corp.             | 35           |
| Potomac Instruments, Inc.                     | 101          |
| Power Optics, Inc.                            | 106          |
| RCA Electro Optical Div.                      | 81           |
| Ramko Research                                | 57,69        |
| Recording Supply Corp.                        | 106          |
| Recortec, Inc.                                | 103          |
| Revox Corporation                             | 107          |
| Richmond Hill Laboratories Limited            | 81           |
| Roh Corporation                               | 60           |
| Russco Electronics, Inc.                      | 86           |
| Scully/Metrotech                              | 78           |
| Shallico, Inc.                                | 104          |
| Sintronic Corporation                         | 16           |
| Sony Corporation of America                   | 22,23        |
| Sound Dynamics                                | 106          |
| Sound Technology                              | 17           |
| Sparta Electronics Corporation                | 5            |
| Spotmaster                                    | 76           |
| Stainless, Inc.                               | 87           |
| Stanton Magnetics, Inc.                       | 68           |
| Studio Tape Exchange                          | 104          |
| TeleMation, Inc.                              | 79           |
| Television Equipment Associates, Inc.         | 100          |
| Tentel  | 107          |
| Texas Electronics, Inc.                       | 102          |
| Thomson-CSF Laboratories, Inc.                | 49           |
| Time & Frequency Technology, Inc.             | 15           |
| UMC Electronics Company                       | 14, 105, 108 |
| Unimedia                                      | 44           |
| United Systems Corp. a Subsidiary of Mansanto | 98           |
| Vamco Engineering                             | 91           |
| Vega - Div. of Cetec Corp.                    | 28           |
| Video Aids Corp. of Colorado                  | 18           |
| Video Products                                | 83           |
| VideoMax Corporation                          | 9            |
| Vital Industries, Inc.                        | Cover 4      |
| Ward-Beck Systems Ltd.                        | Cover 2      |
| Wilkinson Electronics, Inc.                   | 84           |

## PROFESSIONAL SERVICES

**MIDWEST ENGINEERING ASSOCIATES**  
*Consulting Engineers*  
 6934 A N. UNIVERSITY  
 PEORIA, ILLINOIS 61614  
 (309) 692-4233

**Applied Video Electronics, Inc.**  
 STUDIO SYSTEMS DESIGN AND INSTALLATION ENGINEERING. REFURBISHING/MODIFYING COLOR CAMERAS AND QUADRUPLIX VIDEO TAPE RECORDERS.  
*Post Office Box 25  
 Brunswick, Ohio 44212  
 Phone (216) 225-4443*

**McCLANATHAN & ASSOCIATES**  
*Consulting Engineers*  
 APPLICATIONS & FIELD ENGINEERING  
 TURNKEY INSTALLATIONS—RADIO & TV  
 DIRECTIONAL ANTENNA DESIGN  
*P.O. Box 750  
 PORTLAND, OREGON 97207  
 Phone: 503/246-8080*

TELECOMMUNICATIONS AND BROADCAST CONSULTANTS  
**Tabcon Inc.**  
 Sales / Programming / Management / Engineering Field Services  
 4425 East 31st St  
 Tulsa Okla 74135  
 918-742-5410

**W. H. BRADLEY, P.E.**  
*Consulting Radio Engineer  
 Engineering Applications & Field Engineering  
 Phone 918-245-5444  
 300 West 41 Street,  
 SAND SPRINGS, OKLAHOMA, 74063*

**DAWKINS ESPY**  
 Consulting Radio Engineers  
 Applications/Field Engineering  
**P.O. Box 3127 Olympic Station 90212  
 Beverly Hills, California  
 (213) 272-3344**

**RCI RECORDING CONSULTANTS INC**  
 PROFESSIONAL AUDIO CONSULTANTS AND PRODUCTS  
 7912 GEORGIA AVE. 301 565-2270  
 SILVER SPRING MARYLAND 20910

## PROFESSIONAL SERVICES

**SMITH and POWSTENK**  
 Broadcasting and Telecommunications Consultants  
 2000 N. Street, N.W.  
**Washington, D. C. 20037**  
 (202) 293-7742

