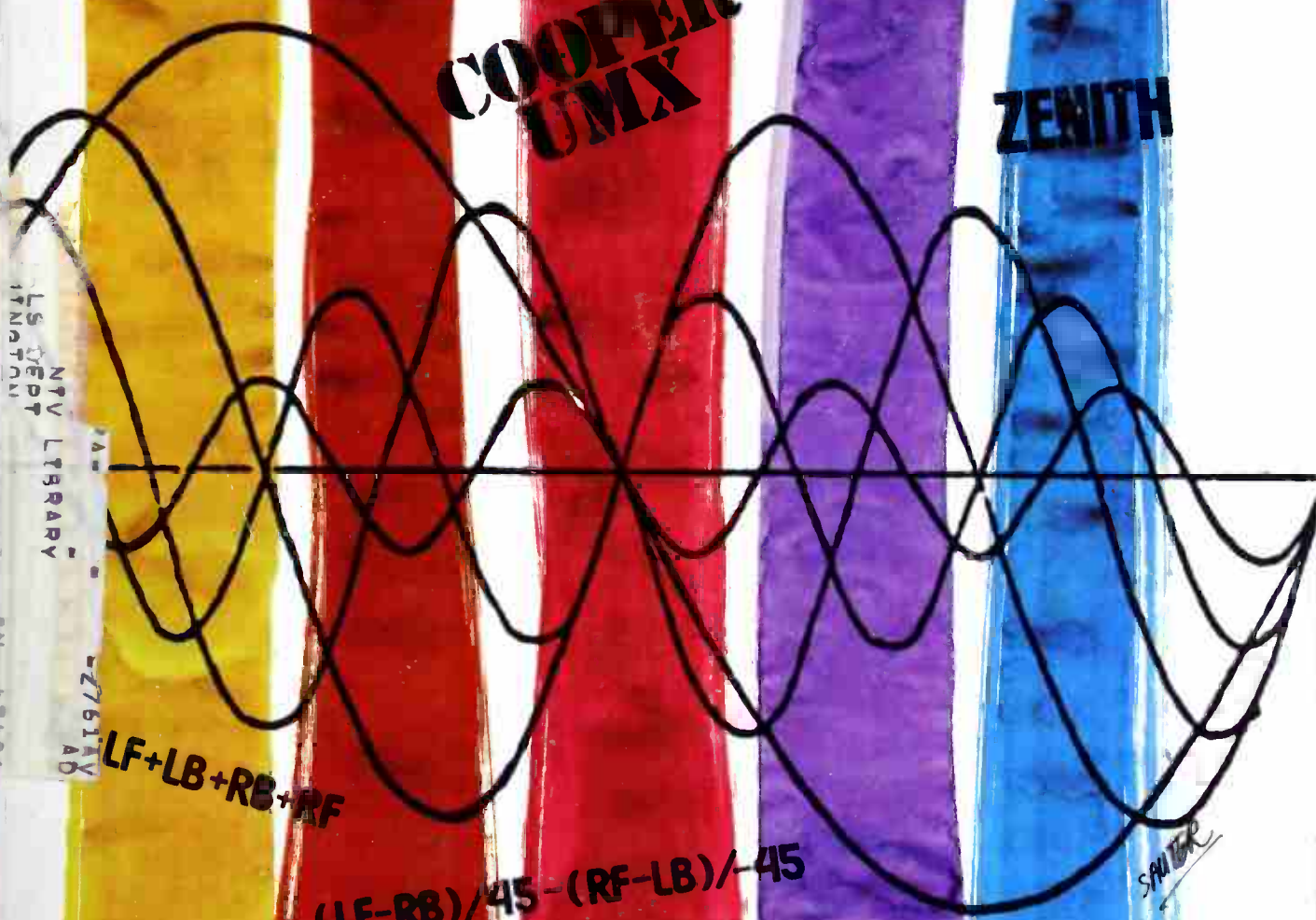


FEBRUARY 1976

BME

BROADCAST MANAGEMENT/ENGINEERING

QSI RCA GE
 COOPER-OMX ZENITH



LS DEPT
 TV LIBRARY
 -276111V
 AD

$$Y = LF + LB + RB + RF$$

$$(LF - RB) / 45 - (RF - LB) / 45$$

$$Y = LF + LB - RB - RF$$

$$X = LF - LB - RB + RF$$

$$U = LF - LB + RB - RF$$

MAR 1 - 1976

Library

Five Ways To Four-Channel FM: The FCC Will Want To Hear From You



SS 3159

The SS3159 stereo disc reproducer provides complete facilities for professional stereo reproduction of disc recordings. It is completely self-contained with SP100 turntable, tone arm, plug-in pickup cartridge, equalized preamplifiers, audio cue switching, power supply and pedestal assembly.

The turntable offers the highest quality, lowest noise operation available. It adds virtually nothing to the original sound as recorded on the disc. And with the advent of quadrophonic discs, it's imperative that vertical as well as horizontal "rumble" be reduced to a minimum.



FOR FURTHER INFORMATION CONTACT:

McCURDY RADIO INDUSTRIES INCORPORATED

1051 CLINTON STREET, BUFFALO, N.Y. 14206 (716) 854-6700, TWX 610-492-3219

EASTERN SALES OFFICE: P.O. BOX 86 SADDLE RIVER N.J., 07458, (201) 327-0750 TWX 610-492-3219

IN CANADA: McCURDY RADIO INDUSTRIES LIMITED

108 CARNFORTH ROAD, TORONTO, ONTARIO M4A 2L4 (416) 751-6262 TELEX: 06-963533

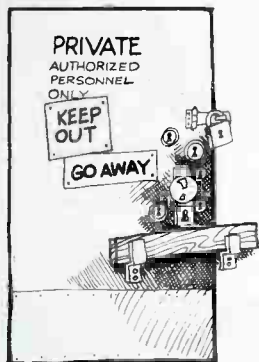
SS 7800

The SS7800 Series of modular audio consoles provides complete professional facilities for mixing and shaping today's complex audio material.

In addition to complete program mixing, monitoring and control, SS7800 Series consoles provide PA feeds and comprehensive Solo/Cue, Echo-Send/Receive, Fold-back and talkback system facilities. A full range of options is also available including Equalizers, Compressors, Program Assign with Pan, and Remote Controls.

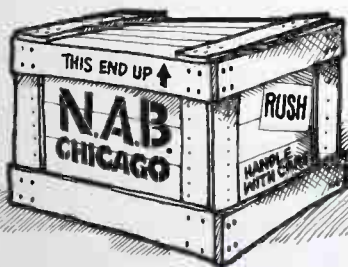
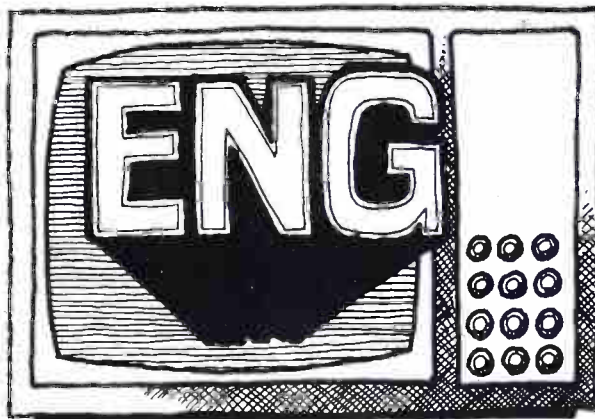


A second SECRET has been uncovered!



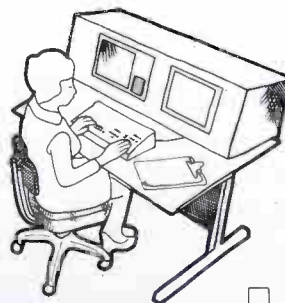
We tried to keep the door slammed on a second new x-pandable system under development. But the word is out.

Would you believe a fast, flexible, accurate time code ENG system for under \$20K? And the 34X is x-pandable, too!



As you know, we were going to surprise you in March with two new systems. Now you know.

Nobody can keep a secret in this business.



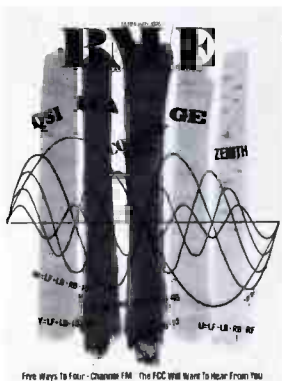
cmx systems

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

Circle 101 on Reader Service Card

BM/E

BROADCAST MANAGEMENT/ENGINEERING



This month's cover depicts the choices before the FCC—and eventually you—in deciding what kind of discrete four-channel broadcasting system to adopt.

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

Editor

James A. Lippke

Associate Editor

Robin Lanier

Contributing Editor

Robert Wollins

Editorial Assistant

Karen Goudket

Art Director

Gus Sauter

Manager

Publication Services

Djuna Zellmer

Circulation Manager

Barbara B. Connolly

FCC Counsel

**Pittman Lovett Ford
and Hennessey**

Publisher

Charles C. Lenz Jr.

FEBRUARY 1976/VOLUME 12/NUMBER 2

6 Broadcast Industry News

Satellite news service for independent stations off and running; Digital storage of stills brings big advance in TV.

24 Interpreting FCC Rules & Regulations

Broadcaster-Citizen Group Agreements

34 NAB Will Outdo Itself Again; Biggest Hall, Biggest Show in Chicago

Special pre-convention report tells what to expect at NAB '76.

40 Do We Want Discrete Four-Channel Stereo For FM?

It is fully practical with present technology and the five proposed systems for achieving it all work well. But now the FM broadcaster must match the promises and problems of discrete four-channel stereo against his own interests.

48 The Road Ahead Looks Smooth For AM Stereo

The National AM Stereo Committee of the EIA is beginning its evaluation of proposed systems.

54 The Microprocessor And Its Application To Broadcast Control

Offering complex control capabilities in a tiny, low-cost package, microprocessors are cost effective and efficient. The next step will be interconnecting networks of small processors to achieve more automation of technical operations.

64 Radio's ENG

Electronic News Gathering for TV has dominated the spotlight this past year. But radio has been pushing ahead, too, and this report shows how WBZ Radio, a Group W station in Boston, can go on the air live from almost anywhere to deliver instant news.

68 How To Set Up A Good Microwave Antenna System for ENG

The problems in establishing a good microwave signal for ENG are entirely different from those in setting up a fixed microwave link.

74 National Public Radio Sends Signal Tones On Program Lines

"NetCUE," a special tone-sensitive receiver using a phase comparison, can pick out the signal tones even if they are 10 dB down in the noise.

78 Broadcast Equipment

New and significant products

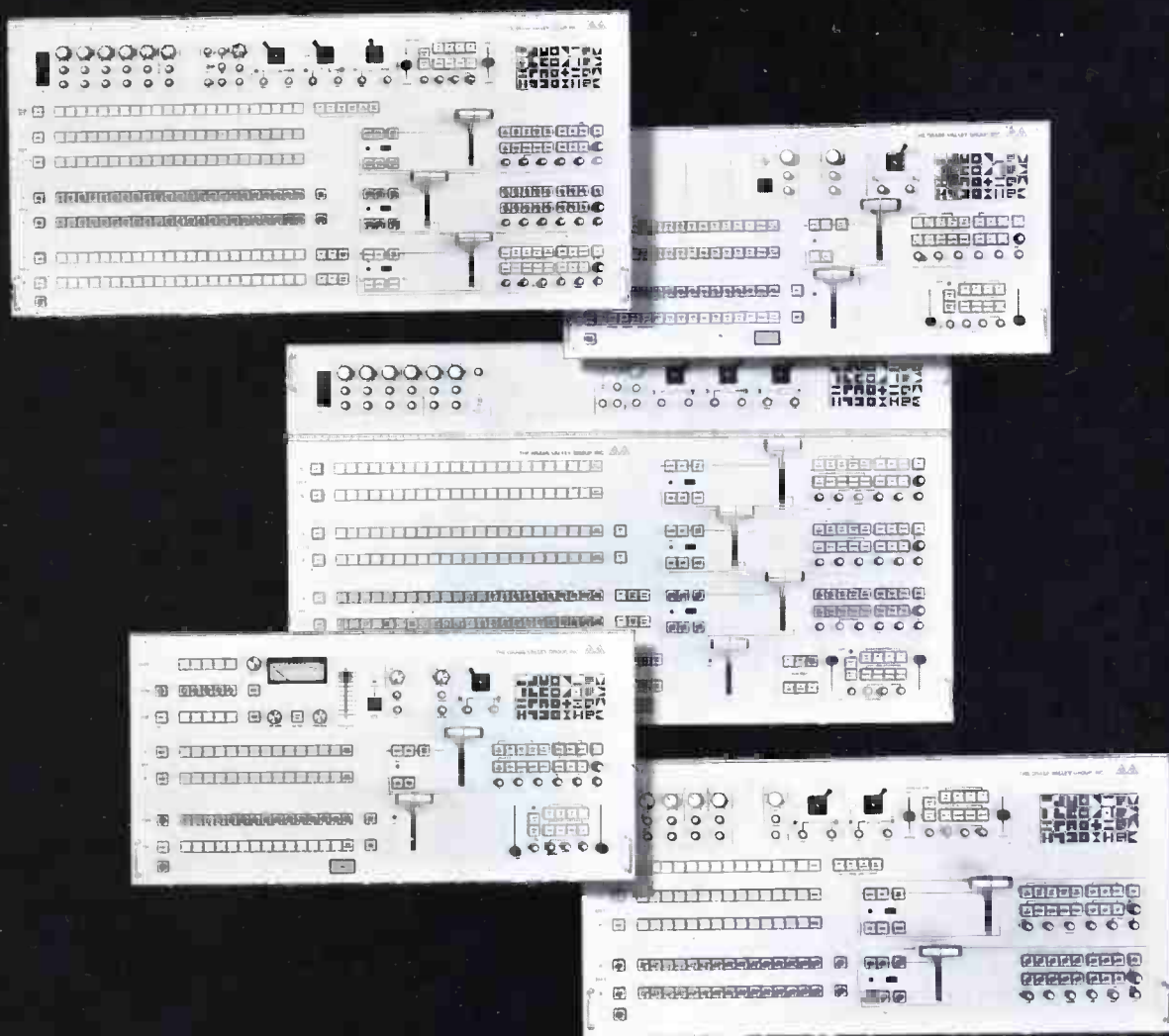
85 New Literature

Useful reading materials



BM/E, BROADCAST MANAGEMENT/ENGINEERING, is published monthly by Broadband Information Services, Inc. All notices pertaining to undeliverable mail or subscriptions should be addressed to 295 Madison Ave., New York, N.Y. 10017. BM/E is circulated without charge to those responsible for station operation and for specifying and authorizing the purchase of equipment used in broadcast facilities. These facilities include AM, FM, and TV broadcast stations; CATV systems; ETV stations; networks and studios; audio and video recording studios; consultants, etc. Subscription prices to others: \$15.00 one year, \$25.00 two years. Foreign: \$20.00 one year, \$35.00 two years. Foreign Air Mail: additional \$24.00. Copyright © 1976 by Broadband Information Services, Inc., New York City. Controlled circulation postage paid at East Stroudsburg, PA.

1600 SERIES SWITCHING SYSTEMS ARE AVAILABLE IN STANDARD CONFIGURATIONS FOR ALMOST ANY APPLICATION—IN NTSC, PAL, AND PAL-M VERSIONS



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

BROADCAST INDUSTRY NEWS

Satellite News Service For Independent Stations Off And Running

Out of the ashes of the now defunct Television News Inc. operation, which discontinued its service last October, has sprung a brand new TV news service. It's the Independent Television News Associates, headquartered at station WPIX, New York. Whereas TVN lost large sums, the new operation is in the black according to managing director Reese Schonfeld. That's primarily because ITNA is a cooperative effort and revenues must equal or exceed costs. The present ten members kick in a fee ranging from \$3000 a week each in the New York City market and \$500 a week in smaller markets.

Each day members get a daily feed emanating from New York between 6:30 and 7 p.m., Eastern standard time. Seven to ten stories a day are sent. Material is originated by the UPI Film

Service and members themselves. Quite a bit is originated in Washington, D.C. by WTTG and New York (WPIX and WNEW) as might be expected, but there are stories fed from West to East for incorporation in the daily feed. The cross country hop is via satellite (Westar) and the economics of satellite distribution make the whole thing feasible. The major drops are New York City, Chicago and Los Angeles.

Several stations microwave from these drops to their stations. KTVU, Oakland, Calif. and KTXL, Sacramento, Calif. share a service. KPLR, St. Louis pays for a feed from Chicago but expects to put up an earth receiving station atop an apartment building in St. Louis. It's seeking FCC permission to use a compact horn antenna produced by AII systems rather than the conventional 10-meter parabolic dish for size considerations but the FCC so far has denied a waiver request.

INTV gets the lowest possible satel-

lite and microwave charges now by virtue of tying in with the Robert Wold Co. which is already a big satellite and microwave user because of its sports distribution network.

Success of the ITNA, as described by several speakers at the Third Independent Television Stations Inc. convention, Los Angeles, last month was attributed to the fact that the stations had a real need. They were beginning to increase ratings with their TVN service and could not stand by and let the service drop.

Success of the cooperative effort in news and the spectacular drawing power of the first exclusive programming for independents, the soap opera *Mary Hartman, Mary Hartman* (from Norman Lear's Tandem Productions), excited many delegates to INTV into considering a cooperative to buy programming. John T. Reynolds, Golden West Broadcasters, moderating the

continued on page 8

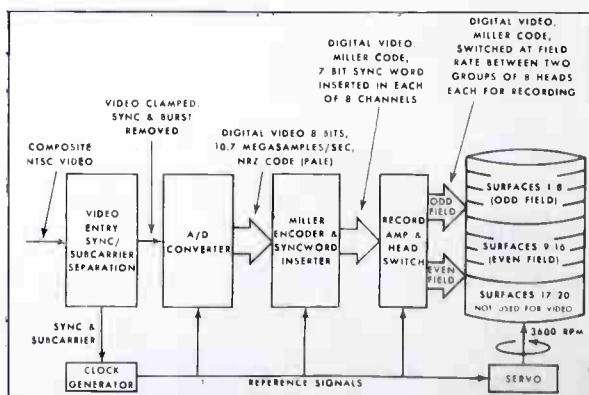
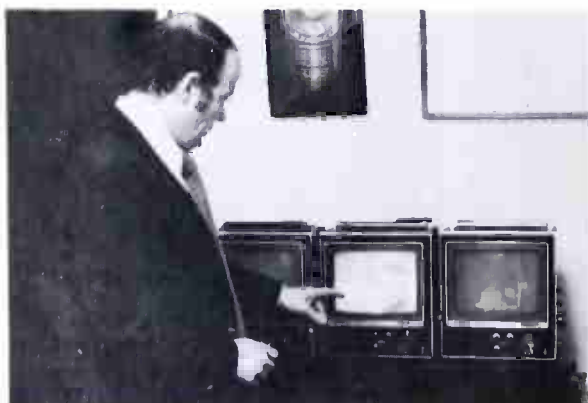
Digital Storage Of Stills Brings Big Advance In TV

The use of digital video recording to store still pictures and slides, and allow their injection into video programming on a fast random access basis, promises to improve television practice radically. The Ampex Corp. and the Columbia Broadcasting System, announced in mid-January, the joint development of such a system.

The system, called "Electronic Still Storage" (ESS), uses digital magnetic recording on computer disc packs. The basic system will hold up to 1500 video frames, with access time to any frame of less than 100 milliseconds. The system storage is expandable, and shelf storage of

the disc packs is virtually unlimited. Recording into the system will be through standard video cameras and film chains. The stored frames can be rearranged into any sequence for automatic projection.

Joseph A. Flaherty, see photo, manager of engineering development for the CBS network, said: "The new ESS system will have a dramatic effect on the presentation of slides and stills in television operations. The device will be a key element in the design of future television stations." A paper on the system was delivered at the SMPTE mid-winter television conference in Detroit.



Block diagram of the electronic still storage system.

The COHU 1550

A GIANT

Compare features of telecines available in today's market and you will quickly see why Cohu's 1550 "Performer" is proclaimed the standard in the industry and stands as a GIANT in terms of performance.

8 SMPTE slides look great on the 1550, and more importantly its superior performance can be verified by its ability to handle the typical everyday quality of program source material.

Technically, the 1550 gives you 700-line center and 600-line corner resolution, Manual Instant Paint, automatic black and white color balance, response for 2 to 1 increase in light is 70 milliseconds to within 90% of final value with zero over-contrast, gamma control continuously variable from 0.4 to 1, less than 1% geometric distortion, 52 dB minimum signal-to-noise ratio, unsurpassed colorimetry, and fully protected electron beam coated optics.

Cohu's new color encoder/image balancer/auto balance unit, the Model 1550, is standard equipment on the 1550. It provides automatic two-level horizontal and vertical detail enhancement and adjustable detail coring with both manual and automatic detail gain including remote control of level. The encoded color signal meets all applicable NTSC, EIA, and FCC specifications. Other user advantages are vertical interval reference insertion, full or partial color bars, plus remote control of color burst, color bars and chroma.

Don't buy any telecine until you have seen the GIANT. Contact your local Cohu sales office or Cohu, Inc., Electronics Division, P.O. Box 623, San Diego, CA 92112. Telephone (714) 277-6700. FAX 910-335-1244.