**Joseph & Donna Roizen VIDEO CONSULTANTS**  
 International TV Systems Marketing/Technical Writing  
 800 Welch Rd., Suite 354  
 Palo Alto, Ca. 94304  
 Tel: (415)326-6103

**LIGHTNING ELIMINATION ASSOCIATES CONSULTING ENGINEERS LIGHTNING RELATED PROTECTIVE**  
 strikes - surges - transients, etc.  
 ROY B. CARPENTER, JR. - DIRECTOR  
 9102 Firestone Blvd., Downey Ca. 90202  
 (213) 923-1268 Cable: LEAINC

James Tiner, President  
**TINER COMMUNICATIONS SERVICE, INC.**  
 "We Specialize in Towers"  
 Complete Tower and Antenna Installation and Service  
 P.O. Box 3827, 15201 Hickman Road  
 Des Moines, Iowa 50322 (515) 271-2711

**P. H. LEE ASSOCIATES, INC.**  
 Over 36 Years in Communications And Broadcast Engineering  
**AM-FM-TV Frequency Measurement**  
 P.O. Box 1575  
 Thousand Oaks, Calif. 91360  
 (805) 492-5055 (213) 889-7769

**VIR JAMES**  
 CONSULTING RADIO ENGINEERS  
 Applications and Field Engineering  
 Computerized Frequency Surveys  
 345 Colorado Blvd.  
 Phone: (Area Code 303) 333-5562  
**DENVER, COLORADO 80201**  
 Member AFCCE

**RALPH E. EVANS ASSOCIATES**  
 Consulting Telecommunications Engineers  
**AM-FM-TV-CATV-ITFS**  
 3500 North Sherman Boulevard  
**MILWAUKEE, WISCONSIN 53211**  
 PHONE: (414) 442-4210 Member AFCCE



# CLASSIFIED

ing rates in Classified Section are 25 per word, each insertion, and must be paid by cash to insure publication. Initial or abbreviation counts a full minimum classified charge, \$2.00.

on which replies are sent to us for (blind ads), there is an additional \$3.00 per insertion, to cover department, processing of replies, and mailing

and columns are not open to advertising products regularly produced by manufacturers used and no longer owned by manufacturer or a distributor.

## TRAINING

For first and second class exams with question, 450-page course. Starts with electricity. Over 600 FCC-type, multiple-choice questions and sample exams included. No technical knowledge required. Commo Operator Theory Course, #15-01. Ameco Publishing, 275G Hillside Williston Park, N.Y. 11596. 8-72-1f

**HOW TO PASS YOUR FCC LICENSE EXAM.** 9 out of 10 of CIE graduates who take CIE exam get their licenses! Fully accredited courses that increase your tech skills, add your knowledge. Learn new techniques, learn time-saving short-cuts. Specialize in Engineering, Electronic Communication, Tubeshooting, Engineering and more. Home in your spare time. Fully Accredited. Send TODAY for FREE FCC License and FREE school catalog. Will try to get representative contact you—no obligation. Bill info on request. Write CIE—Institute of Electronics, Dept. KBE-01, 1201 9th Street, Cleveland, Ohio 44114. 5-76-1f

**YOUR ELECTRONICS DEGREE** by correspondence, G. I. Bill approved. For free literature write Grantham School of Engineering, Main Desk, 2000 Stoner Avenue, Los Angeles 90025. 8-72-1f

**PHONE** in six to twelve weeks through recorded lessons at home plus one week construction in Boston, Philadelphia, Atlanta, Chicago, Seattle or Los Angeles. 12-month year teaching FCC license courses. Johnson Radio License Preparation, 1201 Manhattan Beach, Calif. 90266, Telephone 709-31. 8-75-1f

**BEST ENDORSEMENT** and third phone book on cassettes. Illustration book in current FCC-type exams. Radio License School, 1201 Ninth, Manhattan Beach, Calif. 8-75-1f

**BE THE FIRST TO GET THERE FIRST! DON'T MISS SCHOOL OF COMMUNICATIONS/** Since we're training Broadcasters for Broadcasting! 1st class training using latest methods and completely equipped Transmitter studio. Call or write for dates and start dates. Don Martin School, 1400 Hollywood Blvd., 5th floor, Hollywood, CA 90028 (213) 462-3281 or (213) 657-5886. 8-75-1f