SEE US AT NAB BOOTH NO. 302

YOU EXPECT
MORE FROM
... AND
YOU GET IT.



COHU SALES OFFICES:

ENGLAND Bedford, MA 617-275-0370 • NEW YORK Florham Park, NJ 201-763-7325 • WASHINGTON, DC 301-656-3061 • PENNSYLVANIA Wayne 484-7325 • GREAT LAKES Michigan City, IN 219-874-3333 • NORTH CENTRAL Lincoln, NE 402-467-2900 • SOUTHEAST Orlando, FL 305-896-4881 • ALABAMA 205-881-6220, Greensboro, NC 919-273-1918 • ROCKY MOUNTAIN CO 303-573-8835 • TEXAS Arlington 817-461-1707 • CALIFORNIA San Diego 619-278-8931, Costa Mesa 213-869-5884, Carrritos 213-926-7002, San Jose 415-326-0280

AMONG TELECINES

NEWS

programming session at the convention, was optimistic that the time might now be ripe for such an endeavor.

Satellites For RCA And CTS Go Into Orbit

Both commercial communications and experimental communications services got new, advanced satellites in separate launches in December and January.

RCA's Satcom (domestic satellite network) will be expanded and made more efficient with the RCA Satcom I, a 24-channel "bird" sent up December 12th at Cape Kennedy. It is designed for coast-to-coast service, with special emphasis on the large network of earth stations being built in Alaska. Eventually more than 80 such stations will carry voice, data and video signals to remote areas of the largest state. Two more RCA satellites will further enlarge Satcom later this year.

A Cape Kennedy launching on Janu-

ary 13th put up a new satellite, the most powerful so far orbited, for the Communications Technology Satellite program (CTS), a joint project of NASA and the Canadian Department of Communications. CTS, following along the lines pioneered by the ATS-6 program last year, will explore many aspects of the technology of satellites for a host of services to remote areas. At power levels 10 to 20 times those of commercial satellites, the new CTS bird allows experimentation with simple, inexpensive earth stations for tele-education, tele-medicine, community interaction, broadcasting, etc. American and Canadian investigators in these fields will use the satellite on a 50%-50% time basis.

Leapfrog Rules Quashed, Cable Gets Freer Choice

The cable industry got all it was asking for in one area, at least, when the FCC swept the boards clean of all "leapfrogging" rules, late last December. Under those rules, in effect for several years, a cable operator was required to carry out of town stations in order of priority always choosing the nearer station when there was a choice. With the total elimination of leapfrog restrictions, cable operators can carry any station their antennas or microwave systems will bring in.

Cable is not by any means totally free in choice of programs, though. There are still the non-duplication rules and the restrictions on sports programs, which by and large represent compromise between the desires of cable and those of the broadcast industry.

Robert L. Schmidt, president of the National Cable Television Association, said that the removal of the leapfrogging restrictions is "a major positive development for the cable TV industry and its subscribers" and that "the FCC action makes development of CATV in some larger markets viable."

Clear Channels Up For Study In FCC Inquiry

An inquiry that could stimulate substantial changes in allocation patterns, power levels, nighttime radio service in many parts of the country has been opened by the FCC, under the title "AM Clear-Channel Proceeding."

A reactivation of a proceeding that was terminated in 1961, the new inquiry was started, says the FCC announcement, because of the finding that a number of areas in the country are still under-served with clear-channel nighttime radio. The FCC asks for industry comment on a long list of questions, among them the following: Should additional Class II stations be authorized for nighttime operation on

continued on page 12

■ BOOTH #409 • NAB SHOW • CHICAGO • MAR. 21,22,23 & 24TH ■

TIME SYNC TIME SYNC TIME SYNC TIME SYNC TIME SYNC TIME SYNC TIME SYNC TIME SYNC TIME SYNC TIME SYNC TIME SYNC

TIME SYNC TIME SYNC TIME SYNC TIME SYNC TIME SYNC TIME SYNC TIME SYNC TIME SYNC TIME SYNC TIME SYNC TIME SYNC

When the NAB Show is over—the exhibit they'll all be talking about will be the one you can see at booth #409

That's where Datatron will unveil a remarkable new editing system.

Datatron's TEMPO '76

You are cordially invited to see for yourself the introduction of a new generation of editing equipment.

TIME SYNC.

Don't miss seeing the editing equipment that makes tomorrow's technology available today. The Datatron TEMPO '76.

datatron, Inc.
EDITING SYSTEMS DIVISION

■ BOOTH #409 • NAB SHOW • CHICAGO • MAR. 21,22,23 & 24TH ■

Circle 103 on Reader Service Card

Kodak salutes the NPPA "Newsfilm Station of the Year"



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

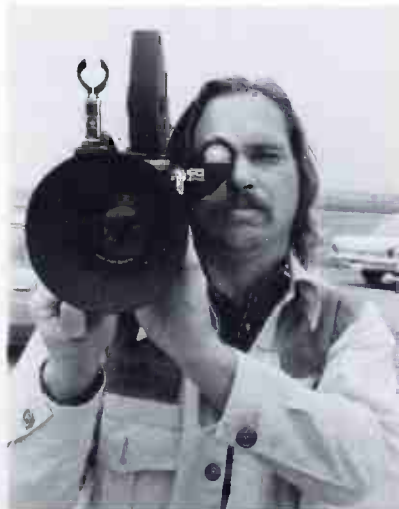
This is the heart of WKY-TV.

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

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

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

And this is the backbone.



Darrell Barton, chief photographer.

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

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

Where do they stand on ENG?

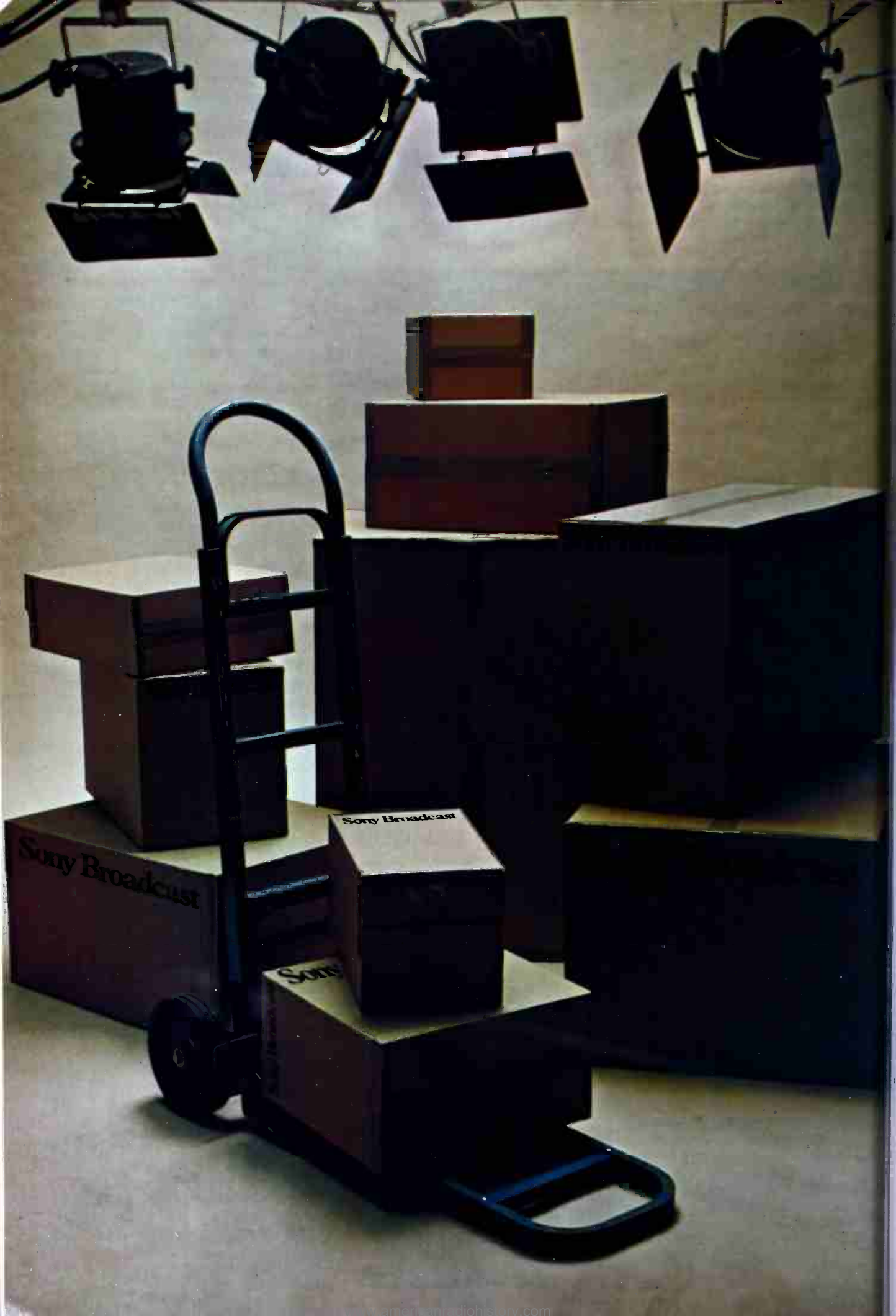
"There are some real benefits in seeing appropriate stories as they are happening," says Schultz. "But we think the audience would become bored quickly if we tried to give that kind of urgency to most stories."

Good film. Good people. The best reporting. That's what we call good news.

Film. The Basic Medium.



Circle 120 on Reader Service Card



On March 21, Sony will reveal a major commitment to the broadcast industry.

That date is the opening of the 1976 National Association of Broadcasters convention in Chicago.

At the show, Sony will exhibit eight new video products specially designed for the broadcast industry. They represent the largest investment in broadcast equipment ever made by Sony.

But the new products are only part of the important things we will introduce at N.A.B.

A new organization. Formed specifically by Sony to serve the broadcast industry and headed by Dave MacDonald, our team of broadcast specialists is knowledgeable, experienced and eager to apply our technological leadership to your problems.

A new service policy. Sony recognizes that the broadcast industry cannot afford "downtime." At the show, we'll explain how we plan to service our equipment quickly and efficiently.

A new name. Sony Broadcast will begin to appear in many places. It's there to assure you that we're dedicated to the product and service standards necessary for the broadcast industry.

What this all adds up to, of course, is a major commitment on the part of Sony to the broadcast industry.

Sony Broadcast

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

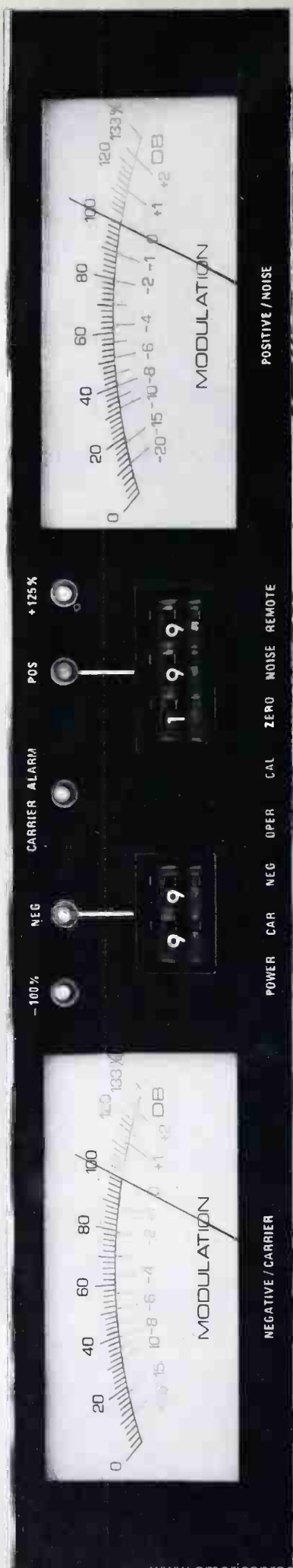
The AMM-3 is the best AM monitor available.

Ask Arno Meyer for a demonstration at the NAB - Booth 509.

\$1300.

FCC Type Approval No. 3-231

Belar Electronics Laboratory, Inc., Lancaster Ave. at Dorset, Devon, PA 19333 (215) 687-5550



BELAR
AM MODULATION MONITOR

NEWS

clear channels? Should there be expanded use of some or all clear channels by many local or regional stations?

The FCC also invited parties to participate in studies aimed toward full use of FM for nighttime service in all parts of the U.S.; toward analysis of the economic and social effects of high-power operation; in studies on the sources and levels of interference to existing Class I-A stations. Broadcasters interested in this major inquiry are strongly advised to get the complete description (Docket #20642) from the FCC, to aid them in preparing comments, due on or before March 18, 1976, with reply comments by April 18, 1976.

FCC Affirms April 15 For EBS Two-Tone Start

The Federal Communications Commission has denied requests from the Louisiana Association of Broadcasters and from the National Association of Broadcasters that the deadline for switch-over to the new two-tone EBS signal be postponed beyond the April 15th date previously set. Thus the requirement stands that every broadcast station be ready to switch to the new signal at midnight of April 15th. If you haven't bought your two-tone equipment, your time is short! At least 14 brands have FCC approval (see the January BM/E for a complete list).

Beep Tone Yes For Private Calls, No For Radio Nets

The FCC in January strongly reaffirmed the requirement that any recording of a telephone call (with certain exemptions) must be accompanied by the "beep tone" to inform the caller of the recording process.

Communications Certification Laboratory had urged an elimination of the requirement on the grounds that there were existing legal safeguards against any invasion of privacy. The FCC replied that the rule was not intended merely to provide an after the fact remedy, but to have a "prophylactic" or deterrent effect. However, the FCC did, in December, extend to broadcast nets, not themselves licensed broadcasters, the exemption from the beep requirement granted to broadcast stations. The net or "cooperative programming effort" must be composed entirely of licensees to merit the exemption.

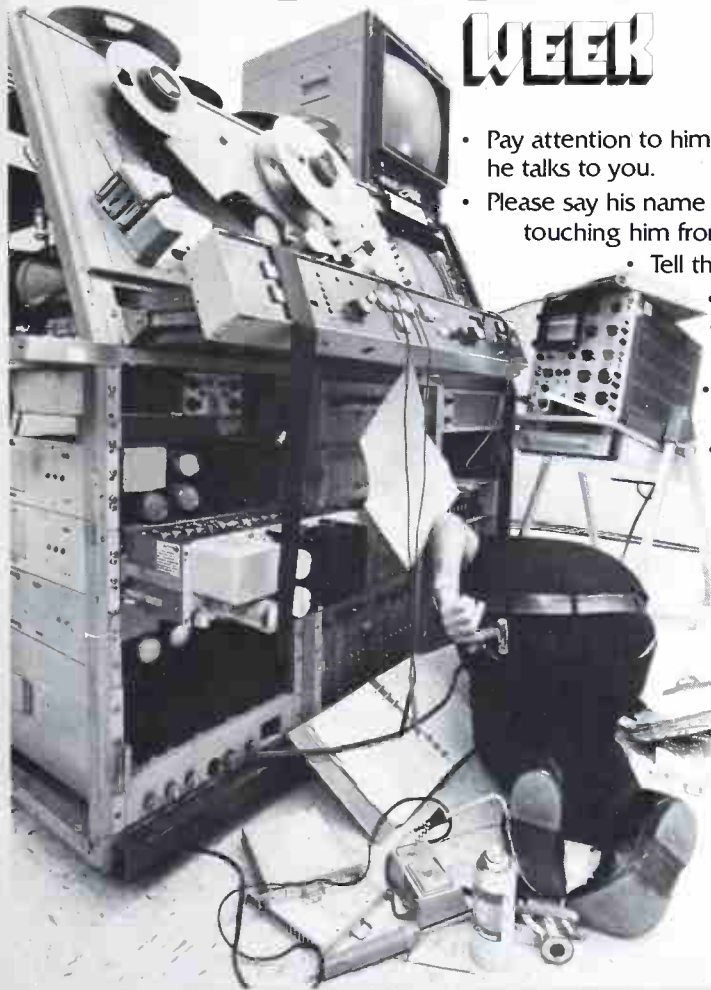
Vinyl Coat Protects Top Of CN Tower

The CN Tower in Toronto, the world's tallest free-standing structure, has had

continued on page 14

THIS IS

NATIONAL BE KIND TO VIDEO TAPE TECHNICIANS WEEK



- Pay attention to him when he talks to you.
- Please say his name before touching him from behind.
 - Tell the boss that he always works hard.
- Fetch him a cup of coffee at all times.
- Make an effort to remember his name.
- Agree that "the equipment did it to us again."
- Please do not steal his ashtray, coffee cup, or Playboy.
- Please don't hide his tweakers.

Brought to you as a public service by Videomax.

Max, it's a
giveaway
poster."

"Anyone can
call or write
for their copy."



See Videomax for heads. "better than new," with the best price and performance advantages in the industry. And that's the truth.

VMXTM **videomax**TM

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, Washington: (301)384-4733

Circle 108 on Reader Service Card

NEWS

its steel transmission mast protected by the application of high-performance vinyl coatings. The reinforced concrete structure which stands 1,815 ft. will be exposed to Toronto's freezing rains and high winds which can cause severe icing at the antenna mast's high elevation and create a serious hazard at ground level.

This problem was solved by design-

ing a 1½-in. thick glass-reinforced plastic shield, called a radome, whose shape and slippery surface will prevent ice accumulation. However, because the radome will surround the antenna mast and greatly restrict maintenance access, corrosion prevention became a prime consideration. The mast was constructed of a special slow-rusting alloy steel, sandblasted and flame-spray metalized with eight mils of zinc at the shop.

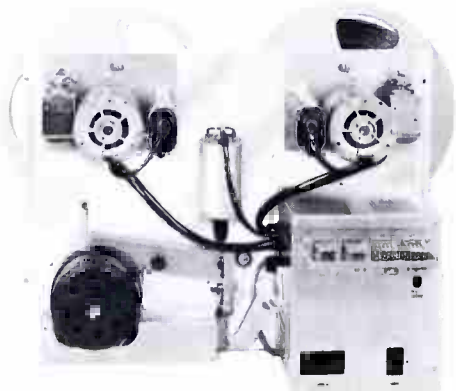
In addition, long-lasting paints were

Built for Professionals



ITC's 750 Series Reproducer

1/2 Track Stereo \$1150



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



INTERNATIONAL TAPETRONICS CORPORATION

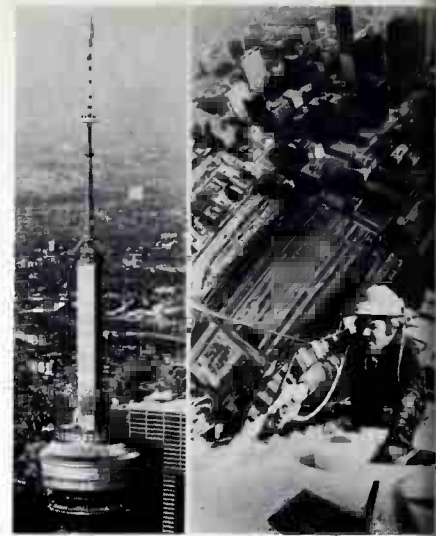
2425 SOUTH MAIN STREET • BLOOMINGTON, ILLINOIS 61701

Marketed in Canada exclusively by McCurdy Radio Industries Ltd • Toronto

© 1975 by ITC

Form No.: 112-0005

Circle 109 on Reader Service Card



required which could be field applied to the mast at the highest altitudes. An all-vinyl paint system was selected, consisting of wash primer, anti-corrosive primer, and topcoat, specified to meet Canadian government standards. The paints, manufactured by Mobil Paint Co., Toronto, were based on vinyl resins supplied by Union Carbide.

The vinyl coating system was field-applied to the CN Tower antenna mast by four painters in 10 days. It is expected to protect this skyscraping steel structure for 20 years.

10th Anniversary of 1st Master FM Antenna

The 10th anniversary of the first broadcast from the world's first Master FM



Antenna atop the Empire State building was commemorated on December 16, 1975.

The antenna was first installed on December 15, 1965 to permit numerous FM stations to broadcast simultaneously. The antenna was omnidirectional and provided a substantially circular pattern with both vertical and horizontal polarization that vastly improved the FM broadcasting through-

continued on page 17

Fewer parts... fewer problems with **audiopak® A-2** broadcast cartridge

*Ribs are molded into the flange—
no pencil leads
to break and jam.*

*No top wire.
Reloading's easier.*



*Tape guide is
an integral part of
the cartridge base
— not glued in —
to insure accurate azimuth control.*

Try one free

In the broadcast cartridge world, the simpler the better. That's why the design of the audiopak A-2 eliminates parts that can give you trouble.

The lessons learned from our years of experience developing the world's leading 8-track cartridge have been applied to our audiopak A-2. The result is a more durable, more reliable broadcast cartridge. And because we manufacture the entire product—from tape to packaging—we can assure you of the highest possible quality control.

We're so sure we have the best product on the market, we want to prove it... at no cost to you. For

your free sample and more information on the audiopak A-2 broadcast cartridge, write on your company letterhead to: Capitol Magnetic Products, Division of Capitol Records, Inc., 1750 North Vine St., Los Angeles, Calif. 90028. Attention: Marketing Manager, Professional Products.



Capitol®
REG TM OF CRI

CAPITOL MAGNETIC PRODUCTS
A DIVISION OF CAPITOL RECORDS, INC.
LOS ANGELES, CALIFORNIA 90028
A MEMBER OF THE EMI GROUP



TM OF EMI LIMITED

Circle 110 on Reader Service Card

IKEGAMI

ENG. SYSTEMS

300 CAMERAS IN SERVICE

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

Rugged. Reliable.

The ultimate proof of reliability is actual field service. In two years, Ikegami ENG Systems have dominated the industry. ... because one user tells another they're the "dependables." Call one of the user stations listed and prove it!

12½ pounds light.

Because the backpack is a separate unit, you can set it down and work really light with the camera alone. And the backpack is only 22 lbs., including batteries.

Studio-quality color.

Three 2/3" Plumbicon® tubes, full two-line image enhancer, prism optics and other advanced features deliver superb colorimetry and resolution.

Remarkable sensitivity.

Fine picture quality even at 30 foot-candles.

In-depth service nationwide.

Nine convenient distributors offer full stocks of parts and quick service.

There's one near you:

LANDY ASSOCIATES

12 Buston Road
Cherry Hill, New Jersey 08003
609-424-4660

TRI TRONICS, INC. (TTI)

4019 Tujunga Avenue
North Hollywood, California 91604
213-985-6616

TECHNICAL VIDEO SYSTEMS

1148 Burke Street
Winston-Salem, North Carolina 27101
919-722-6181

BENNETT ASSOCIATES, INC.

P.O. Box 23
Mercer Island, Washington 98040
206-232-3550

CAMERA MART

456 West 55 Street
New York, New York 10019
212-757-6977

ELECTRONICS PRODUCTS CORP.

16006 Waterloo Road
Cleveland, Ohio 44110
216-692-3050

ROSCOR, INC.

6160 W. Oakton Street
Morton Grove, Illinois 60053
312-539-7700

GRAY COMMUNICATIONS

1709 Stuart Avenue
Albany, Georgia 31707
912-439-7610

MARTIN, ZIENKOSKY & BROWNE

13731 Omega Road
Dallas, Texas 75240
214-233-5535

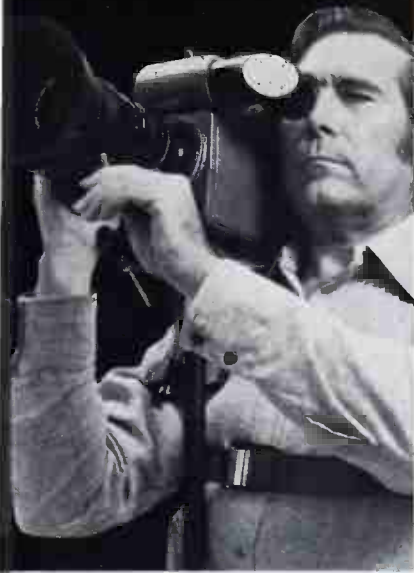
Call or write for a demonstration.

IKEGAMI

Depend on it

Ikegami Electronics (USA) Inc., 29-19 39th Avenue
Long Island City, New York 11101 (212) 932-2571





Ask the man
behind the
IKEGAMI
camera at these
stations...

- | | |
|---|---|
| NBC-TV
New York, N.Y.
12 247-8300 | KFMB-TV
San Diego, Calif.
714 232-2114 |
| AKM-TV
Anchorage, Ala.
907 276-7070 | WMHT-TV
Schenectady, N.Y.
518 356-1700 |
| WDSU-TV
New Orleans, La.
504 588-9378 | KOOL-TV
Phoenix, Arizona
602 257-1234 |
| WVJ-TV
Detroit, Mich.
313 222-2000 | WBNS-TV
Columbus, Ohio
614 224-7121 |
| KSD-TV
St. Louis, Mo.
314 421-5055 | WTVJ-TV
Miami, Fla.
305 377-8241 |
| WRGB-TV
Schenectady, N.Y.
518 377-2261 | WJBK-TV
Southfield, Mich.
313 557-9000 |
| WIS-TV
Columbia, S.C.
803 799-1010 | KIRO-TV
Seattle, Wash.
206 624-7077 |
| WESH-TV
Winter Park, Fla.
404 253-7616 | WJZ-TV
Baltimore, Md.
301 466-0013 |
| WSB-TV
Atlanta, Georgia
404 892-3456 | KTUV-TV
Oakland, Calif.
415 834-2000 |
| WBZ-TV
Boston, Mass.
617 254-5670 | KOMO-TV
Seattle, Wash.
206 624-6000 |
| WSOC-TV
Charlotte, No. Carolina
704 372-0930 | WHIO-TV
Dayton, Ohio
513 254-5311 |
| WIC-TV
Pittsburgh, Pa.
412 321-8700 | KYW-TV
Philadelphia, Pa.
215 238-4700 |
| MATE-TV
Knoxville, Tenn.
615 637-9666 | WGN-TV
Chicago, Ill.
312 528-2311 |
| WSM-TV
Nashville, Tenn.
615 749-2244 | WCBS-TV
New York, N.Y.
212 765-4321 |
| KPRC-TV
Houston, Texas
713 771-4631 | WABC-TV
New York, N.Y.
212 581-7777 |
| KING-TV
Seattle, Wash.
206 682-3555 | WTNH-TV
New Haven, Conn.
203 777-3611 |
| KWTV-TV
Oklahoma City, Okla.
405 843-6641 | |
- Additional Stations
on Request.**

NEWS

out the New York area and doubled the range of the stations using the facilities.

Another result of the installation was better radio reception in cars equipped with FM sets. When the first broadcast was made in 1965, only 5% of the nation's cars were equipped with FM sets compared to 60% today.

NCTA's 25th Anniversary Convention To Be Held

The National Cable TV Association's 25th annual convention will be held in Dallas from Sunday, April 4 to Wednesday, April 7. The NCTA has selected "CATV '76: Our Silver Year" as its theme.

The emphasis of this year's convention will be on system management and operations and on major federal, state and local regulations affecting the industry. Key subjects will include pay cable, political cablecasting, and financial administration. For more information contact Gary Arlen, NCTA, 918 16th St. NW, Washington, D.C. 20006, 202-466-8111.

PAL/NTSC Standards Converter In U.S.

Ron Gunning, President and Chief Executive Officer of Image Transform, Inc., North Hollywood, Cal., has announced that the company now has a fully operational PAL/NTSC Standards Converter—the first and only one in North America.

The machine's primary use is for the conversion of PAL 625-line 2-in. high band quadruplex videotapes to NTSC 525-line videotapes and the reverse—525 lines to 625 lines. The company expects to be able to convert from SECAM and 3/4-in. cassettes in about six months time.

Its "AD TV" Not "Free TV"

The National Cable TV Association's Board of Directors says that the NAB anti-pay campaign is designed to "eliminate subscription cablecasting's ability to compete." Through the campaign, "the oligopolistic TV Broadcasters" are attempting to eliminate "the public's desire for an alternative to 'AD TV'." The NCTA defines "AD TV" as the term most aptly suited for commercial broadcasting which NAB refers to as "Free TV."

Interactive CATV System Dedicated

The New York University-Reading Consortium introduced its experimental two-way CATV system in

continued on page 19

Spotmaster[®]

VERSA CONSOLE



Compact rack-mount single channel mixer ideal for CATV, CCTV, film studios and remote broadcasts. Transformer coupled inputs with externally switchable levels. Line and PA outputs.

50 SERIES MONO



Complete small console for production, on-air, educational or CATV use. 8 switch selectable inputs to four sealed mixers with cue detents. Built in muting relay and monitor amps. Rack mount available.

100/200 SERIES MONO & STEREO



Full dual channel consoles with 5 or 8 mixers. Pushbutton selected inputs available to high or low level (switchable) plug-in preamps. FET switching for quiet operation. Dual channel outputs at over +18 dBm peak. Complete internal monitoring and muting functions. Stereo models provide in-phase stereo from mono sources.

SLIDE TYPE CONSOLES



Available in mono or stereo with built in muting, monitor and intercom provisions. Ten slide type mixer pots, CTS type controls and full dual channel operation provided. Modular type consoles with plug-in mixers, up to 26 inputs also available.

ALSO TAPE CARTRIDGE
MACHINES AND STUDIO
ACCESSORIES

BROADCAST
ELECTRONICS, INC.

— A FILMWAYS COMPANY —

8810 BROOKVILLE ROAD
SILVER SPRING, MD. 20910
301-588-4983 TWX 710-825-0432
CABLE "SPOTMASTER"

Circle 112 on Reader Service Card

◀ Circle 111 on Reader Service Card

I can measure lower distortion than you've ever seen. I'll show you at NAB



Hi!

Yes, I can measure distortion down to .002% (-94 dB) with this new Sound Tech system.

And I can measure it in 5 seconds.

That's because Sound Tech's new 1700B is push-button controlled—and it nulls automatically.

What's more, the 1700B is both an ultra-low-distortion signal source and a total harmonic distortion analyzer—a complete distortion measuring system.

You'll like these other 1700B features, too:

- Covers 10 Hz to 110 kHz
- Has differential input
- Measures signal ratios up to 100 dB
- Measures 30 microvolts to 300 volts as a high-sensitivity ac voltmeter
- Reads power into 8 ohms

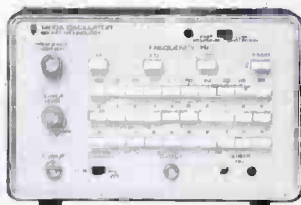
I'll be at NAB to show you how easily the 1700B measures.

Booth 123 — it's easy to remember.

See you there.

—Rosemary

Ultra-low-distortion oscillator



See this at NAB, too.

It's an ultra-low-distortion oscillator for use in measuring lowest distortion amplifiers. Has less than .001% distortion. Covers 10 Hz to 110 kHz. Push-button frequency selection. Output variable from less than 1 millivolt to 3 volts.

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

NEWS

Reading, Pa. on January 9, 1976. Officials on the federal, state, and local levels will participate on the interactive system with senior citizens and representatives from the public agencies.

The system consists of three interconnected neighborhood communications centers (NCCs) to which senior citizens have ready access. These centers have the capacity for both transmitting and receiving broadband video and audio signals. One NCC is in Horizon Center, a multi-service center for the entire elderly population of the county. The second is in Kennedy Towers, a high-rise building exclusively for senior citizens. The third is in the community room of Hensler Homes, a mixed-population garden apartment complex, with about 25% elderly residents. In addition, the homes of 200 senior citizens, which are beyond the range of easy access to any of the centers, will be equipped with converters that enable them to receive one-way transmission of the interactions of the system and to join in by telephone.

Programming for the system will be unusual because there is no audience, there are only participants. There are no TV programs, as they are usually known; there are types of teleconferences. Two basic forms of programming are planned: regular, daily, open-ended sessions; and special large-scale telemeetings. In the latter, the elderly population can communicate directly with decision-makers.

Studies Analyze Content, Frequency Of Kid's TV Ads

According to two studies of children's programming on network and independent stations which were commissioned by Action for Children's Television (ACT), commercial messages interrupt programs directed to the under-12 viewing audience "on an average of once every 2.9 minutes." An analysis of advertising practices revealed that "almost half of all commercial announcements were for cereals, candies, and sweets."

The patterns emerged during an investigation of "Weekend Commercial Children's Television" and "Television in the Afterschool Hours" conducted by Dr. F. Earle Barcus, Boston University School of Public Communications.

Tocom Sees Cable Turn-Around

After a loss of \$1.6 million in the year ended June 30, 1975 (largely the result of inventory writedown), Tocom, Inc., of Dallas, reported a profit of \$620,000

for the three months ended September 30th, 1975.

The company report also pointed to other signs of renewal of customer activity in cable, including the increase of pay-cable subscribers from 30,000 to about 400,000 during the past year.

Tocom's major product line, two-way cable, got a satisfying demonstration in an incident in Woodlands, Texas, a "new town" which has a Tocom cable installation including police, fire, and other customer-to-

headquarters services. A fire in the attic of a home set off an alarm in its very early stages, bringing the fire fighters in time to prevent large-scale damage.

NAB & Nets Defend "Family Viewing" In Calif. Suit

"Family viewing" was adopted voluntarily and does not violate the free-speech rights of program producers, the NAB and the three major networks say

continued on page 20



Out In Front

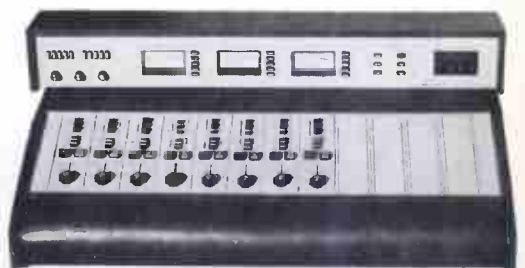
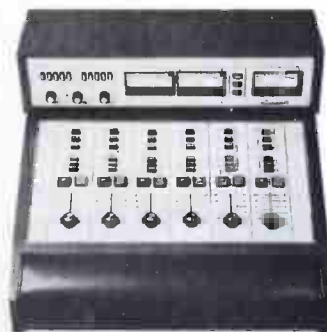
Our Western heritage taught us it's the only place to be. And today that's where we are . . . out in front with audio console CHOICE and PERFORMANCE!

The choice of eleven models leads the industry. Choose from four to twenty-four mixers. Four to seventy-two inputs. Choose mono, stereo, quad-capable . . . for radio, TV, recording and special applications.

And performance? State-of-the-art performance above industry standards. Performance so outstanding that we GUARANTEE YOUR SATISFACTION.

Put your station OUT IN FRONT with a Sparta console.

Call us now.



SPARTA
Division of Cetec Corporation

5851 Florin-Perkins Road, Sacramento, Ca. 95828 (916) 383-5353 · Telex: 377-488 · Cable SPARTA

Circle 114 on Reader Service Card

NEWS

In a motion filed in U.S. District Court in California. The motion asks for the dismissal of two suits, brought by the Writers Guild of America and by Tandem Productions, which charge that "family viewing" was dictated by government, abridges the First Amendment rights of program writers and others, and violates anti-trust laws. The NAB-network action made it seem likely that family viewing would prevail, although the court's action cannot, of course, be predicted.

NAB Sues To Bar New Cable Duplication Rule

The National Association of Broadcasters in January filed a suit in the U.S. District Court of Appeals to reverse an FCC relaxation of the non-duplication rules for cable. The new rules, adopted last fall, have among other changes substituted a fixed mileage zone for the former contour area, in determining the "local" zone for non-duplication of local signals. In addition, the reference point for the "local" determination is moved from the transmitter site to the community center.

Another change exempted a one-hour period of a live sports broadcast from the rule. The NAB charged in the suit that the FCC gave no reason for the changes, which according to the NAB will increase unfair cable competition with local broadcasters.

TM Group Orders Ten IVC-9000's

Ten IVC-9000 Broadcast Videotape Recorders have been ordered by the World Plan Executive Council-U.S., the Transcendental Meditation Movement, from International Video Corp., Sunnyvale, Calif.

The recorders are being installed at the Academy for the Science of Creative Intelligence, Livingston Manor, N.Y.; the Maharishi European University, Weggis, Switzerland; in a mobile teleproduction van that will produce videotaped material throughout Europe; and at the organization's broadcast TV outlet KSCI, Channel 18, Los Angeles, all of which are part of the Transcendental Meditation Movement.

Company Uses Moog to Create Radio ID Jingles

Syndicated Productions, a new division of WAY Audio Creations, has been formed and will initially offer two syndicated radio ID jingle packages. Entitled Synapellas and Concept III, available on an exclusive market basis,

continued on page 22



Be Choosy...

Choosing the right automation system for your station is not easy. We know that.

That's why Schafer offers a wide range of different models, each with different capabilities.

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

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

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

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

NAME _____

TITLE _____

STATION _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

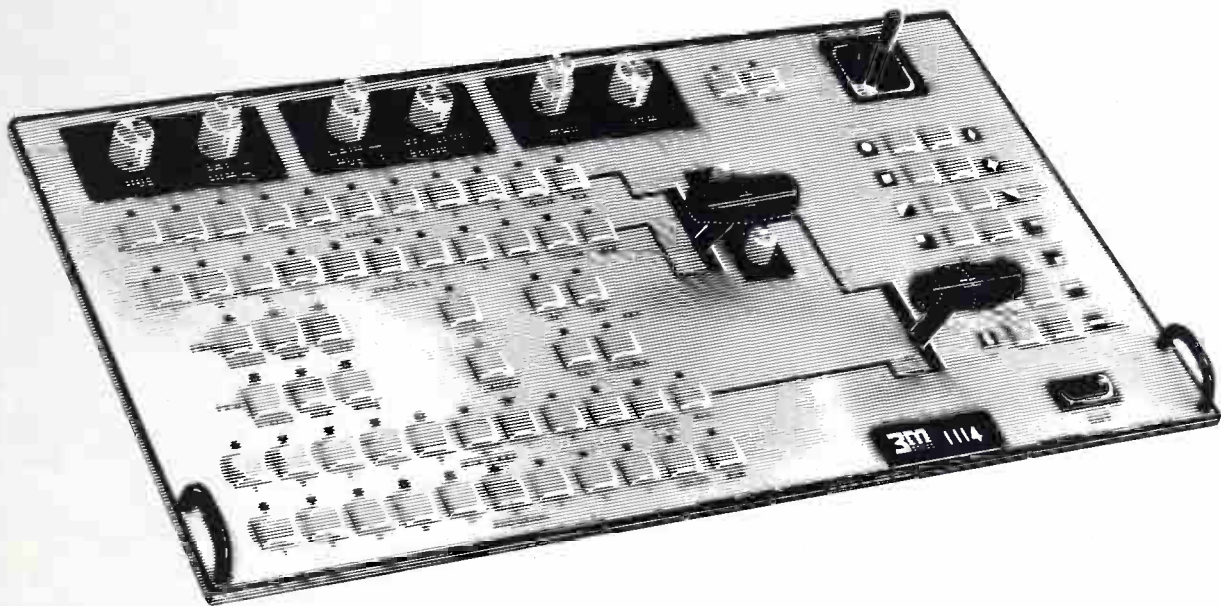


Schafer Electronics Corporation

75 Castilian Drive, Santa Barbara Research Park
Goleta, California 93017 (805) 968-0755

Circle 115 on Reader Service Card

The best word to describe our new production switcher is "Responsive"



RESPONSIVE . . . The 3M Model 1114 Production Switcher provides the most wanted and used features in a convenient single-unit package.

RESPONSIVE . . . Truly economical. The Model 1114 is priced substantially below other units with comparable features.

RESPONSIVE . . . Full-function design places all switches and controls at your fingertips. Fast and easy to use.

Model 1114 is loaded with features. The Preview Channel allows accurate set-up of effects before actual use, including preset wipes and pattern modulation. And, the Key-Over-Effects function gives added dimension to special effects capabilities.

For the name of your nearest dealer, contact: Video Products, Mincom Division, 3M Company, 15932 Shady Grove Road, Gaithersburg, MD 20760.

Order Today!
Only \$5,286.

Phone: 301-662-0564

Built-In Features

- FULL BROADCAST QUALITY
- 100% VERTICAL INTERVAL SWITCHING, INCLUDING EFFECTS
- 11 INPUTS, INCLUDING COLOR BACKGROUND AND COLOR BLACK; 4 BUS SYSTEM
- 14 SPECIAL EFFECTS, INCLUDING CIRCLE
- SPOTLIGHT; BLINK KEY
- JOYSTICK EFFECTS POSITIONING
- DISSOLVE TO EFFECTS; DISSOLVE OR CUT TO KEY; WIPE BEHIND KEY
- PRESET WIPES; SOFT WIPE SELECT
- PREVIEW/PROGRAM CUT BAR
- INTERNAL CHROMA KEYS (OPTIONAL)
- COMPLETELY SELF-CONTAINED
- EXTERNAL INTERLOCKED WITH TALLY SYSTEM (HI CURRENT RELAYS)
- INTERNAL COLORIZER; INTERNAL COLOR BLACK GENERATOR
- OUTPUT SWITCHER WITH BOTH PREVIEW AND PROGRAM SELECTOR
- ALL INPUTS WITH BNC CONNECTORS AND TERMINATING, BURST AND SYNC ADDING SWITCHES
- MOMENTARY P.B. EFFECTS SELECTOR WITH ILLUMINATED PATTERN TALLY
- PATTERN MODULATOR; INTERNAL-EXTERNAL KEY; MUCH, MUCH MORE

VIDEO PRODUCTS

Mincom Division **3M**
COMPANY

Circle 116 on Reader Service Card

McMARTIN

the **NEW NAME** in
TRANSMITTERS ...

FM

1,000 to 55,000 Watts

AM

1,000 and 2,500 Watts

see it all at **N.A.B./76, Booth 609**

4500 South 76th Street Omaha, Nebraska 68127 (402) 331-2000 telex 048-485

Circle 117 on Reader Service Card

Accurate Field Strength Measurements Can Be Easy

With the Model FIM-21, electromagnetic field strengths can be measured to within 2% across the entire 535 to 1605 KHz AM band. And to intensity levels as low as 10 $\mu\text{V}/\text{m}$. Its integral shielded antenna in the cover, front panel speaker, large illuminated mirrored meter, and ganged oscillator/receiver tuning, make it easy to operate in the field. An optional telescoping stand adds convenience. It's also a versatile instrument — use it as a tuned voltmeter for RF bridge measurements.

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

Circle 118 on Reader Service Card

NEWS

both packages feature music played on the world's largest Moog synthesizer.