**FCC EXAMS** with Ameco books. Each contains FCC questions plus simplified multiple choice FCC-type exams and answers. 3rd class includes broadcast endorsement \$1.00. 2nd class \$1.50. 1st class \$1.50. Free catalog. Ameco Publishing, 275G Hillside Ave., Williston Park, N.Y. 11596. 8-72-1f

## SERVICES

**TUBES...ALL TYPES EXCEPT ORTHON** NOW BE RECONDITIONED AT AN UNBEATABLE PRICE, LEAD OXIDE TYPES AND VACUUM TUBES FROM \$35 TO \$200.00. ALL RECONDITIONED TUBES COME WITH 500 HOUR WARRANTY. FOR DETAILS WRITE: RODONCO REPAIRING, CAMERA TUBE DIV., 4020 W. BLOOMINGTON DR., BLOOMINGTON, IND. 47401. 8-75-1f

## SERVICES (CONT.)

**DESIGN AND CONSTRUCTION—MOBILE UNITS, COMPLETE STUDIOS, TURN KEY AND/OR CONSULTING (20 YEARS EXPERIENCE). TELEVISION ENTERPRISES, INC.,** Box 29486, Atlanta, Ga. 30329, (404) 934-9100. 5-76-8t

**FREQUENCY MEASURING SERVICE—WE'RE #2 —MONITOR REPAIRS—MOBILE UNIT—**covers Northern 2/3 Ill., Eastern Iowa, Eastern Minn., Southern 2/3 Wis., Western Mich., and Western Ind., monthly. Radio Aids, 528 Ravine Ave., Lake Bluff, Illinois 60044, (312) 234-0953. 2-74-1f

**COMMERCIAL RADIO MONITORING CO.** Precision frequency measurements since 1932. Local and mobile service covering entire midwest plus. Test instruments, counters, monitors repaired and certified. Lee's Summit, Mo. 64063. (816) 524-3777. 9-74-1f

**SPOTMASTER PARTS—**24 hour service. Repairs and rebuilding of your Spotmaster equipment. Franchised Spotmaster repair service. 90 day warranty. COMMUNICATION MEDIAS/BROADCAST COMPONENT DISTRIBUTORS, P.O. Box 54, Allentown, Pa. 18105, 215-437-0607. 6-75-12t

**ONE STOP FOR ALL YOUR PROFESSIONAL AUDIO REQUIREMENTS.** Bottom line oriented. F.T.C. Brewer Company, P.O. Box 8057, Pensacola, Florida 32505. 7-71-1f

**HELI. X-STYROFLEX.** Large stock—bargain prices—tested and certified. Write for price and stock lists. Sierra Western Electric, Box 23872, Oakland, Calif. 94623. Telephone (415) 832-3527. 1-73-1f

**BUILD YOUR OWN TV AND RADIO PRODUCTION EQUIPMENT.** Easy, inexpensive, (mostly IC). Plans or kits: Special Effects Generator, Automatic Logger, Vertical Interval Video Switcher, Solid State Lighting Board, Preset Audio-Video Board, Preset Lighting Board, Crystal Controlled Wireless Mikes with Matching receivers. Subsonic Tone Control for audio tapes, 8MM SOF Cameras and Projectors, Distribution Amplifiers (Sync. Video, Audio), Audio Control Boards (Studio & Remote) Proc-Amp with compensation and regeneration for adapting Helical Scan VTR's to broadcast standards. PLUS specialized correspondence courses in TELEPHONE Engineering (\$39.50), and Integrated Circuit Engineering (\$49.50). Plans from \$5.95 to \$15. SUPER CATALOG plus years update of new devices Air Mailed \$1.00. Don Britton Enterprises, P.O. Drawer G, Waikiki, Ha. 96815. 5-76-36t

## WANTED

**WANTED:** All surplus broadcast equipment especially clean A.M. & F.M. transmitters, capacitors, 112 Clark & Potomac Phase monitors, Field Strength Meters, etc. High prices. All custom duties paid. Surplus Equipment Sales at 2 Thorncliffe Pk. Dr., Unit 28, Toronto 17, Ont., Canada (416) 421-5631. 1-76-1f