The syndications are designed for any uptempo music format including MOR, contemporary, rock, country, and R&B. Prices, which depend on market size according to 1975 Standard Rate and Data figures, range from \$60 to \$125 per cut for Synapellas and \$70 to \$150 per cut for Concept III. Free demo tapes are available to radio stations by writing c/o P.O. Box 21, Station "B," Buffalo, N.Y. 14207.

Staffs Up At TV Stations But Minority Hiring Slow

A study of employment practices in TV conducted by the United Church of Christ says that although the nation's TV stations are steadily increasing their work forces in spite of the economy, the hiring of blacks and other minority people for new jobs or vacancies in old ones has slowed sharply. According to the report, commercial stations added 730 new full time jobs between 1974 and 1975, a 2% increase, but the proportion of minority employees increased by only .03%, rising from 12.4% to 12.7% of the work force.

News Briefs

Chiron Telesystems Div. of The Computer Exchange, Inc. has changed its name to **Chyron Telesystems Div. of Chyron Corp.** and is in the process of moving its corporate headquarters to 223 Newtown Road, Plainview, NY 11803

Cable Program Services, an organization devoted exclusively to serving the local origination needs of the CATV industry, has been formed and is located at 39 W. 16th St., NY, NY 10011, 212-242-8566

John Snell Professional Sound Service, a new production and recording company, is located at Suite 610 295 Madison Ave., NY, NY 10017 212-949-7668.

The CATV Installation & Equipment Operation of **GTE Sylvania** has moved its Southeast Regional Sales Office to 3046 Covington Road, Marietta, GA from Dayton, OH

Cox Data Services hopes to move into a new, expanded location on Marcel 1st in The Prado, a modern office and shopping complex in suburban Atlanta

Satori Productions, Inc. has moved to expanded new quarters at 250 W. 57th St., Suite 2105, NY, NY 10019, 212-581-8450.

Ground breaking took place in mid-November on the site of the new

continued on page 2



**On the air...
Relax...
CDL is there!**

At WTCN-TV, Total Automation is a Reality!

At the heart of the station is a CDL Operations Computer System, which handles all the program switching, effects, material verification, run-sheet printing, FCC logging and machine control.

The first installation anywhere to have a *direct-wire link* to a Kaman Sciences, BCS-Traffic/Accounting System, the CDL System commands the receipt of scheduling information from and the transmission of log verification to the Traffic/Accounting Computer.

Another impressive CDL first at WTCN, is the full closed-loop control and monitoring of two Ampex ACR-25 Video Cassette Machines . . . *which don't even have to be loaded in the correct air-play sequence . . .* the CDL Computer sorts that out!

CDL's New System 100 Operations Computer System may be configured for "Total" control or may be used initially to perform automatic switching and later expanded into a fully integrated system, with business computer link-up and ACR-25 closed-loop control.

CDL's latest news . . . a System 100 with *direct-link* capability to a DCC "BIAS" Traffic/Accounting System.

A truly modular approach, the CDL System 100 is today's answer to **Total Broadcast Automation.**

For more information or to arrange for consultation about your specific requirements, please call or write.



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

Circle 119 on Reader Service Card

INTERPRETING THE **FCC** RULES & REGULATIONS

Broadcaster—Citizen Group Agreements

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

The plethora of recent petitions to deny license renewal applications has given rise to re-doubled attempts by broadcasters to reach agreements with public interest groups concerning programming, employment, and station operation. Some agreements have aroused significant Commission concern because they purport to bind the broadcast licensee's programming discretion, contrary to the dictates of the Communications Act of 1934, as amended.

Proposed Policy Statement

The Commission began an inquiry into the subject on June 10, 1975¹. The Commission found that "... some agreements attempt to yield licensing control to essentially private interests, contrary to the scheme of the Communications Act, which requires that the licensee must assume responsibility for insuring that its station operates in the public interest." The Commission went on to give examples of *improper* agreements including:

- (1) An agreement with provisions which bind the licensee to broadcast a fixed amount of programming directed to a particular segment of the community or a particular number of citizen-initiated or issue-oriented messages at stated periods of time (i.e., an abdication of licensee responsibility by improper infringement upon the licensee's discretion in the matters of programming and program scheduling);
- (2) a provision requiring a licensee to hire an individual from a list of employment candidates supplied by a citizen group;
- (3) a provision conditioning a licensee's selection of a particular program host upon the approval by a citizen group;
- (4) an agreement provision expressly precluding the filing of a petition to deny by a citizen group.

¹*Proposed Policy Statement And Notice of Proposed Rulemaking Re: Agreements Between Broadcast Licensees And The Public.* Docket No. 20495, FCC 75-633, 40 Fed. Reg. 25689 (May 29, 1975).

²*Report and Order in Docket No. 20495, FCC 75-1359, adopted:* Dec. 10, 1975; released: Dec. 19, 1975.

The May 29th *Proposed Policy Statement* was based in part upon the assumption that the licensee as well as the public interest group will conduct discussions in *good faith*, and upon the principles of: (a) "the value of local dialogue," (b) "the purely voluntary nature of agreements," (c) "the preservation of the licensee's non-delegable responsibility to serve the public," (d) "the advantage of minimum government presence in local discussion."

With this as background, the Commission proposed to limit its perusal of licensee-citizen group agreements only insofar as:

- (1) A substantive agreement is incorporated into a broadcast (renewal) application and assumes the status of a licensee representation to the Commission (which will be subject to the Commission's promise vs. performance test—whether the licensee has made a reasonable and good faith effort to effectuate its proposals);
- (2) a citizen group seeks a declaratory ruling to determine if an agreement is contrary to the Commission's Policy Statement.

Policy Statement and Rulemaking

Broadcast licensees and public interest groups filed comments and replies regarding the *Proposed Policy Statement*; the Commission issued a *Report and Order*² adopting a *Policy Statement* and amending one of its Rules.

Nearly all parties who made comments endorsed the importance of a continuing dialogue between broadcasters and local citizens as a means of identifying community interests to be served by broadcasters' programming. More than one broadcaster commented that very often alleged "citizens groups" were *not* representatives of the public at large or even of a particular minority which some groups purport to represent. Further, said the broadcasters, the demands of some of these groups have often been contrary to the public interest.

continued on page 26

When the FCC approves
a 750kW power level
for 12 clear channel AM stations
to better serve the people
of the United States,
EIMAC tubes will do the job.



Your choice for Class C, Doherty, Ampliphase or PDM service. EIMAC makes it work. Varian, EIMAC Division, 301 Industrial Way, San Carlos, California 94070. Telephone (415) 592-1221.



Circle 102 on Reader Service Card

FCC RULES & REGS

At the opposite end of the spectrum, public interest groups that submitted comments argued that the mere refusal of a broadcaster to meet with a citizen group without explanation should raise an issue of inadequate ascertainment of community needs.

Many comments urged the Commission to defer as much as possible to the discretion of the licensee regarding what agreement terms are in the public interest. For instance, one commenter suggested that tests for evaluating agreements should turn upon whether the agreement constitutes an *egregious abdication* of the licensee's responsibility to make continuing program judgments.

The Commission began its discussion of its *Policy Statement* by noting that the Communications Act mandates that the licensee *alone* must bear the ultimate responsibility for planning, executing and supervising programming and station operation. The Commission summarized:

"This responsibility cannot be delegated, and a licensee cannot (even unilaterally) foreclose its discretion and continuous duty to determine the public interest and to operate in accordance with that determination."

The *Report and Order* took pains to point out a fine distinction that broadcasters must keep in mind: a licensee has a non-delegable *responsibility*, and not simply a non-delegable *accountability*, for programming and station operation. Thus, for a licensee to delegate its

programming responsibility of its own free will and without any outside urging to a public interest group, is unacceptable by Commission standards, *even if the broadcaster believes that the public interest group would discharge the duty of programming responsibly and in the public interest.*

Holding a licensee strictly accountable for retention of control over programming matters at all times is not new. The Commission has already proscribed network agreements which overly restrict the carriage of programs from other networks³.

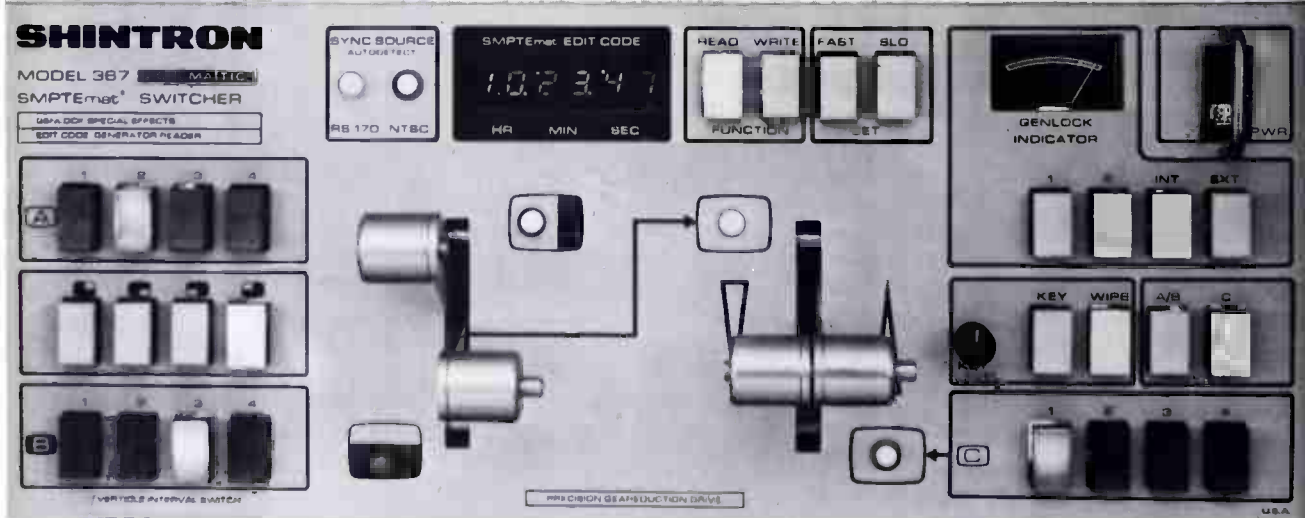
Based upon this tenet of national policy, the Commission formally adopted its *Policy Statement*. Formal rules were not adopted because the Commission felt that broadcasters and public interest groups would become entangled in a morass of complex rules that would be needed to adequately deal with the issue.

The first conclusion of the *Policy Statement* is that a licensee is *not* obliged to negotiate toward an agreement with a community group. *The rationale of this policy is grounded in the licensee's obligation to enter a continuing community dialogue to ascertain community needs and interests to enable it to better serve the public interest.* Community needs ascertainment is required for initial broadcast applicants and renewal applicants alike (Recently, the Commission amended its Rules to require renewal applicants to ascertain community needs throughout the period of license and not just in the six months prior to license renewal.) Thus, even though the

continued on page 3

³Filing Agreements 33 FCC 2d 653 (1972).

'ENG Package' Package



- 3 Bus Color Switcher
- Edit Code Reader/Generator
- NTSC Color Sync Generator
- ALL IN ONE PACKAGE FOR \$4,320.00

SHINTRON

144 Rogers St. Cambridge, MA 02142 U.S.A. (617) 491-8700

.....The Precision People



Introducing the lightweight champion!

MICROCAM™

Here's the hardest hitting eight pounds in the business. That's right! Just eight pounds for an ultra-miniature, three-Plumbicon® broadcast-quality color TV camera head, complete with lens and viewfinder.

The associated electronics pack weighs only another three pounds and can be worn on the battery belt. Miniaturization has reduced power consumption to 22 watts, which means a full hour of operation is possible from a 2½ pound battery pack. A two line vertical image enhancer and comb filter are included as standard equipment.

MICROCAM™ will go anywhere, capture anything, live or on tape. It will revolutionize studio programming and remote operations for news, sports, commercials, and special events.

MICROCAM™ also costs less than its heavyweight competitors. Meet the new champ — a broadcast-quality color camera at half the size, half the weight, with half the power consumption.

See the new lightweight champ at the NAB Convention.



THOMSON-CSF LABORATORIES, INC.

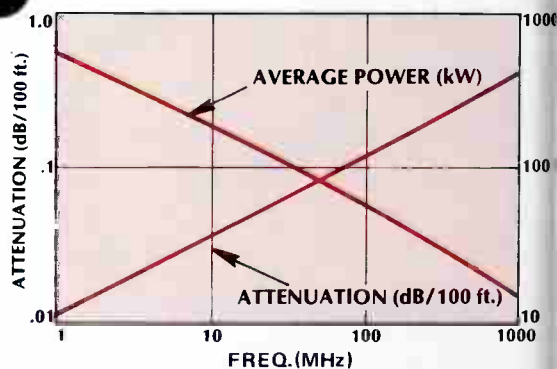
37 Brownhouse Road, Stamford, Connecticut 06902

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

Circle 122 on Reader Service Card

NEW coaxial cable

3 1/2" - 50 kW - 100 MHz



Copper Corrugated, Air Dielectric for High Power – Low Loss Applications, Specifically – FM Broadcasting and AM, VHF/UHF TV Antenna Feeders

This 3 1/2" air dielectric Wellflex consists of a corrugated tubular copper center conductor, unique polyethylene locked vertebrae helix dielectric, copper corrugated outer conductor and black polyethylene jacket. It is remarkably flexible, has excellent mechanical stability and extremely low attenuation.

SPECIFICATIONS:

Velocity of Propagation	96%
Attenuation at 100 MHz	0.110 dB/100 f
Average Power at 100 MHz	50.06 kW
Peak Power	940 kW

Send for our new 3 1/2" Coax Data Sheet and our complete catalog.



Cablewave Systems

Cablewave Systems Inc.

60 Dodge Avenue, North Haven, Connecticut 06473
203-239-3311 • TWX: 710-465-0244

Circle 123 On Reader Service Card

CC RULES & REGS

Commission has stated that it encourages extensive local dialogue, it has left to each licensee's discretion whether to enter into separate discussions and/or agreements with community interest groups.

The Commission went one step further by saying that licensee should *reject any* group's proposals that it feels are not in the public interest. On the other hand, if a group's individual members do not appear to be representative of the community of license, but the group has raised problems, interests and views that the licensee feels should be dealt with, the licensee should do so. "It is the proposals themselves—rather than their proponents—which the licensee ought to consider in relation to its public interest duties." Further, when the licensee feels that it must consider problems and views that are raised, it need *not* enter into negotiations looking toward an agreement with the group that raised these issues.

The *Policy Statement* goes on to specify that no broadcaster-citizen group agreement may immutably bind the licensee's discretion in the area of programming and station operation. The underlying rationale is that a licensee is obliged to (and must have unfettered opportunity to) modify any programming practice or proposal "when in the reasonable exercise of its good faith judgment, it believes that the public interest so requires." The Commission is on record as stating that it will attempt to construe provisions of broadcaster-citizen group agreements in a manner favorable to their implementation, where possible. Everything will be done to avoid forcing parties to redraft agreements. To do so for the purpose of correcting ambiguities in language would not only become a potentially intolerable burden to broadcasters dealing with a variety of citizen groups, but may well inhibit full development of local dialogue, a primary goal of national communications policy. The *Policy Statement* makes clear that improper *binding* of the licensee, rather than improper *content* of broadcaster-citizen group agreements, is to be avoided. Thus, an agreement may contain a great amount of specificity and will not be improper. Broadcasters are cautioned, however, that "detail may give rise to *expectations* of inflexibility which, if imposed, would be improper."

The *Policy Statement* also dealt with "savings clauses," which purport to void any agreement provisions which the Commission concludes abridge licensee responsibilities. While the Commission will not require that each agreement contain an express savings clause, a "blanket" savings clause will *not* be implied. As the Commission plainly stated:

We will not strain the plain language of agreements to construe away provisions inflexibly binding licensees, nor to strengthen inadequate savings clauses, since these are matters for the parties.

Agreement in Public File

The one rule amendment that the Commission did make regarded the filing of agreements. Henceforth, licensees that enter into written agreements with citizen groups must file these agreements in their local public file. The licensee need not *publish* notification of the

continued on page 32

WORLD'S BEST 2.5 KW FM TRANSMITTER USING ONLY ONE TUBE

- USES (1) 5CX1500
- SOLID STATE EXCITER
- SOLID STATE IPA
- SOLID STATE SUPPLIES
- SOLID STATE CONTROL
- FM NOISE, -65 db
- 1/2 db, 30 H -35 KHz
- VAC.CAP. TUNING
- VAC CAP. LOADING
- NO SLIDING CONTACTS
- NO NEUTRALIZATION
- 2750 WATTS AVAILABLE
- NEEDS ONLY 5 1/2 sq. ft.
- COMPLETELY ACCESSIBLE
- FCC TYPE-ACCEPTED



ONLY THE WILKINSON FM-200E HAS ALL THESE FEATURES YET IS PRICED LESS THAN \$11,600.00.

WILKINSON ELECTRONICS, INC.

701 Chestnut St.
Trainer (Chester) PA. 19013
Telephone (215) 497-5100

Circle 124 on Reader Service Card

McMARTIN

EBS "TWO"

READY FOR APRIL 15TH DEADLINE!



EBS-2 Decoder-Two Tone Monitor **\$ 99.50**
FCC CERTIFIED



TG-2/EBS Encoder-Two Tone Generator **\$225.00**
FCC TYPE ACCEPTED

with



AMR-1 Fixed Single Frequency AM Receiver **\$ 99.50**
or the **NEW**

AMR-3 Three Frequency AM Receiver **\$125.00**

or



FMR-1 Fixed Single Frequency FM Receiver **\$ 99.50**
FCC CERTIFIED

McMartin, a leader in the development of broadcast equipment has available for **IMMEDIATE DELIVERY** the NEW Two Tone Emergency Broadcast System. This system complies with all FCC Regulations. A complete AM or FM system (EBS-2, TG-2/EBS and AMR-1 or FMR-1) will cost you **only \$424.00.**

or with the **NEW AMR-3** **\$449.50**

see us at Booth 609, NAB/76

McMartin Industries, Inc. * 4500 South 76th Street
Omaha, Nebraska 68127 • (402) 331-2000 • Telex 048-485

Circle 126 on Reader Service Card

FCC RULES & REGS

agreement locally, nor *file* the agreement with the Commission.

The Commission added a note to its Rules⁴ defining exactly what agreements must be included in the public file:

... a citizen agreement is a written agreement between a broadcast applicant, permittee, or licensee, and one or more citizens or citizen-groups, entered for primarily non-commercial purposes. The definition includes those agreements that deal with goals or proposed practices directly or indirectly affecting station operation in the public interest, in areas such as—but not limited to—community ascertainment, programming, and employment. It excludes common commercial agreements such as advertising contracts; union, employment, and personal services contracts; network affiliation, syndication, and program supply contracts; and so on. However, the mere inclusion of commercial terms in a primarily noncommercial agreement—such as a provision for payment of fees for future services of citizen-parties . . . would not cause the agreement to be considered commercial . . .

Licensees are *not* required to place summaries of, or notes concerning, oral agreements in their public files. Further, the Commission will not examine *oral* agreements because of the difficulty of defining the exact content of same.

Commission Review of Agreements

The Commission intends to review written citizens group agreements only if (1) the agreement terms are incorporated into (a) a potential licensee's initial application or (b) an existing licensee's renewal application. Such agreements will constitute a representation to the Commission by the licensee and will be judged pursuant to the Commission's *promise-vs.-performance* test (i.e., whether the licensee has made "reasonable and good faith efforts" to effectuate its proposals).

In the event that the Commission determines that "substantial questions" of unsatisfactory performance are raised by specific allegations, the licensee's renewal application will be designated for hearing on this issue⁵. Forfeitures will not be imposed because the Commission presently lacks authority to do so with regard to agreement violations.

Conclusion

The main point to be made by the Commission's *Policy Statement* is that the broadcast licensee may not delegate its programming and station operation responsibility (including employment practices). Licensees do have a duty to ascertain community needs and interests via a local dialogue, but need not do so by negotiating and/or concluding an agreement with a citizen group. Being watchful not to violate these parameters, licensees are free to enter agreements with community groups aimed at optimizing broadcaster service in the public interest. Agreement terms not conforming with policies enunciated in the *Policy Statement* will have no force or effect before the Commission. Further, serious abdication of licensee responsibility will raise a question concerning the licensee's basic fitness. **BM/E**

⁴Section 1.526 (Note 2) of the Commission's Rules.

⁵Section 309(c) of the Communications Act. 47 U.S.C. 309(c).

Harris' MW-50 keeps some very fine company.

These pace-setting AM stations are now, or soon will be broadcasting, with Harris' MW-50, 50 kilowatt PDM (Pulse Duration Modulator) transmitters.

And here are a few of the reasons why:

- 125% positive peak modulation capability.
- PA efficiency approaches 90%.
- 60 kW output capability.
- Excellent transient response.
- Only five tubes — three types.
- A cleaner, louder signal.

For more reasons why the MW-50 is at home in so many top stations, write Harris Corporation, Broadcast Products Division, Quincy, Illinois 62301.



HARRIS
COMMUNICATIONS AND
INFORMATION HANDLING

CFGO CKLW KCBS WJR
 KGBS KING WINZ KMOX
 CFCW KOB KDKA KFRE
 WWWE WBT WNOE
 WHDH WCAW
 WGTO WRKO
 WKBW WBBM
 KQRX KPOL KSTP WINS
 WGN KGO WABC WCAU



... AND IN BRAZIL, ECUADOR, INDONESIA, IRAN, LEBANON, MALAWI, NIGERIA AND VENEZUELA.