**WANTED:** Pre-1926 radio equipment and tubes. August J. Link, Surcom Associates, 305 Wisconsin Ave., Oceanside, Ca. 92054, (714) 722-6162. 3-76-1f

**WANTED:** Color cameras, monitors, distribution amps, lighting, audio recorders, mixers, etc. A growing non-profit Christian TV-radio ministry needs used video and audio equipment, accepted as tax write off from commercial stations. Please contact: John Bennett, Calvary Tabernacle, 6324-7th Ave., Brooklyn, N.Y. 11220, (212) 745-7915 5-76-2t

**IMMEDIATE CASH PAID** for all clean excess tubes, particularly image orthicons, vidicons and lead oxide tubes used in TK-42, TK-43, TK-27, PC-70, PE-250, etc. Also need transmitting and vacuum tubes. Special need for VR-3000, 2" VTR portable or equal, LDH4311 sync card for LDH-50. List any 1 watt microwave, cameras and recorders with us. Reply to: S & M Associates, 1231 Waterview Street, Far Rockaway, N.Y. 11691. 5-76-2t

**EDUCATIONAL FM** applicant needs tax-deductible studio and transmitter equipment donations. Box 2734, Phoenix, Arizona 85002. 5-76-1t

## EQUIPMENT FOR SALE

**IVC VIDEO HEADS** for 800 series machines—\$75.00. RCA MI40790BZ Low Band air bearing Video head Assembly—\$150.00. Trompeter J-2 Video Jacks—\$2.00. WE 233 Video looping jacks—\$4.00 each. Ampex VR1200 Capstan Motor—\$150.00. Ampex VR1100 Solid State Signal System—\$125.00. Norman Gillaspie, Box 2124, Monterey, Calif. 93940, 1-408-375-7424. 5-76-3t

**RCA TELEVISION EQUIPMENT:** TR-LB—\$1,000.00, TR-2—\$1,000.00, TR-3 Low Band Color—\$5,000.00, 2 TK-42 Color Cameras—\$7,000.00 ea. 2 TK-15 B & W Cameras—\$500.00 ea. Call Rich or Greg, 301-927-2254. 5-76-1t

**TV STATION CLOSED—**will sacrifice Sencore tube-tester—\$150, Telemation Message Channel Wheel—24 panels with panasonic camera—\$450. Sound reader by Optical, Zeiss Moviestope, Showtimer, film splicer, and Neumade Super X power rewriter all for only \$450. Shure mike mixer no vu meter—\$75. All above excellent condition except camera needs new tube. Have 3/4 inch cassettes with medium use at \$10 each for one hour reels. Also fearless pan heads, tripods, cannon lens from bw RCA cameras—make an offer. Cens 12, Box 1688, Rapid City, South Dakota 57701, 605-343-4162. 5-76-1t

**FOR SALE:** TR-22 High band color video tape machine, also one CEI-280 plumbicon broadcast camera. Write WXON-TV, P.O. Box 2020, Southfield, Mich. 48075 or call 313-355-2901. 5-76-1f

**FOR SALE:** One 275' guyed tower. Tower has 46" face width and one star mount. Ideal for FM, CATV or microwave installation. Quality Tower Service, Inc., 531 Schrock Rd., Columbus, Oh. 43229, 614-846-2611. 5-76-1t

**FOR SALE:** Three AM copper ground mats 8' X 24'. Also assorted Andrews Microwave hardware. Write or call for details. Quality Tower Service, Inc., 531 Schrock Road, Columbus, Ohio 43229, (614) 846-2611. 5-76-1t

**TWO RCA HEADWHEEL ASSEMBLIES.** Models 40790-A, 40790-B. Complete, good condition in RCA shipping cases. Best offer. D. Castellano, 415-937-9566. 5-76-2t

**SPOTMASTER "FIVE SPOT" CART MACHINE.** GOOD CONDITION. CONTACT KSJU RADIO, COLLEGEVILLE, MN. 56321, (612) 363-2692. 5-76-1t

**ONE (1) TELETRATOR,** Model 600 (including) symbol gen. & 4501 scan converter, complete & operational. Best offer. Hauenstein & Burmeister, Inc., 2629 30th Ave. South, Minneapolis, Minnesota, 55406. 5-76-2t