Circle 125 on Reader Service Card

NAB Will Outdo Itself Again; Biggest Hall, Biggest Show In Chicago

The 54th Annual Convention of the National Association of Broadcasters, opening March 21 for a four-day stand at McCormick Place in Chicago, will continue a long NAB tradition—a bigger show every year than the last. As this magazine went to press, some 200 exhibitors had signed up for 95,400 square feet of exhibit space, which easily tops all earlier figures. And that is not likely to be the final figure, because the vast floor of McCormick Place will allow the NAB to sell even more space—probably nobody will be turned away this year

because he came to the door after the house was full.

In a moment we'll describe a few of the exhibitor's plans, based on preliminary information sent to BM/E. As this "early morning line" indicates, it will be a lively show on the hardware front.

Attendance will be high

Just as there will be an exhibitor record in 1976 there will be an attendance record. It's virtually certain that attendance will soar to new heights this year. BM/E polled its annual

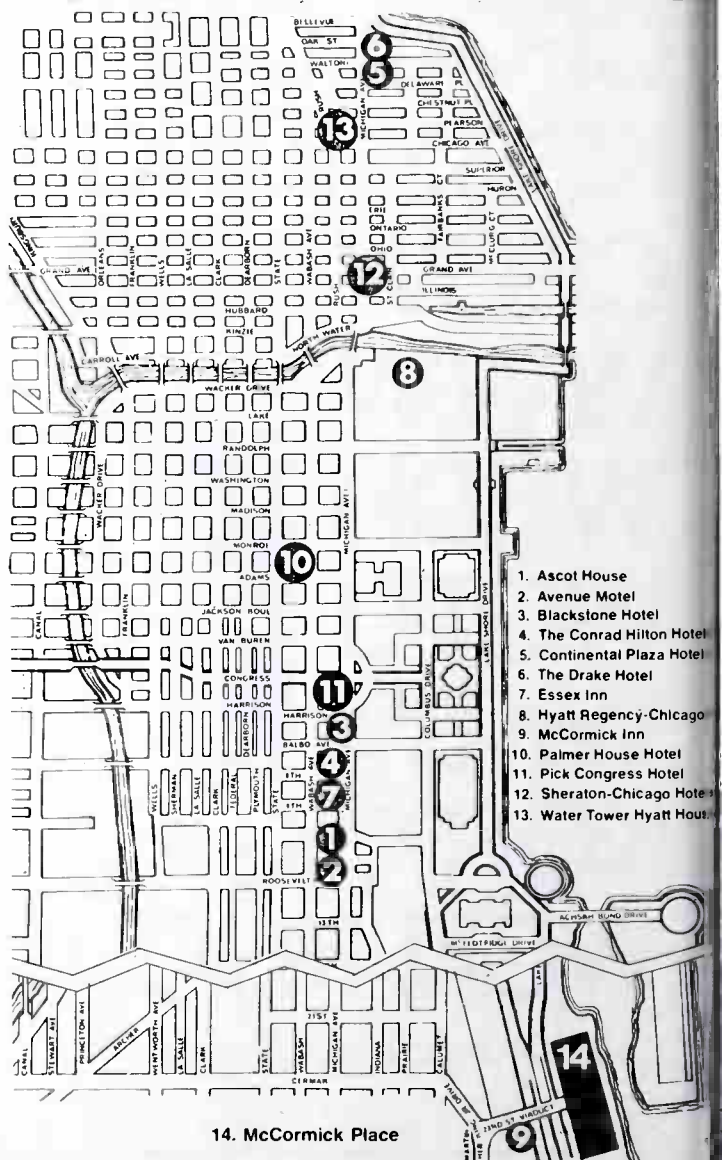
"Panel of 100" and found that 69% planned to attend. This is up from the 57% who planned to attend the most out-of-the-way Las Vegas Convention. TV managers will be going to Chicago in about the same numbers as they went to Las Vegas (85% of those polled) but there will be many more radio managers at Chicago than at Las Vegas. (Our poll shows 60% are headed for Chicago. This is 20% better than last year.)

The attendance of radio chief engineers at Chicago will be better than a
continued on page 3

Downtown Chicago and Hotel Listing

Downtown Hotel	Address	Tel. No. (Area 312)
Allerton Hotel	701 N. Michigan Ave.	787-4200
Ambassador Hotels	1300 N. State Parkway	787-7200
Ascot House	1100 S. Michigan Ave.	922-2900
Allerton Hotel	701 N. Michigan Ave.	787-4200
Ambassador Hotels	1300 N. State Pkwy.	787-7200
Ascot House	1100 S. Michigan Ave.	922-2900
Astor Tower Hotel	1300 N. Astor St.	943-1111
Avenue Hotel	1154 S. Michigan Ave.	427-8200
Bismarck Hotel	171 W. Randolph St.	236-0123
Blackstone Hotel	636 S. Michigan Ave.	427-4300
Chicago Downtown Travelodge	1240 S. Michigan Ave.	427-4111
The Churchill	1225 N. State Pkwy.	944-5000
Conrad Hilton Hotel	720 S. Michigan Ave.	922-4400
Continental Plaza Hotel	909 N. Michigan Ave.	943-7200
Croydon Hotel	616 N. Rush St.	337-6700
Delaware Towers	25 E. Delaware Pl.	944-4245
Drake Hotel	140 E. Walton Pl.	787-2200
Eastgate Hotel	162 E. Ontario St.	787-3580
Essex Inn	800 S. Michigan Ave.	959-2800
Executive House	71 E. Wacker Dr.	346-7100
Hampshire House	201 E. Delaware Pl.	943-5000
Harrison Motor Hotel	65 E. Harrison St.	427-8000
Holiday Inn-Kennedy		
Espressway	1 S. Halsted St.	829-5000
Holiday Inn-Lake Shore Drive	644 N. Lake Shore Dr.	943-9200
Hyatt Regency Chicago	111 E. Wacker Dr.	565-1000
Lake Shore Drive Hotel	181 E. Lake Shore Dr.	787-8500
Lake Tower Inn	600 N. Lake Shore Dr.	787-4700
LaSalle Hotel	10 N. LaSalle St.	373-0700
LaSalle Motor Lodge	720 N. LaSalle St.	664-8100
Mart Inn	545 N. LaSalle St.	467-0800
Midland Hotel	172 W. Adams St.	332-1200
Oxford House Motor Hotel	225 N. Wabash Ave.	346-6585
Palmer House	17 E. Monroe St.	726-7500
Park Dearborn Hotel	1260 N. Dearborn St.	944-5620
Pick Congress Hotel	520 S. Michigan Ave.	427-3800
Playboy Towers	163 E. Walton Pl.	751-8100
Ramada Inn	Congress Expwy. at Canal St.	427-6969
Seneca Hotel	200 E. Chestnut St.	787-3280
Sheraton Chicago Hotel	505 N. Michigan Ave.	944-4100
Tower House Hotel	1229 S. Michigan Ave.	427-9180
Water Tower Hyatt House	800 N. Michigan Ave.	943-5600
Westbury Hotel	160 E. Huron St.	787-2900
The Whitehall	105 E. Delaware St.	944-6300
YMCA Hotel	826 S. Wabash Ave.	922-3183
NORTH SIDE		
Acres Motel	5600 N. Lincoln Ave.	561-7777
Chicago Travelodge-North	5201 N. Sheridan Rd.	334-5600
Tlde-Sands Motel	5235 N. Sheridan Rd.	275-2100
Webster Hotel	2150 N. Lincoln Park West	348-6800

Free shuttle bus service between numbered hotels and McCormick Place provided

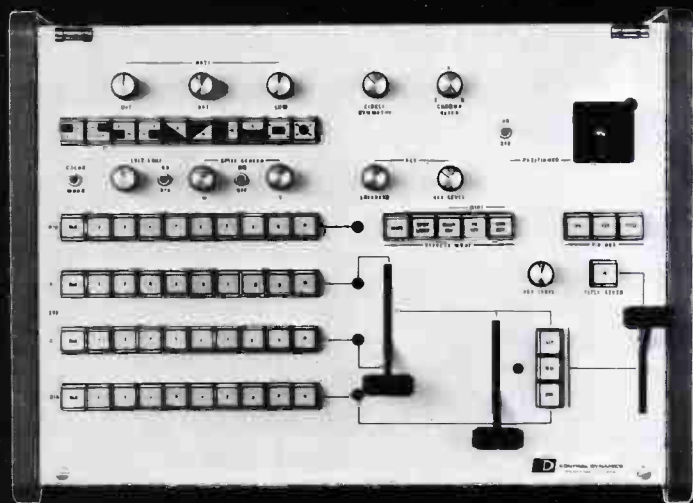


1. Ascot House
2. Avenue Motel
3. Blackstone Hotel
4. The Conrad Hilton Hotel
5. Continental Plaza Hotel
6. The Drake Hotel
7. Essex Inn
8. Hyatt Regency-Chicago
9. McCormick Inn
10. Palmer House Hotel
11. Pick Congress Hotel
12. Sheraton-Chicago Hotel
13. Water Tower Hyatt House

14. McCormick Place

Sophisticated effects

with a "small" switcher!



CDL's New VS-14 Provides Broadcast Quality, BIG SWITCHER Capability... at a Small Switcher Price

Big Switcher Features:

- Wipe/Key/Mask Key Amplifier
- Mix Amplifier
- Downstream Keyer that inserts or dissolves color titles
- Soft Wipes
- Soft Keys
- Vignettes
- Color Matte Generator
- Chroma Keying & External Key*
- Mask Key
- Preset Split Screens
- Spotlight
- Joystick Wipe Positioner

and they're all **Standard!**

The combination of a MIX AMP, WIPE/KEY/MASK KEY AMP and a DOWNSTREAM KEYS allows easy execution of a complex effects sequence... such as... dissolve from the source to a masked chroma key*... then dissolve a color matted title over a chroma key, and finally dissolve out of the chroma key to a different source while retaining the title.

*CDL RGB Chroma Keyer Module is optional

Other standard features include:

- 10 inputs (composite or non-composite)
- 4 buses
- Color Black Generator
- Variable ellipse on circle wipe
- Vertical Interval Switching
- On-Air Tally System

... and more!

The self contained rack mount model is ideal for mobile applications and tight corners. Also available in a remote controlled model for studio and post-production installations.

Features galore... plus CDL's Big Switcher Quality and Reliability in a small package using the latest solid state technology.

All this at small switcher prices!

Self Contained VS-14 . . . \$ 8,250.
Remote Controlled VS-14R \$11,250.

The VS-14 is the 2nd in a series of small switchers with Big Performance and a New Dimension in switching. Call or write for our VS-14 brochure.

CDL will change your impression of what small switchers can do.

Want to add Audio?
Team up with CDL's
NEW and unique AFM-10
Audio Mixer/Switcher.
See our ad in this issue.



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

Circle 127 on Reader Service Card

NAB CHICAGO

Las Vegas but only about two out of five are going. Heads of engineering at TV stations, on the other hand, will be at Chicago in strong force. For some reason, this group didn't go to Las Vegas but at least 85% of those polled will be going to Chicago. (This compared to 61% for Las Vegas and 70% for Houston.)

Interest in types of equipment is shown in the accompanying tables. As

might be expected, ENG is the hottest area for TV broadcasters. In radio the interest in tape recorders and consoles remains high (the former was hyped in 1975 because of many new model entries in '74-'75) but the product of single most interest is EBS. Apparently half the industry hasn't yet placed its order!

Our Panel of 100 poll indicates broadcasters will be spending more money in 1976 than in previous years. The average radio station budget is up

only a modest 8% but TV broadcasters report budgets 50% higher than last year.

A relevant program

This year radio broadcasters will have many sessions devoted to their vital interests since the Radio Advertising Bureau has been invited in to work with the NAB in coming up with in-depth sessions on radio programming and radio sales/management. Engineering sessions will hit many topical areas: ENG (both radio and TV), AM stereo, audio cueing on SCA, wireless microphones, and a great many sessions on digital broadcasting including papers on PCM and electronic still frame storage.

Among the outside speakers already announced for the Convention are FCC Chairman Richard E. Wiley, for the combined radio-TV luncheon on Tuesday, March 23; and Paul Harvey, noted radio commentator, for the radio luncheon on Monday, March 22. The NAB has also announced that the Engineering Achievement Award for 1976 will go to Frank Gregg Kear, consulting broadcast engineer, who has had a very distinguished career as a technical pioneer in radio, going back to the 1930's.

A full exhibit floor

It's a little early to report precisely what will be shown at Chicago (we'll have a near-final fix on that in the March issue of BM/E) but a few patterns are emerging. New ENG cameras will be all over the place along with other ENG products such as tape recorders, editors, microwave gear and ENG "accessories."

There will be a new source for audio tape cartridge players: UMC Electronics. Some new transmitter models are promised by AEL. McMartin says it will be introducing an "impressive expansion" of its AM/FM transmitter line. Radio automation equipment will be in prominent display. IGM, Schafer and SMC all showed new systems at the National Radio Broadcasters convention at Atlanta last fall and this equipment will be highlighted at Chicago.

New ENG cameras

At this moment we suspect the most talked about camera will be the new Thomson-CSF Microcam described briefly last month in BM/E. In the full-broadcast-quality category, this unit boasts the lowest power drain (22

There are **2** great **CHYRON** systems

providing titling...graphics
for television production

CHYRON II Electronic Graphics System,

unquestionably the most advanced and versatile system available today...the one system that offers the highest character resolution and do-it-yourself capability for unlimited type font and logo preparation, plus more features than any other TV graphics equipment.

CHYRON III Electronic Titling System,

At a moderate price CHYRON III provides more flexibility and quality than higher priced units, including unlimited font and logo interchangeability, large message storage capability, and character resolution exceeded only by CHYRON II.

For complete information write:

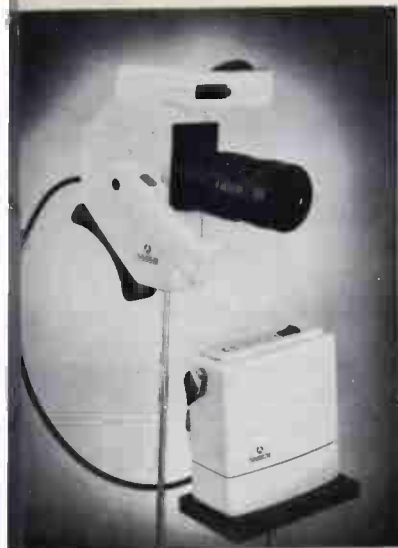
Visit Us
At NAB
Booth 501B

CHYRON III

TELESYSTEMS DIVISION OF CHYRON CORPORATION

223 Newtown Road, Plainview, New York 11803 • 516 249-3296
851 Burlway Road, Burlingame, California 94010 • 415 348-1144

Circle 128 on Reader Service Card



Thomson-CSF Microcam that will be exhibited at NAB for the first time.

acts) and lowest weight (11-lbs.) of any unit introduced to date. The winner as far as price is concerned is likely to be the Toshiba CK-38. This three-tube Chalnicon-equipped unit is priced at about \$12,000.

Our prediction may go sour as a result of some new entries from Japan. Sanyo says it will have a new camera and we don't have details. The moment of truth will take place at Chicago. We're into the third round of ENG camera design and what can be expected in terms of power, weight, size and prices is nothing short of phenomenal.

As we mentioned in January, Sony will unveil a new line of ENG equipment which is expected to include recorders, editors and maybe TBCs and cameras. Hot on Sony's heels as a source of ENG U-matic equipment will be JVC.

At the recent National Audio Visual Association meeting, JVC declared its 1976 goal was simple—to be the number one firm in the video equipment market. It has singled out the broadcast field as its primary focus for growth in 1976 and claims "dollar for dollar, feature for feature," its new line the most attractive available. At the top of the video cassette recorder line is the new JVC CR-8300U priced at \$5,495. It offers smooth and stable video insert and assembly editing. It also has the editing versatility of being able to select any combination of video, audio channel 1 and audio channel 2 signals. For editing it has a rapid tape search speed and a tape count memory control for easy search. Although the unit does not backspace as indicated in a BM/E footnote last

month, the location of a specific edit frame is facilitated through a still/slow motion control including a slow motor speed of 1/15. Automatic assembly and insert control is a feature and a remote control unit is available.

JVC also has a new battery-powered portable VCR, the CR-4400U weighing 25½-lbs. (with a rechargeable PBP-1 battery and KCS-20 cassette). Power consumption is claimed to be "approximately 50% of that used by other portable units." The CR-4400U

has a capstan servo system and there is no need for a separate color adaptor. Unit has fast forward and rewind after pushing stop button. There is also touch feather control for Pause and Still framing. Price is \$2,945.

Another recorder system of unusual interest to NAB visitors will be the Bosch-Fernseh BCN 1-in. system introduced last year at Montreux (BM/E Aug. p. 44). This unit will be at Chicago. Included in the series is the BCN 20 portable unit. Bosch reports



IF YOU'D CALLED US YESTERDAY, WHEN YOU WERE RUNNING OUT OF THESE, YOU WOULDN'T BE RUNNING OUT TO GET THEM NOW.

Because we stock the most extensive variety of video supplies (and accessories) you'll find anywhere. Because our fast, friendly, personalized service makes sure they're on their way to you fast. And because we're only a phone call away.

Send for our free catalog now. You'll find it's crammed full of everything you'll need—from simple things like gaffer tape, adapters and ready-made cables...to graphic tools, maintenance supplies...all the way up to lighting kits, intercoms and test equipment. Plus just about everything you can think of in between.

Then give us a call, whatever your needs. If we don't have it, we can tell you where to get it...and we will.

Comprehensive
SERVICE CORPORATION

18 West 61st Street, New York 10023 (212) 586-6161
829 North Highland Ave., Hollywood CA 90038 (213) 462-0969
Call TOLL FREE 800-223-5460 except in New York State and
Los Angeles Metro Area.

Circle 129 on Reader Service Card

NAB CHICAGO

sales to Berlin, Paris, New Dehli and Peking and it will be testing the American market at Chicago.

Some brand new items from Harris

The Broadcast Equipment Division of Harris will unveil some brand new

products at Chicago. One is a new studio camera the TC-80. It's described as a state-of-the-art system with many automatic features. Use of triax cable is optional. Harris will also show a new TF-100 color film camera which has many new features and is simple to install.

A new circular polarized TV an-



JVC's new Total Video System.

Overall Interest In TV Equipment

	Percent Interested 1976	Percent Interested 1975
TV Cameras, Portable (ENG)	70%	44%
Time Base Correctors	61	64
VTRs, Portable	50	32
Character Generators	47	46
Test Equipment	47	44
Microwave for ENG	40	N.A.
Picture Monitors	38	40
Video Cartridge/Cassette Players ..	35	40
VTRS (quad)	33	44
Video Tape Editors	28	32
Remote Control Equipment	28	28
Audio Consoles	27	42
TV Cameras (top-of-line)	26	22
Production Switcher (large)	25	30
Production Switcher (small)	25	22
Transmitters	25	32
Film Chains	24	34
Master Control Switcher	24	32

Switching Automation	21	N.A.
Routing Switchers	19	32
TV Cameras (medium price)	18	16

Overall Interest In Radio Equipment

	Percent Interested 1976	Percent Interested 1975
Tape Recorders/Players	55%	78%
Consoles, Mixers	54	53
EBS Equipment	51	N.A.
Cartridge Players	48	49
Audio Processing Equipment	43	43
Automation Equipment	40	46
Remote Pickup & STL	38	32
Microphones, Accessories	38	N.A.
Noise Reduction Systems	36	32
FM Monitoring Equipment	33	19
AM Monitoring Equipment	27	28
AM Transmitters	27	25
FM Transmitters	25	18

Trouble-Free UHF Antennas

from America's only exclusive antenna manufacturer

- Safe power ratings from 30 KW-120KW
- Omni-directional patterns with power gains to 48.
- Exceptionally low VSWR (1.05) for crisp, sharp TV pictures.

Jampro's time proven Zig Zag UHF TV antennas have many advantages over competitive brands.

First, with our ultra simple feed system, our antenna provides extremely high power capability, which insures trouble-free service.

Second, there are no interbay feed cables. Single or dual 6 1/8" coaxial lines allow 60 and 120 KW power handling with ease.

Third, plastic radomes give unaffected service in salt or corrosive environments, as well as snow and ice.

Fourth, every antenna is pattern-tested on our mile-long test range before shipment to meet your most stringent requirements.

Call us for a quotation today.

JAMPRO ANTENNA COMPANY
A SUBSIDIARY OF CETEC CORPORATION

Phone (916) 383-1177 • 6939 Power Inn Road, Sacramento, California 95828

J
A
M
P
R
O

na will be shown by Harris. It fea-
s excellent axial ratio, and a pat-
that can be tailored to user's re-
ements. (See article on Circularly
arized Antennas next month for
e information on this antenna.)

**Electronic Still Store System be
own?**

One of the hottest new items to
ak in recent years is the new
pex/CBS system for storing slides
digital form on computer disc
ks. First paper on the subject was
livered at the Winter TV SMPTE in
roit last month by CBS personnel.
NAB, it is expected that Ampex
ngineers will deliver a paper on the
stem. Whether or not the system will
shown on the exhibit floor is not
own at this time. The system should
ve Redwood City to get to CBS
ew York in time for use at the
omocratic Convention. It may be
opped via Chicago, but Ampex is not
aing.

will be a big video show

As always, the exhibit hall will be
ed with video equipment. Telemet
l be featuring the Model 7960-A
udio Production Switcher. This unit
a be purchased with 9, 15, or 21
uts. Options include color matte
t black burst generator, positioner
h circle, square and diamond
oes, 6 X I preview bus, downstream
ert keyer with optional color matte
d non-synchronous inhibit for Mix
A B.

Vital will show total automation for
7 and a new switcher with a star spe-
el effects will be introduced. Vital,
well as Grass Valley and CDL, will
ve master control switchers working
om BIAS log information.

Dynasciences will show something
ew in downstream chroma keyers,
mely its model 7200. Also to be
own is a new Vibra Stop low cost
rotation stabilized lens. Matthey (at the
E.A. booth) will show an automatic
video equalizer. IVC will have a new
me base correctdr.

There will be something new in
ynamic graphics from Chyron but we
an't say more until March.

Other products to be seen

An economy open reel tape record-
r, the 750 Series, will be introduced
y International Tapetronics. ITC will
lso feature an automatic cartridge
ape Splice Locator/Eraser.

continued on page 82

THE CARTRIDGE FAMILY ...instantly.



whether you're putting in a
new automation system, be it theirs or
ours, or expanding your old one, demand INSTACART...
for unparalleled instant access flexibility and fantastic reliability,
INSTACART is the choice, with a proven track record that's the envy
of the industry.
Available in mono or stereo, with 12, 24 or 48 cartridge positions,
INSTACART brings incredible instant random access flexibility to
your live or automated operation. INSTACART—ask anyone—it's...
the best there is!

Call or write today
for full details.

See us at NAB,
Chicago, Booth 605

IGM

A Division of NTI
4041 Home Road
Bellingham, WA 98225
206-733-4567

Circle 131 on Reader Service Card

YOU'RE A BROADCAST PROFESSIONAL . . .

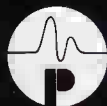


We supply the finest professional audio products from major equipment
manufacturers

We manufacture the Multi-sync, Multilimiter, and Digitimer

We design complete broadcast audio facilities from the wall in

WE'RE PACIFIC RECORDERS AND ENGINEERING



PACIFIC RECORDERS AND ENGINEERING CORPORATION

11100 ROSELLE ST., SAN DIEGO, CALIFORNIA 92121

TELEPHONE (714) 453-3255 TELEX 695008

Circle 132 on Reader Service Card

Do We Want Discrete Four-Channel Stereo For FM?

It is fully practical with present technology, and the five proposed systems for achieving it all work well, says the report of the National Quadraphonic Radio Committee, recently delivered to the Federal Communications Commission. But now the FM broadcaster must match the promises and problems of discrete four-channel stereo against his own interests: Will the cost be worth it in a preferred position with his listeners? Will there be enough good software? Which system is best? This article supplies some of the background facts for this crucial analysis.



K101 antenna, used in air tests.

The FM broadcaster had better be ready, by spring or early summer of this year, to express himself on two questions: Is discrete four-channel FM going to be worth the cost? What system of discrete four-channel transmission, if any, should be authorized for optional use in FM?

Until now we have left all questions on these topics to the National Quadraphonic Radio Committee of the Electronic Industries Association, set up in 1972 with the express purpose of getting data to help answer such questions. The NQRC has made its report, and our reliance on its guidance turns out to have been a splendid idea. By common consent this is the fairest, most complete, most factual study ever made to help the FCC in a major broadcast decision. Veterans of the NTSC, NSRC, and other earlier ad hoc committee efforts are unanimous in putting the NQRC study at the top.

The report went to the FCC in early December. It includes exhaustive analysis of discrete four-channel FM in general, and comprehensive tests of five specific, competing systems proposed to implement it. Proponents of each system built operating models which went through the most complete over the air and closed-circuit tests that a flock of the industry's top talents could devise.

The overall conclusions of the report were previewed at the NAFMB convention in Atlanta, as reported in BM/E in November. The highlights are (more detailed below): discrete four-channel FM is thoroughly practical with present FM broadcast technology; all five of the proposed systems worked well; in a direct comparison, listeners strongly prefer discrete four-channel reproduction to matrixed or two-channel reproduction.

On the face of it, the report is going to do just what it was intended to do: save a year, or maybe two, in the FCC's deliberations on four-channel FM by making a notice of inquiry unnecessary. It is hard to imagine that more testing is needed when one looks over the summaries of the tests in this report.

The FCC, of course, can disagree and issue a notice of inquiry calling for more data. But the best guess is that the next move will be an FCC notice of rule making, proposing a decision and inviting the comments of the

industry. This notice might come, staff members at the FCC have said, by late spring or early summer; but broadcasters will recognize that this is a best-hope forecast, vulnerable to the well-known clogging in the FCC pipeline.

Thus with comments, reply comments and rebuttals all due, it is realistic to assume that, at best, the rest of 1976 will be taken up in the FCC-industry dialogue, with a final decision coming, at best, early in 1977.

But the FM broadcaster cannot forget about four-channel FM until 1977 (or later). What happens at the decision point will depend in large measure on what he does now, in 1976. As suggested at the beginning, the decision will be heavily influenced by what the broadcaster tells the FCC he wants, expressed either individually or through the broadcast associations around the country. The NQRC report demonstrates, most convincingly, that discrete four-channel FM is *practical*. The industry must decide on a broad basis whether it is *desirable*.

It is particularly important that the individual broadcaster make his position known, because there will be heavy pressure on the FCC from a number of special interests. Each of the five proponents of specific systems will naturally be pushing hard for that system (one member of a Committee panel estimated for BM/E that some system proponents had spent several million dollars apiece to underwrite their demonstrations).

To take another example: it is in no sense being derogatory to point out that firms with heavy investment in matrix systems will like it best if *no* discrete system is approved. The solution there would be a highly desirable but extremely unlikely industry move toward total compatibility of four-channel recording systems.

The main questions the FM broadcaster has to satisfy himself about over the coming months are the obvious ones:

- Is any of the proposed systems clearly superior to the others?
- What will it cost the broadcaster to get into discrete four channel?
- Will his investment give him a clear advantage with his listeners?

• And, most important, *where is the software coming from?*

Here BM/E can only suggest, in the briefest terms, where some of the answers might lie. Conclusive answers or even reasonably convincing ones must come from discussion among many elements of the industry. Hopefully, conventions and other industry meetings during the coming year will provide forums for such guidance.

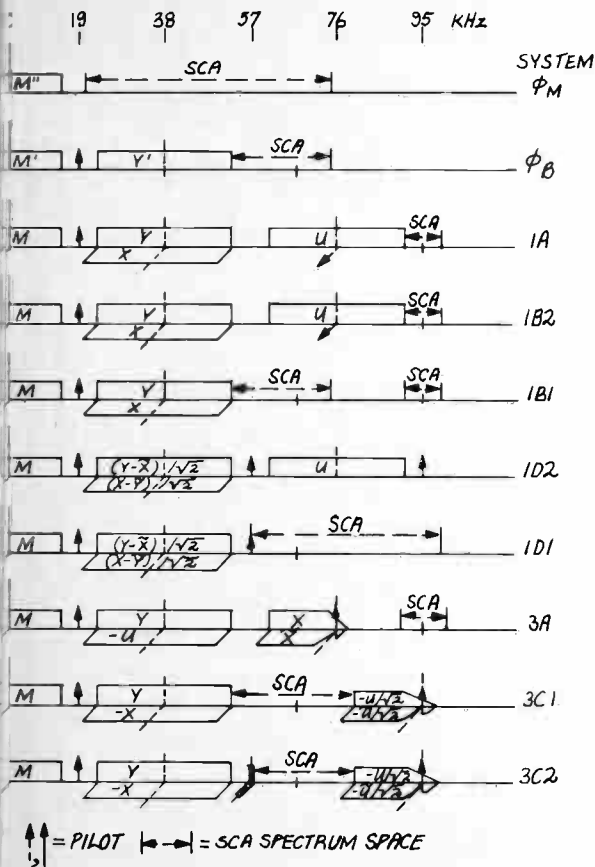
Overall: it is practical, compatible, and needed

The report puts it this way: "The tests clearly demonstrated the viability of quadrasonic services both from the practical and the quality aspects." This judgement includes the complete transmitter-receiver system, using presently-common technology at both ends. Present transmitters are fully adequate, as are present antennas.

Present receiver technology is also fully satisfactory, with the quality of the results depending on receiver quality, a factor dependent in turn on cost/consumer choice.

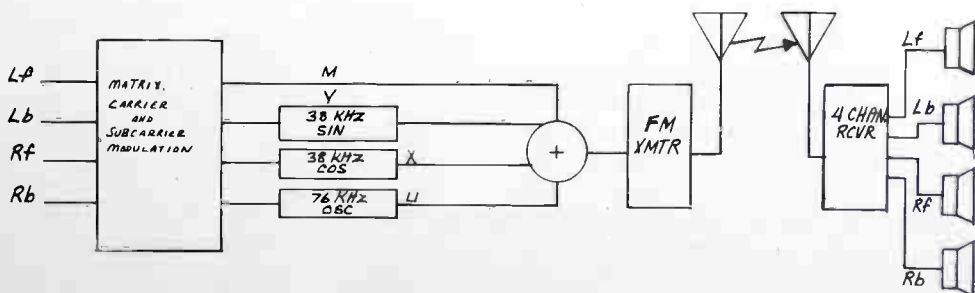
The clean bill of health on "compatibility" includes a no-increase-in-interference finding, as well as maintenance of protection ratios.

The one negative finding (one widely anticipated) was the reduction in SNRs caused by the necessary reduction in modulation levels. This is on the order of 6 to 10 dB (apparently it varies somewhat among the systems) as compared with stereo FM. On that the report says: "(This) . . . is not large enough to significantly reduce the coverage of existing (two-channel) FM services." For *four-channel reception*, some broadcasters may experience some coverage loss at the fringes, as compared to two-channel. Note, however, that mono

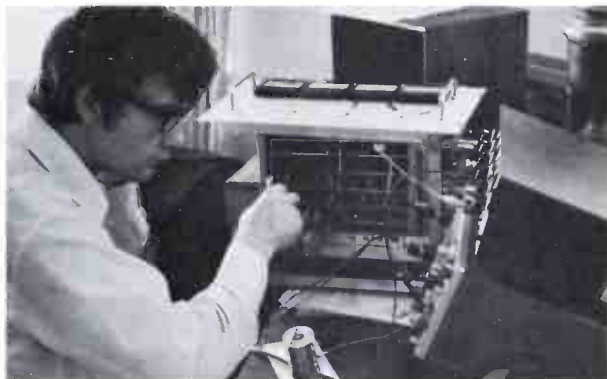


Diagrams show spectrum assignments in all proposed four-channel FM systems. Two at top are mono and stereo M, for comparison. IA is a Quadracast; IB1 and IB2, RCA; ID1 and ID2, Cooper-UMX; 3A, General Electric; 3C1 and 3C2, Zenith. Combination signals used by all are: $M = LF + F + LB + RB$; $Y = LF + LB - RB - RF$; $X = LF - LB - RB + F$; and $U = LF - LB + RB - RF$. First three systems use double-side-band carrier-suppressed modulation on all sub-carriers; last two use vestigial SSB on upper sub-carriers.

General scheme used by several systems includes matrixing into the four combination signals, M, Y, X, and U, their application to main, 38 KHz and 76KHz subcarriers, and their combination to modulate transmitter.



Four-channel signal generating equipment is set up in center and right racks in this laboratory at the College of San Mateo, California. In left rack is the Cooper-UMX system, undergoing tests.



Tom Davies, one of technical assistants to the NQRC, sets up for tests of a decoder. (Note: all photos accompanying this article made by Eric Small, Cooper-UMX).

FOUR-CHANNEL STEREO

Test equipment which was used in field trials is installed in trailer, later used to determine signal characteristics throughout coverage area.



A delay line consisting of 4,000 feet of coaxial cable, shown here on drums, was part of test system for simulating multipath effects.

and two-channel listeners will suffer a small loss (about 4dB) because of the installation of four-channel transmission.

On the desirability of the results, the report sums up the subjective tests (described in BM/E for November) as follows: "The subjective aspect results clearly indicate the need for a quadraphonic service." We go into this very basic point in more detail further along.

Battle of five systems—the "polite" period is over

The system proponents are the following:

Quadracast Systems Inc. (The "Dorren Quadraplex" system);

RCA (with two options);

Cooper-UMX (two options);

General Electric;

Zenith (two options).

The five systems are remarkably similar in overall design, as can be seen from the spectrum charts reproduced here. These charts are taken from Volume 1 of the NQRC report, which gives a detailed description of each system as prepared by its proponent. Volume 1 of the report is available free from EIA. *BM/E strongly recommends that every FM broadcaster get a copy:* address the EIA at 2001 Eye St. NW, Washington, D.C. 20006, or call them at 202-659-2200.

Note first the four signals "M", "X", "Y" and "U", used universally in these systems, as shown in the caption. Every system uses a "main" channel which carries the sum of all four stereo signals, the "M" signal. This assures mono compatibility. Every system uses the 38 KHz subcarrier of stereo FM to carry two of the signals in phase quadrature. Every system uses double sideband suppressed-carrier AM modulation for this subcarrier, which takes up the spectrum from 23 to 53 KHz. And every system uses a 19 KHz pilot as a reference for all the signals.

By putting the left-minus-right (LF + LB - RF - RB, or "Y", signal) on the 38 KHz subcarrier at the zero phase, two-channel stereo compatibility is provided: stereo receivers will get L+R on the main carrier and L-R on the subcarrier, as they do now with two-channel FM. The other signal on the 38 KHz subcarrier can be the "X" signal—front-minus-back—or the crisscross, "U".

From this point on, the systems tend to differ. QSI, RCA Option 2, and Cooper-UMX Option 2 put the fourth stereo signal on a subcarrier at 76 KHz, again

double-sideband AM carrier suppressed. QSI and RCA allow for an SCA subcarrier at 95 KHz with 4 KHz bandwidth; Cooper, Option 2, omits SCA. Zenith puts the fourth signal at 95 KHz, but with vestigial SSB modulation. GE puts the fourth signal at 76 KHz, also with vestigial sideband AM modulation. The charts show the varying disposition, or omission, of an SCA subcarrier.

Fortunately for all of us, the NQRC's studies include exhaustive tests of the noise characteristics, distortion, coverage, interference potential, etc., etc. of each system. These results are shown in Volume II of the report, now being sold by EIA for \$100 a copy (note to EIA: could some summaries be issued?). In any case, persons familiar with the results say that all the systems worked well: the differences are reasonably small.

But there were *some* differences, and the very fact that they were not overwhelming makes it certain that they will be emphasized by the various proponents when the competitive struggle begins. Up to now, everyone agrees, all the competitors have been eminently cooperative in their effort to get a complete, factual report.

But, now, as one observer put it to BM/E, comes the lunge for the jugular—each proponent will naturally push his strengths and the others' weaknesses as strongly as possible. This can have a highly educative value for the FM broadcaster and should be welcomed on that score.

To sum up on this question: right now it is possible only to get tentative opinions, many tinged by self interest, on the comparative merits of the systems. But as the exhaustive test results are made widely available, are analysed and summarized, and as the claims of the various proponents are advanced and evaluated, it seems highly likely that preferences will emerge. One *possible* outcome suggested to BM/E: a combination of two or three systems, which might avoid giving a strong paten position to one proponent—or might avoid lengthly legal squabbles in an area of patent complexity.

The broadcaster's cost: moderate

If and when it comes, the FM broadcaster will need only moderate additions to his plant to get into discrete four-channel broadcasting. As already noted, a major conclusion of the NQRC report is that present transmitters, exciters, antennas, are fine for the job. The major additions, therefore, will be the encoder, some four channel monitoring gear, four-channel control consoles

continued on page 4

SUPER!



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

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

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

Consider what that really means!

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

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

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

And you also get all these important features:

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

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

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

Noise: -116dBm equiv. input noise

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

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

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

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

Availability: We're in production now!

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

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

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



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

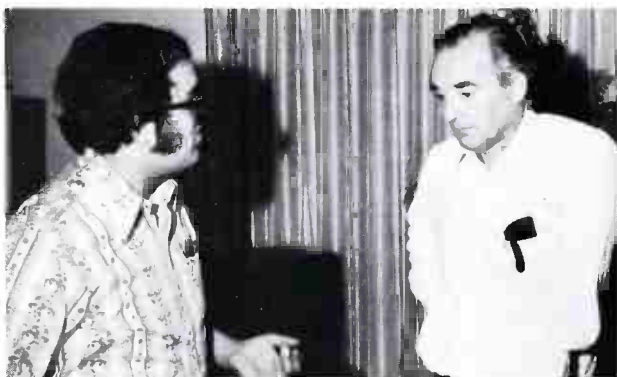
Circle 133 on Reader Service Card

FOUR-CHANNEL STEREO

Dr. Duane Cooper, co-developer of Cooper-UMX system, adjusts unit in system prior to one of test runs.



Typical of multi-company cooperation and joint effort that animated NQRC tests is this scene showing, from left, H.P. Lee of General Electric, Mark Broder, NQRC technician, and Christy Davidge, secretary of Cooper-UMX, working together on analysis of some test results.



Another inter-company consultation during the tests is this one between Lou Dorren, left, developer of the Quadracast system, and James J. Gibson of RCA, who served on several of the NQRC panels.

and four-channel origination equipment. The last will depend heavily on the software that develops—more on that below.

Cost of the encoder is likely to be somewhere in the \$1500 to \$3000 range, according to estimates given BM/E. Four-channel monitors will be essentially stereo monitors multiplied by two. Four-channel consoles are, of course, already in use in large numbers. The broadcaster can choose over a wide range what he wants to pay for such a console: it depends on many factors besides the number of output channels.

Altogether, it appears that an entry to discrete four-channel will be available for \$15,000 to \$20,000—it can be more, but it doesn't have to.

Does the FM listener want it?

Here we move onto the battlefield. On the one hand there is the sad fact that four-channel reproduction has not taken off in the consumer hi fi field. BM/E talked to several nation-wide merchandisers of consumer hi fi equipment. They agreed that four-channel—whether matrixed or discrete—is still a fringe enterprise; one of the largest distributors is, in fact, abandoning four-channel equipment entirely in 1976.

However, a spokesman at Lafayette Radio, as gloomy about present four-channel sales as the others, was still totally enthusiastic about the basic attractiveness and salability of four-channel reproduction when properly presented to the listener. He blamed the competition between systems for a major part of the failure of this “thrilling” listening experience to win buyers—that and an apparent lack of commitment on the part of important software producers to full production of four-channel material.

The attractiveness of four-channel reproduction has been apparent in the substantial success of a number of FM stations with matrix systems, as reported over the last few years in BM/E and elsewhere. Although hobbled, again, by competition between systems, a significant number of stations have stirred highly worthwhile listener excitement with matrix broadcasting. There is simply no question that, under favorable conditions, four-channel reproduction has strong attractions even in matrix form.

So why go beyond matrix systems?

And that brings us to the most contentious question of all—why abandon matrix systems, which are so much cheaper, simpler, requiring no FCC action of any kind?

Every broadcaster has read reams of argument on both sides of this question. The NQRC's subjective tests do supply a direct listener-preference determination, as already noted, between discrete four-channel and a matrix system: discrete won hands down. This tends to confirm a step-by-step point of view held by many: good matrix reproduction does step up to an important improvement, as compared with two-channel; good discrete carries this a large step further. The only unfortunate fact about the NQRC tests is that the two main matrix systems, Columbia's SQ and Sansui's QS, were not included in the tests. This came about because the two firms did not enter their systems in the NQRC trials.*

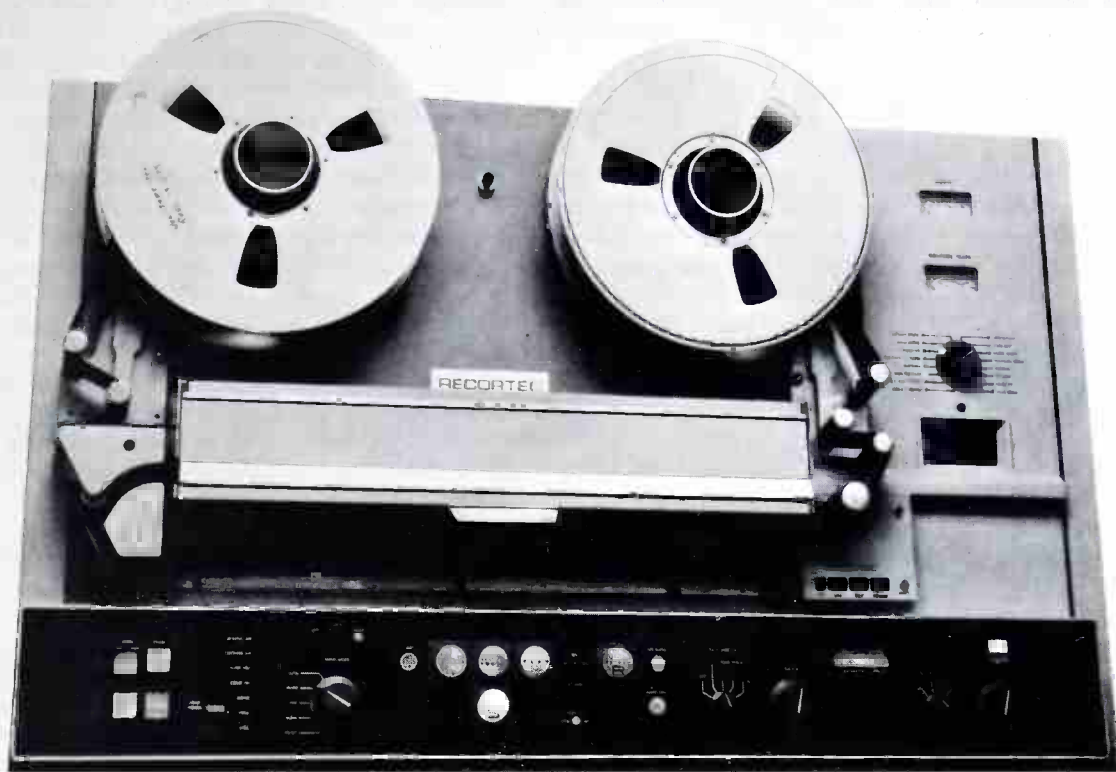
It would be easy to conclude that discrete four-channel FM should simply be given a trial to find out if the margin of improvement is worth the cost to broadcasters—software producers, receiver manufacturers, listeners. But the decision involves more than that. It is the explicit hope of the proponents of discrete four-channel that the choice of an FM system will force the industry, at last, to close ranks behind one overall system for four-channel.