**I.T.C. STEREO CART MACHINE.** RP series record-playback in excellent condition. Has never been in a radio or TV station. \$1,195. Alan Atkins, (713) 666-1765. 5-76-1t

**ELECTRO-VOICE SENTRY IA** studio monitor less than a year old—\$145. Alan Atkins, (713) 666-1765. 5-76-1t

**SONY:** Two AVC-4600 cameras complete with Canon zoom lens/tripod/dolly. VP-1200 Color videocassette player. SEG-1 effects generator. AV-3400 Rover-II camera and recorder with charger, a/c adaptor, and sun gun. 9504 Grandview, Overland Park, Kansas 66212, 913-648-1920. 5-76-2t

**ROHDE & SCHWARZ VIDEO NOISE METER,** TYPE UPSF BN 120311/2. JUST CALIBRATED, USED VERY LITTLE—\$1500.00. (408) 225-6600. 5-76-1t

**SPOTMASTER, FIDELIPAC, RUSSCO, ROH, ELECTRO-VOICE, OTARI, RAMKO, SCOTCH, STANTON, NORTRONICS, SHURE, SENNHEISER, TELEX, MAGNECORD, and VIKING** are all items distributed and serviced by COMMUNICATION MEDIAS/BROADCAST EQUIPMENT DISTRIBUTORS, P.O. Box 54, Allentown, Pa. 18105. 215-437-0607. "Sudden Service" our specialty. 6-75-12t

**ME-4 COLOR FILM PROCESSOR—**Excellent condition. Complete with manuals and some spare parts. Write Michael Laemers, WUHQ-TV, P.O. Box 1616, Battle Creek, MI 49016 or call (616) 968-9341. 5-76-1t



## EQUIPMENT FOR SALE (CONT.)

**WHATEVER YOUR EQUIPMENT NEEDS**—new or used—check us first. We specialize in broadcast equipment. Send \$1.00 for our complete listings. Broadcast Equipment & Supply Co., Box 3141, Bristol, Tenn. 37620. 3-75-tf

**MAGNECORD PT6-A RECORDERS.** Rebuilt units and new and used Magnecord, Telex, Viking, and Spotmaster parts. Huge supply, lowest prices. **REBUILT CARTRIDGE TAPE EQUIPMENT.** Spotlessly clean and thoroughly tested. 30 day moneyback guarantee. **ONE YEAR** warranty. **REPAIR AND RECONDITIONING SERVICES** for cartridge equipment by factory trained technicians. Send for complete information: AUTODYNE, Box 1004, Rockville, Md. 20850, (301) 762-7626. 8-75-tf

**BROADCAST CRYSTALS** for AM, FM or TV transmitters. frequency change, repair or replacement of oven types. Also new vacuum types for RCA, Gates, Collins, etc. transmitters. Quality products, reasonable prices and better delivery! Don't be without a spare crystal. Frequency change and service for AM and FM frequency monitors. Over 30 years in the business. Eidson Electronic Co., Box 96, Temple, Texas, 76501. Phone (817) 773-3901. 12-74-tf

**A FEW COMPETITIVELY PRICED** used Revox A77 and A700 decks available. Completely reconditioned by Revox, virtually indistinguishable from new and have the standard Revox 90 day warranty for rebuilt machines. Satisfaction guaranteed. Example, A77 with Dolby, \$675, plus shipping. Write requirements to ESS!, Box 854, Hicksville, N.Y. 11802 (516) 921-2620. 5-76-tf

### MOTORS FOR SPOTMASTERS

NEW Paps hysteresis synchronous motor HSZ 20.50-4-470D as used in series 400 and 500 machines. Price \$49.00 each prepaid, while they last. 90 day warranty. Terms check with order only, no COD's. Not recommended for Tapecaster series 600 or 700.