This has its bad aspects: it means that some of us are going to “win” and others are going to “lose”, at least

*The matrix system used in the comparison tests did not include decoder logic like that available in both the SQ and QS systems. Presumably either or both, could have made a better showing; whether decisive or not is open to question.

continued on page 46

AUTOMATE YOUR VTR



NEW PERFORMANCE WITH R-MOD

- FRAME ACCURATE ELECTRONIC TIMER
- SHUTTLE AT CONSTANT TENSION
- RELIABLE REPLAY OF CUE SIGNAL
- HANDLING OF TWO HOUR REELS
- AUTOMATIC STOP AT TAPE ENDS
- RELIABLE FOR REMOTE OPERATION
- CONSISTENT FASTER LOCKUP TIME
- INCREASED HEAD AND TAPE LIFE

R-MOD is a reel servo modification kit which consists of new DC reel motors, servo tension arm assemblies and electronic tape timer. It is easily installed in the field to provide your quadruplex VTR with superior tape handling. R-MOD rapidly pays for itself in less head wear, longer tape life and significantly more effective use of your VTR time and operating personnel.

Unless you want to buy the vacuum chamber buffered VTR, R-MOD at only \$8500 is the next best transport on the market. Before buying a new VTR, investigate the improvement R-MOD will make on your present VTR.

Want more details? Recortec is as close as the telephone on your desk. Call us toll free on (800) 586-1586. (Outside California only)

RECORTEC, INC.

777 PALOMAR AVE., SUNNYVALE, CA 94086

TEL: (408) 735-8821

TWX: 910 339 9367

Circle 134 on Reader Service Card

FOUR-CHANNEL STEREO

initially. But it has the excellent promise of putting the industry finally in a rational relation to the consumer, so that four-channel reproduction can grow at a normal, healthy rate. In the end everyone in the industry will benefit from that.

Where is the software?

The foregoing suggests the answer to this paramount question. The optimists see a "follow the leader" effect: once a single system is established, the four-channel software will start to flow from many industry sources. The industry is in better position to do this than when two-channel stereo came, in the late 1950's. Then every piece of material had to be recorded anew. Now practically every recording on industry shelves is in a multi-channel form readily mixed down to four discrete channels, if that is wanted—any record company can do that today.

At the start, the burden is clearly going to fall on RCA's CD-4 system for disc program material. But we can hope that others will come along with discrete systems that are compatible, if not identical. We can hope that, whatever system is used, the software producers will move into full-scale production, on the grounds as already noted, that the FM experience will start a broad move by the public into four-channel stereo.

There is a minor but highly intriguing subsidiary possibility. Discrete four-channel in FM might resuscitate high-quality four-channel tapes. The quality-minded FM

broadcaster would certainly prefer—though he may not be able to do it on a large scale—getting his four channels directly from a tape, to getting them at the output of a CD-4 decoder, with an elaborate re-encoding still to come.

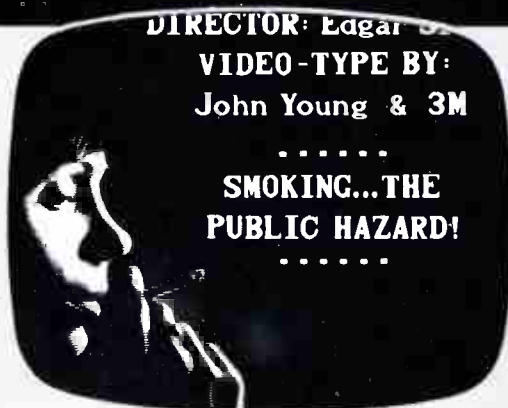
Many broadcasters already have such tapes, from various sources. There is little or no hope that any of the main body of four-channel programming will be available in this form—the big record companies can see no worthwhile return from four-channel tapes.

But independent companies, specialists of various kinds, that have put out four-channel tapes in the past—to a very slim market, indeed—will certainly welcome any enlargement of the market. Vanguard Records, for example, a pioneer with four-channel tapes nearly a decade ago, recently issued additional tapes, plans to continue building their catalogue of such tapes slowly. A spokesman there suggested that if and when a market developed among FM broadcasters, Vanguard might consider accelerating four-channel tape production. This company has a very large, attractive catalogue of music of all kinds, perhaps the finest of any "independent" record producer.

There is, of course, "live" four-channel programming, which could be the most exciting of all benefits from discrete four-channel FM. It can make up only a tiny fraction of the programming available to us, but several station executives BM/E questioned said they would certainly do it from time to time, when the new system comes. For the quality-conscious listener, an occasional "live" pickup could make it all very worthwhile.

BM/E

Video-Type by 3M.



Shown above is Datavision "Piper Roman", using Upper and Lower Case Fonts, 28sl.



Today, more Datavision D-3000 Character Generators are bought for their character quality...than their low cost.

Now supplied with multiple type fonts at no extra charge. OPTION A — Piper Roman (a classic serif face), Regular Caps, 28sl and Small Caps, 20sl; plus Upper and Lower Case, 28sl. OPTION B — Video Gothic (a modern san-serif face), Regular Caps, 28sl and Small Caps, 20sl; plus Upper and Lower Case, 28sl. OPTION C — Both Piper Roman and Video Gothic faces in Regular Caps, 28sl and Small Caps, 20sl. FEATURES: • GRAPHIC ARTS CHARACTERS • 4-PAGE MEMORY • 2-CHANNEL DISPLAY • CHARACTER EDGING • OPTIONAL 1,000 PAGE MEMORY • & MORE.

Get the facts and a free on-site demonstration. Call or write today. Datavision Video Products, 3M Company, 15932 Shady Grove Road, Gaithersburg, MD 20760. Phone: 301-948-0460.

Datavision Video Products **3M**
MINCOM DIVISION COMPANY

1976

...A year of pioneers and pioneering



For over a decade and a half, Moseley Associates, Inc., has pioneered many advances in aural studio-transmitter links (STL) and transmitter remote control equipment. Listed below are but some of these innovations —

MOSELEY - Pioneers of:

- ✓ Dual STL for FM Stereo
- ✓ Composite STL — A SINGLE Link for FM Stereo
- ✓ All Solid-State STL
- ✓ AM Wireless Remote Control with Subaudible Metering
- ✓ FM Wireless Remote Control with Subaudible Metering
- ✓ Automatic Digital Transmitter Logging
- ✓ Digital Transmitter Remote Control System
- ✓ Patented FM Remote Control SCA Phase Modulation Telemetry Return Technique
- ✓ All Solid-State Remote Pickup Link

AND NOW, for the 1976 NAB Convention, we will introduce the first 950 MHz STL transmitter with an on-frequency All SOLID-STATE RF Amplifier — NO varactors!

Please visit us in Booth 505 during the NAB Convention and see this new STL transmitter and other Moseley innovations.



MOSELEY ASSOCIATES, INC.
SANTA BARBARA RESEARCH PARK

111 CASTILIAN DRIVE
GOLETA, CALIFORNIA 93017
TELEPHONE (805) 968-9621
TELEX 658448 CABLE: MOSELEY

Circle 135 on Reader Service Card

The Road Ahead Looks Smooth For AM Stereo

The National AM Stereo Committee of the EIA is beginning its evaluation of proposed systems. Three proposals have already been made; field tests of one system have already indicated that AM stereo is practical. The regulatory and competitive difficulties seem a lot less fearsome than they are with four-channel FM.

Some AM broadcasters are going to be surprised by this statement, but plenty of them are going to be pleased: AM stereo could come in a lot faster than FM stereo did, more easily, spreading through the industry quickly with

large benefit to many station operations.

Technically, AM stereo appears to be readily adaptable to existing AM installations at moderate cost. A number of systems are being put forward (more on that below), and the techniques look no more difficult—perhaps less so—than those of FM stereo. Receiver technology will be equally straightforward. A leading manufacturer of car radios (highly relevant to AM stereo, as discussed in a moment) has said that a car system that already includes FM stereo could have AM stereo added at an additional cost to the manufacturer of around \$2.00.

On the regulatory front, which will be the scene of AM stereo action through the near future, we have the organization of a National AM Stereo Committee (NASC) by the Electronic Industries Association, to function just as the National Quadraphonic Radio Committee did for four-channel FM, and as the NSRC did 15 years ago for two-channel FM. More details on the NASC appear in the accompanying box.

The NASC will receive proposals from developers of AM stereo systems, will evaluate them by whatever means seem desirable, and make a report to the Federal Communications Commission. As this was written three systems had already been submitted to the NASC, and there were a number of others in the offing. One of those systems, that of RCA, has been demonstrated and described at recent industry meetings, and is covered in some detail in the article by Arno Meyer which appears on another page.

The other two proposed systems, those of Sansui Electronics and Comm. Associates, are described very briefly in the accompanying box. A fourth system, that of Kahn Communications, had not been submitted to the NASC at press time, but was used in a comprehensive series of on-the-air tests late last year at station WFBR, in Baltimore. Some highlights of the results are described below.

We can appreciate better the smooth road that seems to be ahead for AM stereo if we consider some of the questions and difficulties hanging over four-channel FM, covered in the article on the NQRC report elsewhere in this issue. Discrete four-channel FM has not won a clear consensus as making matrix systems obsolete in FM; it will be moderately expensive; the proportion of listeners

The NASC Opens For Business, Gets Three AM Stereo Proposals

With the success of the National Quadraphonic Radio Committee to inspire them (see story in this issue), the Electronic Industries Association has set up the National AM Stereo Committee (NASC) to evaluate proposals for AM stereo and report on them to the FCC. Pressure from AM broadcasters for a stereo system has been more and more evident as FM stereo stations in many communities have won strong competitive positions with their two-channel operations. Proposals for AM stereo have been made over several decades, and some systems brought to the operating point in the lab. It seems likely that a number of systems will be advanced to operability and submitted to the NASC; three proposals are already in, from RCA, Sansui Electronics, and Comm. Associates, respectively.

Chairman of NASC is Harold Kassens, formerly Assistant Chief of the FCC Broadcast Bureau and now with A.D. Ring Associates, engineering consultants in Washington. At press time not all the various panels had been organized, but Panel 1, concerned with overall system specifications, has as chairman Carl Eilers of Zenith (who had a similar position with NQRC). Panel 1 was scheduled to meet on February 3rd in Washington to receive detailed descriptions of the RCA, Sansui and Comm. Associates systems from their respective developers.

The RCA system is described in the accompanying story by Arno Meyer of Belar Laboratories. Comm. Associates uses a very different method called "Frequency Aperture Modulation." In this the L+R signal is put on one subcarrier a little below the main carrier, the L-R on another subcarrier a little above the main carrier. Then a filter system selects the band centered on the main carrier and including just the upper sideband of the L+R subcarrier and the lower sideband of the L-R subcarrier; this is the transmitted signal. The receiver responds to the two sideband signals separately.

Sansui Electronics also uses the two sidebands separately, distinguishing between them by introducing a 90° phase difference. Full details on the Sansui system were not available at press time but will be supplied in later stories on AM stereo.

with four loudspeakers in their living rooms, or cars, is quite small, and there is no reasonable way of estimating how fast the public would adopt quadrphony; above all, there is presently no sure indication as to where large-volume software would come from.

In every one of the areas noted, AM stereo seems to be getting pretty. Once a system is adopted by the FCC, there would be no competition of any kind. The cost of additional monitors, limiters, consoles, etc., will be very much less in going from one channel to two than in going from two to four. Two-channel stereo is already installed, of course, in most homes and in a sizeable proportion of cars. The program material is here, has been here for 10 years, in the greatest abundance.

In addition to these plus signals, the AM broadcaster in many cases will have good motivation for getting into stereo. As noted in this magazine and elsewhere recently, many local AM stations have a competitive disadvantage as against FM stereo stations in their communities. AM stereo looks like the way to get back in the game.

A broadcaster who has been actively investigating AM stereo points out to BM/E that in hilly areas, or in large cities with many tall buildings, FM stereo tends to instability in car reception. Thus AM stereo would solve an important listening problem, winning audiences for the AM broadcaster.

Beyond that, even in areas where FM works well in

cars, the AM broadcaster will welcome AM stereo as a way of keeping and enlarging the car audience, which is essential to many AM broadcasters. On this point, there is plenty of evidence that the acoustic effects of stereo, which can be emphasized in car installations, have a very strong attraction for car owners whatever the quality of the signal.

Good evidence that AM stereo can be a practical system comes out of the experiments at WFBR, in Baltimore, mentioned above. The system of Kahn Communications was used. This, in effect, puts one channel on one sideband of the AM carrier, and the other channel on the other sideband. Instrument and listening tests showed stereo signals of low distortion and noise, good separation, available throughout the station's coverage area. The equipment added at the transmitting end, besides the necessary doubling of audio lines, monitors, etc., consisted solely of the Kahn encoder. Two kinds of receivers were tried: one consisted of a dual receiver, with each section detuned slightly, one above and one below the carrier. This provided about 15 dB of separation. A receiver incorporating Kahn's special decoding system averaged 35 dB of separation, far more than enough.

As noted in the box, the NASC is just beginning its deliberations. AM stereo is some distance off—but every fact suggests that it is not going to take nearly as long as four-channel FM has taken to get to the decision point. **BM/E**

A Compatible AM Stereo System

By Arno M. Meyer, President, Belar Electronics Laboratory, Inc.

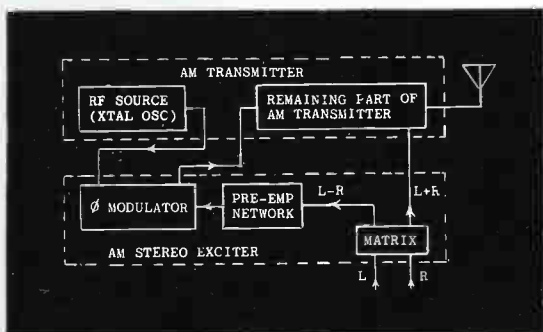


Fig. 1 Block diagram of AM stereo transmitter.

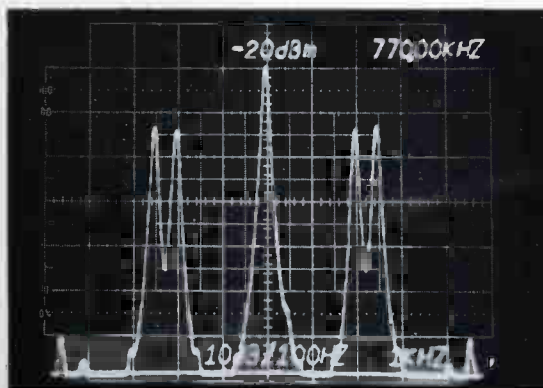


Fig. 2 AM sidebands with L+R, 2 KHZ and 2.5

RCA and Belar Electronics demonstrated a compatible AM stereo transmitting system at the 1975 NAB Convention held at Las Vegas. Both demonstrations used the same system which was based on the AM-FM system developed by RCA and proposed to the FCC in November, 1959. Needless to say, this 1959 system fell by the wayside with the advent of FM stereo.

The AM-FM system of generating a compatible stereo signal is fairly simple. A block diagram of the system is shown in Fig. 1. The left and right audio channels are first matrixed into a L+R and L-R. The L+R or sum signal is applied to the audio input of the AM transmitter to produce the amplitude modulated signal. Note that this is the same type of signal that the FM broadcaster uses now in deriving a mono signal from a stereo sound.

The L-R or difference signal contains the stereo information. This signal is pre-emphasized and applied to an angle modulator which provides the new carrier for the AM transmitter.

This "new" carrier, containing all the FM sidebands of the L-R signal, is applied to the remaining part of the transmitter. The "new" carrier is amplified and processed to add the AM sidebands to the carrier so that the output of the transmitter now contains two information channels—the AM containing the L+R or monaural information and the FM containing the L-R or stereo information.

Fig. 2 shows the spectrum of the AM sidebands produced by a L+R only modulating signal. The L signal is 2 kHz and the R signal is 2.5 kHz. Their amplitudes are continued on page 50

COMPATIBLE AM STEREO

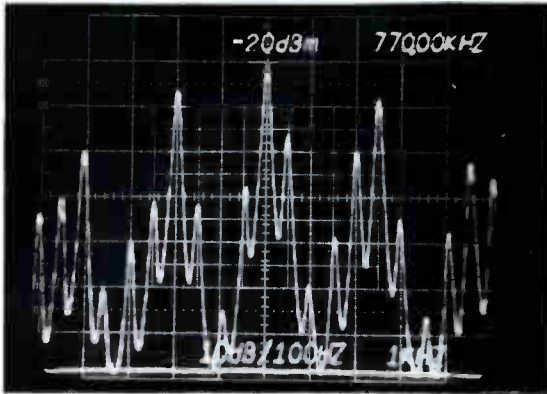


Fig. 3 L-R (FM) added, with 2 KHz deviation.

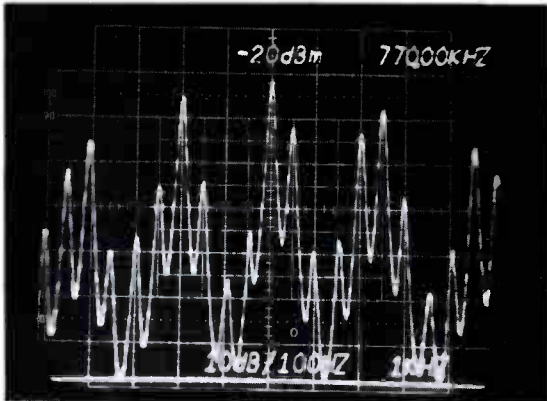


Fig. 4 L-R (FM) added, with 3 KHz deviation.

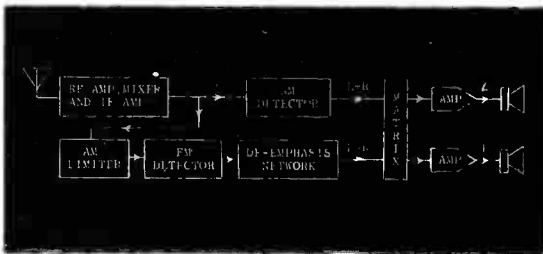


Fig. 5 Block diagram, typical AM stereo receiver.

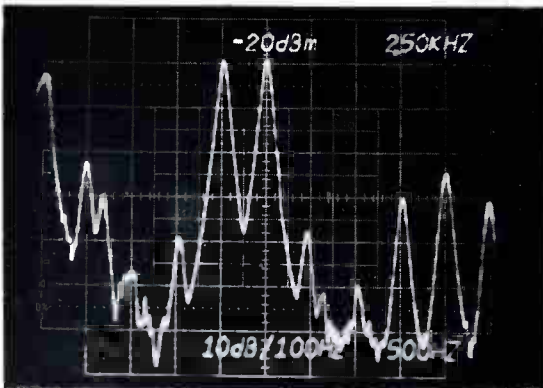


Fig. 6 Output of AM receiver with L+R signal only.

equal and set to 80% peak modulation. Fig. 3 and 4 show the spectrum when the L-R (FM) is added at 2 kHz and 3 kHz deviations respectively.

An ordinary AM receiver will demodulate the AM sidebands only to produce the L+R or mono signal. To demodulate the L-R sidebands, the receiver must contain an FM detector. A block diagram of a typical AM stereo receiver is shown in Fig. 5.

The AM envelope is demodulated in the normal manner to recover the L+R signal. The IF is limited to remove the AM components and detected by an FM detector to recover the L-R signal. The L-R must be de-emphasized to match the transmitted signal in order to preserve the separation. The L+R and L-R are matrixed to form the L and R outputs.

The question most asked is what happens when an ordinary AM receiver is tuned to an AM-FM stereo signal? And is the distortion increased?

Fig. 6 shows the output spectrum of an inexpensive AM receiver taken at the speaker terminals when the L+R only signal (Fig. 2) is applied. The wanted signals are 2 kHz and 2.5 kHz respectively. Harmonic distortion components are shown to be 30 dB down at 4 kHz and 5 kHz and major intermodulation components are shown at 500 Hertz (22 dB down) and at 4.5 kHz (25 dB down). When the L-R signal is added at 2 kHz deviation (Figure 3), the output spectrum of the receiver is shown in Fig. 7. The harmonic distortion increases but the intermod at 4.5 kHz decreases and the intermod at 500 Hertz remains the same. A further increase of deviation to 3 kHz is shown in Fig. 8. These distortions are caused by the very narrow band-pass characteristics of the receiver and not by the detector.