TAPECASTER TCM, INC., Box 662  
Rockville, Maryland 20851

1-72-tf

**SPOTMASTER EQUIPMENT AND PARTS** now in Texas from Sales Southwest, 4002 Houston Highway, Victoria, Texas 77901. 512-578-4323. 11-75-tf

**FULL LINE TUNING** and phasing components available, including contractors, also large supply separate contacts for E. F. Johnson contractors. Write: Geleco Electronics, Ltd., #2 Thorncliffe Park Drive, Unit 28, Toronto 17, Canada. Phone: (416) 421-5631. 2-75-tf

**MICA AND VACUUM** transmitting capacitors. Vacuum relays. Large stock; immediate delivery. Price lists on request. SURCOM ASSOCIATES, 305 Wisconsin Ave., Oceanside, Ca 92054, (714) 722-6162. 3-76-tf

**LOGGING SYSTEM,** complete, English text with two teletypes, digital clock, encoder & decoder, prints hours, minutes, seconds and AM-PM. Nearly new \$4,800.00. Belar FM RF amplifier, new condition, \$275.00. Moseley RPL-2, \$475.00. Hewlett Packard Counter, Mod. 524, with time interval and 100 mc. plug in's, \$495.00. KSRN, Reno, Nevada 89501, 702-786-1045. 3-76-3t

**GE PE-250** Color Camera, GE TY-106B helical antenna ch. 22, Collins stereo console 212S-1, more items on list. S. R. Cathrall, WEZF-TV, Box 22, Burlington, Vermont 05401, (802) 655-3663. 4-76-3t

**350 FT. IDECO** self-supporting, heavy-duty, galvanized, triangular steel tower. Dismantled, with two beacons, clearance lights, photo electric controls and flasher, bolts and nuts. Bundled, ready to ship, \$35,000.00. Have prints, (608) 784-7373, William Bruring, WWLA, La Crosse, Wisconsin 54601. 4-76-4t

**CHANNEL 60 ANTENNA** and 400' guyed tower. Exc. Cond. Will trade for? 312-357-1211. 4-76-3t

**USED RCA TR-22B VTR**—High Banded with Editor, D.O.C., Compressor, used Headwheel panel, Auto guide and Cue. Low hours, no problems. Call Lowell Shore, 616-775-3478. 4-76-2t

## EQUIPMENT FOR SALE (CONT.)

**AUXILIARY GENERATOR:** KOHLER ELECTRIC PLANT, MODEL 15 RM6Z, 15KW SINGLE PHASE, NATURAL GAS, \$3,500.00. CALL RAY GARDELLA, (915) 544-7876. 5-76-2t

## HELP WANTED

**MAINTENANCE TECHNICIAN:** An opening with a Hallmark Cards subsidiary in Crown Center, Kansas City, Missouri. We need a Maintenance Technician for a closed circuit color TV system. Cameras include both studio and ENG type equipment. Emphasis on 3/4 in. U-MATIC video cassette format. RF or MATV experience helpful, but not necessary. In addition to a good salary commensurate with experience, we offer outstanding benefits including company-paid hospitalization, life insurance and profit sharing. Call Virginia Kirlin, collect, 816-274-5663. Hallmark Cards, Kansas City, Missouri 64141. An equal opportunity M/F employer. 5-76-1t

**WEST COAST SALES ENGINEER**—Professional audio console manufacturer requires aggressive Sales Engineer to establish West Coast Office. Solid background required in professional audio sales and/or engineering with minimum of 5 years experience. All replies treated in confidence. Send resume & salary requirements: Dept. 353, Broadcast Engineering, 1014 Wyandotte St., Kansas City, Mo. 64105. 5-76-1t

**AUDIO ENGINEER.** Southeastern university-based 50,000-watt FM, with STL, SCA, remote, automation. First ticket required, degree desired. Salary open. Immediate need. EEO Employer. Contact Harold Baker, MTSU, Box 3, Murfreesboro, Tenn. 37132. 5-76-1t

**TV SYSTEM ENGINEER WANTED.** Graduate engineer, experienced in Microwave and CATV systems to work in system planning and installations for largest MDS operator. Approximately 25% travel. Contact Microband Corporation of America, 176 Broadway, New York, New York 10038. 4-76-2t

**BROADCAST EXECUTIVE**—Group Broadcaster seeking operations executive to serve as administrative assistant to the President. Duties include coordination of station day-to-day operations with home office, including the supervision of engineering projects with each station's chief. Man with good technical background preferred. Salary commensurate with experience and capability. Write in complete confidence detailing experience and general background to: Dept. 351, Broadcast Engineering, 1014 Wyandotte St., Kansas City, Mo. 64105. An Equal Opportunity Employer. 5-76-1t

**TELEVISION TECHNICIANS**—Excellent career opportunity in public broadcast station operated by West Virginia University, located 70 miles south of Pittsburgh, PA in scenic mountainous area. Experience in color studio operations and maintenance. First class FCC license required. Forward resume and salary requirement to: Mr. E. J. Podeszwa, Personnel Officer, West Virginia University, Morgantown, WV 26506. An Equal Opportunity/Affirmative Action Employer M/F. 5-76-2t

**FM STEREO ENGINEER** with technical ability and maintenance experience wanted. Must be willing to assume many departmental responsibilities. Good opportunity/Good benefits. Send resume and salary requirements to: Box 800, Sault Ste. Marie, Michigan 49783. 5-76-1t

**OPPORTUNITY** for salesman in growing FM spot sales market. Production experience helpful. Sales experience essential. Salary commensurate with experience and ability. Send resume to: Box 800, Sault Ste. Marie, Michigan 49783. 5-76-1t

**TELEVISION STUDIO MAINTENANCE ENGINEER/TECHNICIAN**—Corporate non-broadcast, b & w four camera, IVC studio with color potential seeks staff engineer/technician for all maintenance and some operational duties. Midtown Manhattan location. Five years relevant technical television experience. Degree helpful but not mandatory. Good benefits and working conditions. Salary \$15,000 to \$18,000 depending on qualifications. Resume to Box 666, Suite 1501, 183 Madison Ave., New York, NY, 10016. An Equal Opportunity Employer, m/f. 5-76-1t

## HELP WANTED (CONT.)

**CREATIVE, AGGRESSIVE** number tv strong on all phases of transmitter and maintenance for full-time 5 KW AM an automated stereo FM. Opening in new facility, excellent working conditions. Reply in confidence to De Broadcast Engineering, 1014 Wyandotte Kansas City, Mo. 64105.

**PART-TIME SUPERVISION:** MATV Ins your city. \$200.00 day possible. Melvir 1620 N. Federal Highway, Boynton Beach 33435.

**ELECTRONIC TECHNICIAN**—operat maintenance of Norelco, Ampex a equipment preferable. Opening available at full service Mid-west quad tap. Send resume and date available to: D Broadcast Engineering, 1014 Wyandotte Kansas City, Mo. 64105.

## CHIEF ENGINEER AUDIO PRODUCTS

We are seeking an audio equipment engineer who is an aggressive innovative designer. One who designed consoles or components for consoles used in recording and broadcasting applications.

If you are this creative and professional oriented individual looking for a rewarding career we would like to talk to you.

Please send your accomplishments and salary history to:

**MODULAR AUDIO PRODUCTS**  
1385 Lakeland Ave.,  
Bohemia, N.Y. 11716

## Senior Video Technician

Experienced in all phases of studio operations and maintenance. Also a strong background in technical directing and post production quad and professional 1" studio tape editing required. Job assignment location to Westchester, N.Y. area. Excellent potential, fringe benefits. Salary commensurate with experience. Interviews will be by appointment only. Send resume in confidence to:

Personnel Manager  
**Andersen Laboratories, Inc.**  
1280 Blue Hills Ave., Bloomfield, Conn.  
Equal Opportunity Employer

### Regional advertising sales office

**Kansas City, Missouri**  
Mike Kreiter, 1014 Wyandotte St., Kansas City, Mo. 64105, (913) 888-4664

**Indianapolis, Indiana**  
Roy Henry, 2469 E. 98th St., Indianapolis 46280, (317) 846-7026

**New York, New York**  
Stan Osborn, 60 E. 42nd St., Room 12, New York, N.Y. 10017, (212) 687-7240

**Mountain View, California**  
Dennis Triola, 2680 Bayshore Front Room 102, Mountain View, Ca. 94043, (415) 0378

**London W.C.2, England**  
John Ashcraft & Co., 12 Bear St., London, England. Tel: 930-0525

**Badhoevedorp, Holland**  
John Ashcraft & Co., John J. Lucass, Sloterveg 303

**Tokyo, Japan**  
International Media Representatives, Ltd.  
Kotohiracho, Minato-ku, Tokyo. Tel: 502-0656





OT 157

CS 9100



- SA 141** Tape input switcher which mounts in a reel to reel overbridge; selects twenty remote sources of variable levels from -20 to +8 dBm and amplifies them to two selectable outputs. Supplied is a three watt monitor output with speaker and headset jack.
- DA 504** Audio Distribution Assembly consisting of six amplifiers, twelve outputs for each amplifier and power supply wired in a 5 1/4 inch rack mounting frame.
- CS 9100** Ten station intercom system consisting of all input amplifiers, output amplifiers, crosspoints, a power supply and packaged in a 5 1/4 inch rack mounting frame.
- OT 157** Multi-frequency Oscillator consisting of 19 frequencies from 20 Hz to 20 kHz, output levels adjustable in 11 pre-steps from -70 to +18 dBm, balanced output impedances of 150 and 600 ohms. Packaged in a case measuring only 1 1/4 in. Wide by 5 1/4 in. High by 6 1/4 in. Deep.

**McCURDY RADIO INDUSTRIES INCORPORATED**

1051 CLINTON STREET, BUFFALO, N.Y. 14206 (716) 854-6700, TWX 610-492-3219

**McCURDY RADIO INDUSTRIES LIMITED**

108 CARNFORTH ROAD, TORONTO, ONTARIO M4A 2L4 (416) 751-6262, TELEX: 06-963533

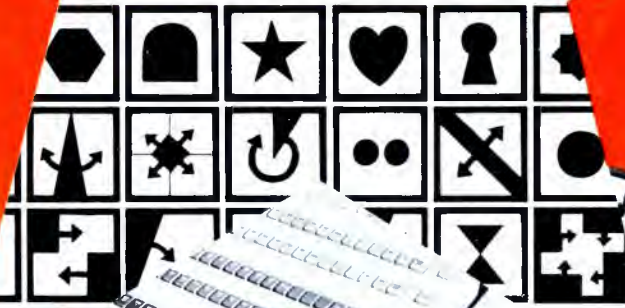
EAST COAST OFFICE: SADDLE RIVER, N.J. P.O. BOX 86, ZIP 07458, PHONE (201) 327-0750, TWX 610-492-3219

For More Details Circle (2) on Reply Card



# VIX-114 production switcher with STAR studded features

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



- 12, 16, 20, or 24 inputs. 4 bus, 6 bus, 8 bus or more bus systems.
- All digital waveform and quad split generators.
- Digital key edging, border, shadow and outline available on all ME's.
- Vari-key. Soft, hard, shadow, or see-thru key.
- Digital quad split. Wipe or dissolve in each quadrant.
- Electronic vignette. Adjustable soft pattern edges.
- Superb linear chroma keyer. RGB or encoded.
- New digital, drift and jitter-free proc. amp on output.
- Ready to interface for computer aided operation.
- Many more state of the art and operational features described fully in series 114 brochure.

The VIX-114 series video switching systems are conceived and designed by the largest specialized independent video switching company in the USA. Vital Industries, Inc. is holder of US patents on digital effects and analog rotary effects. Vital VIX-114 series switchers open new vistas in production of television commercials and programs to yield maximum pleasant visual impact.

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



GOOD ENGINEERING IS VITAL

**VITAL INDUSTRIES, INC**

MAIN OFFICE: 3700 N.E. 53rd Ave., Gainesville, Fla. 32601 • Phone 904/378-1111

**MORRELL BEAVERS** Midwest  
2644 North Seventh St.  
Terre Haute, Indiana 47804  
Phone 812/466-3212

**ROBERT McALL** Northeast  
34 Autumn Lane  
Hicksville, N. Y. 11801  
Phone 516/735-0055

**GORDON PETERS** Southwest  
P. O. Box 912  
Arlington, Texas 76010  
Phone 817/261-6855

**ERIC KING**  
Fox Hill Road  
Lynchburg, Va. 24503  
Phone 804/384-7001

**GORDON PETERS** West Co  
7960 West Beverly Blv  
Los Angeles, California 90048  
Phone 213/653-9438

For More Details Circle (3) on Reply Card