Higher quality receivers produce much less distortion due to their better band-pass characteristics. Tuning to the "best sound" with the L-R component on will also lower the distortion.

continued on page 52

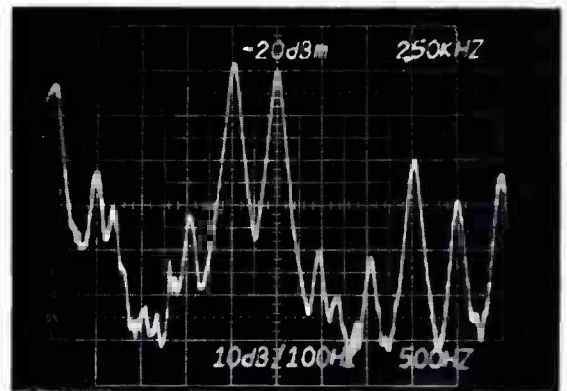


Fig. 7 Output of receiver, L-R added at 2 KHz deviation.

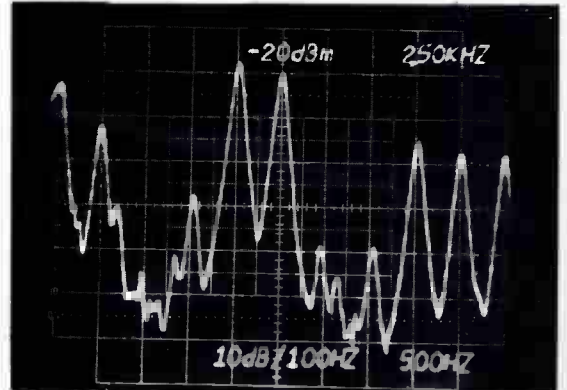
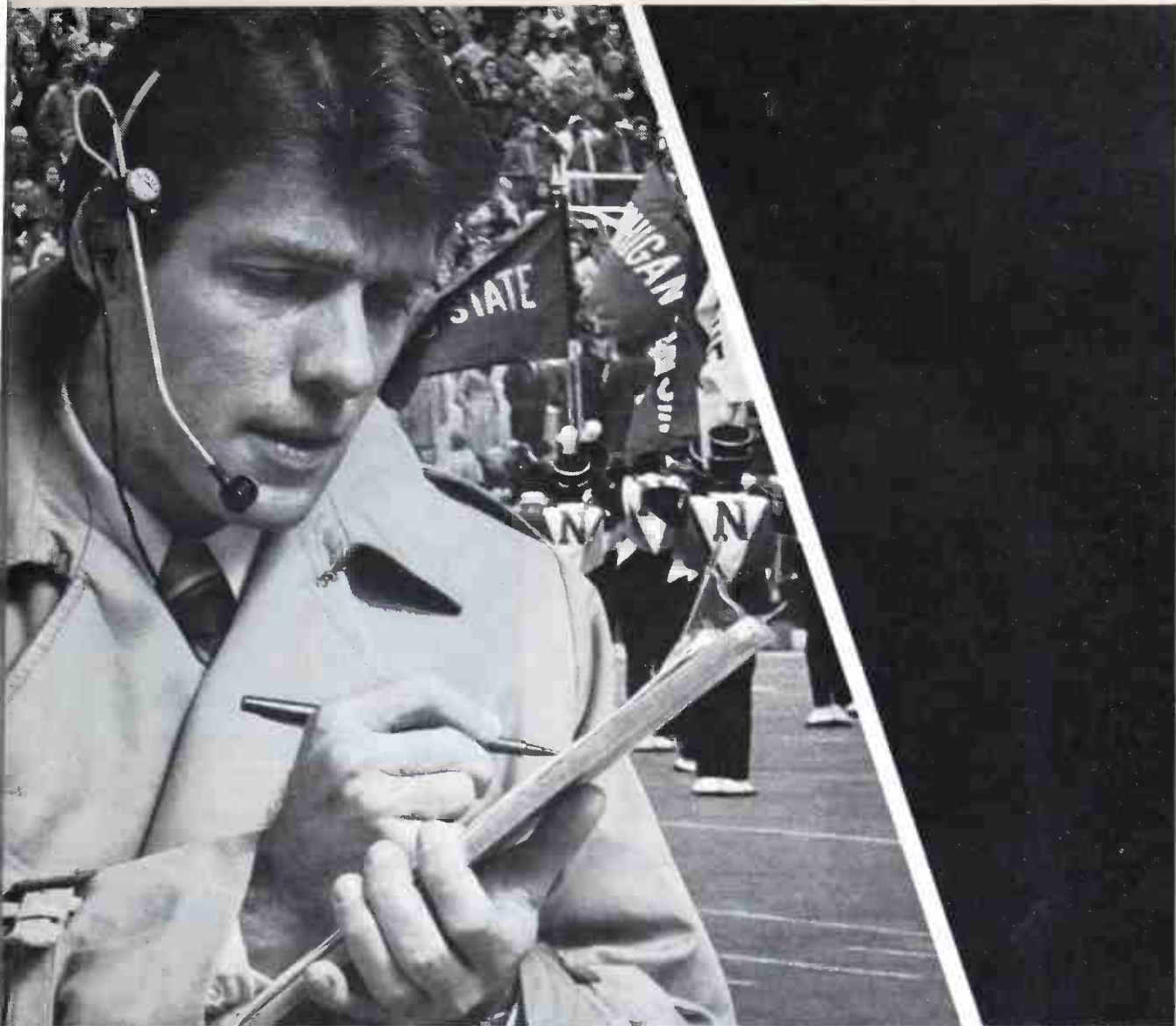
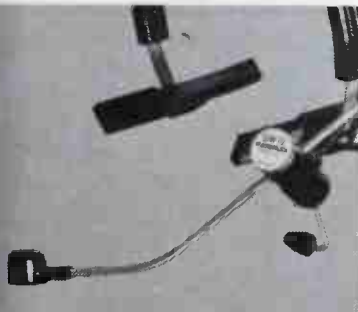


Fig. 8 Output of receiver, L-R added at 3 KHz.



**Next best thing
to a sound proof booth.**



Shure's new headset microphones are coming through loud and clear. With their unique miniature dynamic element placed right at the end of the boom, Shure's broadcast team eliminates the harsh "telephone" sound and standing waves generated by hollow-tube microphones. The SM10 microphone and the SM12 microphone/receiver have a unidirectional pickup pattern that rejects unwanted background noise, too. In fact, this is the first practical headset microphone that offers a high quality frequency response, effective noise rejection, unobstructed vision design, and unobtrusive size.

Shure Brothers Inc.
222 Hartrey Ave., Evanston, IL 60204
In Canada: A. C. Simmonds & Sons Limited



Manufacturers of high fidelity components, microphones, sound systems and related circuitry.

Circle 136 on Reader Service Card

COMPATIBLE AM STEREO

Laboratory measurements of an AM stereo receiver without bandpass filters yield distortion figures of under 1% and channel separations of better than 25 dB. Proper receiver design can retain much of this performance to provide more than acceptable stereo performance.

Fig. 9 shows a fully modulated L+R only signal of L=5 kHz and R=8 kHz. Fig. 10 displays the signal with the L-R added at 4 kHz deviation. The spectrum is well within the emission limits set forth in Par. 73.40 of the FCC Rules and Regulations.

The AM-FM system is one example of a compatible stereo system that will not obsolete present day monaural receivers. Sufficient interest has been shown in AM stereo that the National AM Stereophonic Radio Committee has been formed under the sponsorship of the EIA, IEEE, NAB, and NRBA with Harold Kassens as chairman. At the present time three systems are being proposed: Comm Associates, RCA, and Sansui. It is clear that the time is right to seriously consider AM stereo as a viable broadcast service.

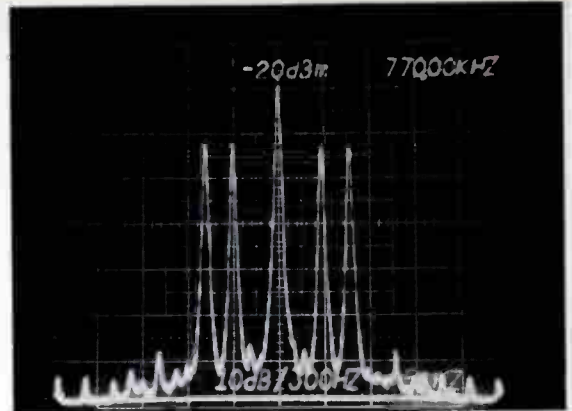


Fig. 9 Fully modulated L+R signal, L=5 KHz, R=8 KHz.

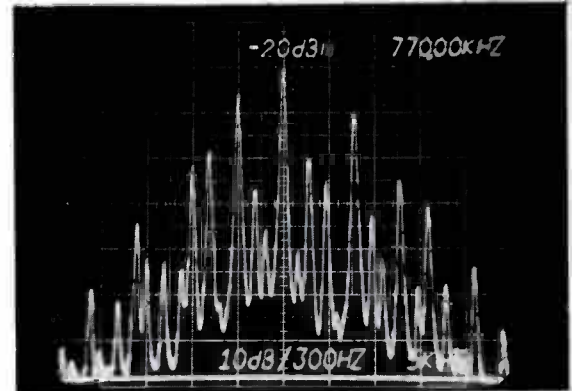


Fig. 10 Above signal, L-R added at 4 KHz deviation.

**Looking for a quality color monitor that can be delivered fast and at a sensible price?
Your shopping nightmare is over!**

VM-12PRO



\$1300.00

VM-19PR



\$1350.00

VM-9PRD



\$1850.00

The Videotek series of professional quality Trinitron® color monitors has been proven time after time for superior workmanship, reliability and stability. All models feature keyed backporch clamping, raster size regulation, A-B selection and blue-gun.

The 12" Pro also includes pulsecross, underscan, set-up, external sync, tally light, front

mounted drive controls and background controls.

The 9" is available as a single (\$950.00) or a single with space provided for the Tek 528 Waveform Monitor (\$995.00).

The entire series is designed for mounting into any standard 19" equipment rack. To top it off, you can have these monitors operating in your systems two weeks from today.



VIDEOTEK, INC.

640 EAST VINE STREET/STOWE, PENNSYLVANIA 19464/(215) 582-2053

Circle 180 on Reader Service Card

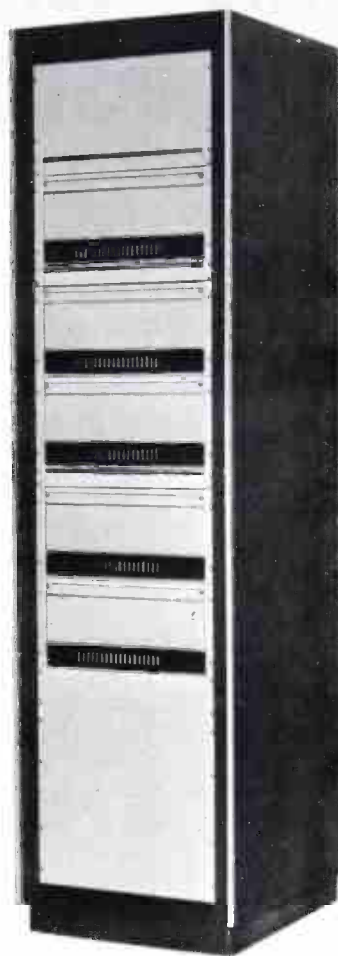
Shopping for a Distribution Switcher?

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 (audio hum and noise measures -80 dBm on the TVS/TAS-1000 vs. -57 dBm on the competitive unit) and without use of single-source custom hybrid components.

SPEND LESS.

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



40 x 50 AFV Switcher

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 10 x 10 to 80 x 50. To find out more about the one switcher offering compact, cost-effective signal distribution with true broadcast quality and reliability, contact the nearest TeleMation sales office.

**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. (301) 937-8700 • New York (212) 575-1466 • London • Rio de Janeiro • Sao Paulo • Santiago • Mexico City • Cairo.

The Microprocessor And Its Application To Broadcast Control

By Kenneth P. Davies

Offering complex control capabilities in a tiny, low-cost package, microprocessors are cost effective and efficient. They are finding their way into broadcast equipment. The next step will be interconnecting networks of small processors to achieve more automation of technical operations. The article that follows is based on a presentation made by the author at the 9th International Television Symposium, Montreux.

The microprocessor provides inexpensive computer power at the point where it is needed or is going to be used. Since its introduction in 1970, primarily as a memory as an alternative to large logic packages, the microprocessor has found its way into a number of new applications. It has taken over certain areas of control logic previously performed by conventional networks of gates. The microprocessor has already found a place in broadcast equipment: in automation controllers, editors and cameras (as automatic test systems) to name a few.

The microprocessor is a close relative of the devices found in pocket calculators and provides a level of capability, in conjunction with other devices, midway between there and simple mini-computers.

Basic concepts

While generalizations are dangerous in a rapidly developing area such as this, a typical microprocessor looks like the Intel 4004 (a 16 or 40 pin DIP) and contains the key elements illustrated in Fig. 1. In passing it should be noted that this particular microprocessor is among the simpler ones, but illustrates well the techniques involved. Packed into the LSI chip are the basics of a computer system:

- The instruction register whose decoded output controls the flow of data inside the unit.
- The arithmetic unit which provides the basic capability of binary addition, subtraction, comparison and testing.
- A control stack program counter to control and monitor the flow of data to the instruction register from memory.
- A register stack to store data and intermediate results lying between memory, arithmetic section, and input/output devices.
- A timing and control section which interprets the output from the instruction decoder, in conjunction with the clock generator, to provide an orderly flow of data inside the microprocessor. Inputs are provided in addition to this area for a test input (to allow simple program branching on a polling basis), an interrupt input to allow an external timing signal to be recognized, and a

halt input that can be used to suspend processing in an orderly manner.

- External data bus buffer which operates in a bi-directional mode to supply instructions and data to the processor as demanded by the program, and which carries away the results of the processing to memory or to external devices.

In short, the microprocessor contains the essentials of a fairly conventional small computer. It is also obvious that the device is small and hence operates in a register-to-register mode to minimize memory access congestion. Frequently the microprocessor employs multiplexing of the bus interconnection inside the chip and hence some clock cycles are not available for processing, resulting in rather slow instruction cycles in the region of 6-12 microseconds.

Most microprocessors are built using large-scale integration techniques using PMOS in the early units, or NMOS in units developed later. Higher speed technologies giving acceptable device densities such as silicon on sapphire or IIL have not yet been successfully applied though the IIL technique will undoubtedly be the one to watch very closely in the near future.

Application of microprocessors

By itself the microprocessor is a useless device, and only when teamed up in a small system, as in Fig. 2 with instruction memory, data memory, and input/output capability, can it begin to produce useful work. The details of interfaces for memories, clocks, input/output and external devices vary widely from one design to another, and the lack of these hardware components in a consistent and economical format has been a major stumbling block to the development of microprocessor systems.

The microprocessor performs its tasks through the interpretation of a fixed program stored in the memory, generally read-only, and dedicated to the current task. This is quite different from the general computer approach and the *program* here is essentially part of the hardware or, shall we say, firm-ware rather than software.

The generation of this instruction code is also quite different from the mini-computer case. In a microprocessor the capability is quite limited and hence code

Mr. Davies is Director of Engineering, Central Dynamics Ltd., Montreal, Canada.

must make very efficient use of storage space. It must also meet very firm rules (which vary widely) in regard to timing, instruction sequence, memory capability and input/output procedures. The designer must also pay very close attention to the capability of the processor, particularly if nested routines are allowed which take up large amounts of temporary storage.

Design of the control program is, to a large extent, an exercise in very detailed hardware type decisions, with the results expressed in very tedious assembly level code. Specialized programs run on large computer systems can help in the generation of this code and can also help by providing a simulation of the microprocessor to remove gross errors that are not time-dependent. (Debugging of the code in realtime is a difficult task due to the problems in examining registers and memory locations to view the intermediate results).

A couple of examples will probably best illustrate the parallels and differences between the TTL logic and microprocessor solutions to the same problems. Fig. 3 shows a hardware solution to provide the functions of filtering an input from the pushbutton to eliminate noise and contact bounce, synchronizing it with the system, and directing the flow of another signal to one of two outputs dependent on the state of the switch. Viewed as an incremental cost, and neglecting system overhead costs, this represents a simple cost of approximately \$5.00 and produces an answer in 200 nsec plus the filter delay, usually of the order of 5-10 msec.

The equivalent microprocessor version is shown in Fig. 4 as a flow chart. This arrangement takes approximately 100 microseconds to obtain an answer plus the integration time of approximately 16 msec. It occupies 2 locations in its basic format and can easily be put into ROM by noting that the two major program loops are actually duals of each other and can be accommodated by a single sub-routine. Storage of this program represents a cost of about \$3.00. It should also be noted that the bulk of the sub-routine can be used again to de-bounce other switches and hence, in a real system, this cost will drop considerably.

A second example of a fairly common operation in television is the addition of two 8-digit numbers such as might occur in time-code operations. Fig. 5 shows a standard high-speed BCD adder with appropriate storage logic that yields a design that will add the two numbers in approximately 8 microseconds and present the answer in the 8 x 4 RAM memory. It has an approximate hardware cost of \$60.00.

The software version, shown in simplified form in Fig. 6, occupies at most 40 memory locations having a cost of approximately \$5.00, but it takes approximately 900 microseconds to complete the calculation.

Application criteria

From this it can be seen that the microprocessor approach has some obvious economic advantages in situa-

continued on page 56

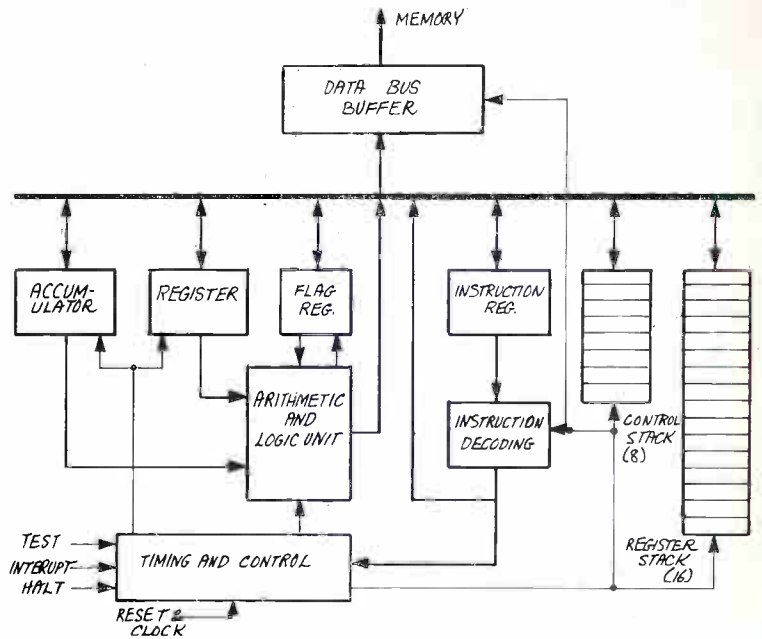


Fig. 1 Block diagram of a microprocessor unit (MPU).

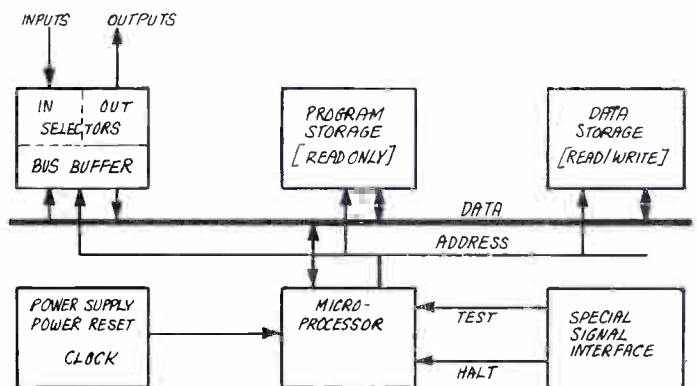


Fig. 2 Block diagram of a complete system using an MPU.

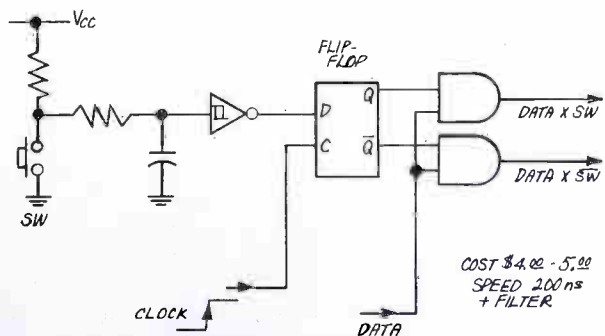


Fig. 3 Logic diagram of hardware branch decision.

MICROPROCESSOR

tions where:

- The data to be processed is in BCD (4-bit machines) or bytes (8-bit machines) format.
- Large numbers of single wire random inputs are absent as the cost of interfacing signals of this nature is quite high.
- Output timing is not critical to delays of a millisecond or so.
- Response to an input stimulus can tolerate delays of 100-150 microseconds without producing erroneous data.
- The basic overhead cost of the system—that is, the microprocessor, power supply, and operating memory—is not overwhelming.
- The volume of the application is not high enough that a custom-designed LSI module is economic.

The MPU will find its way into many facets of broad-

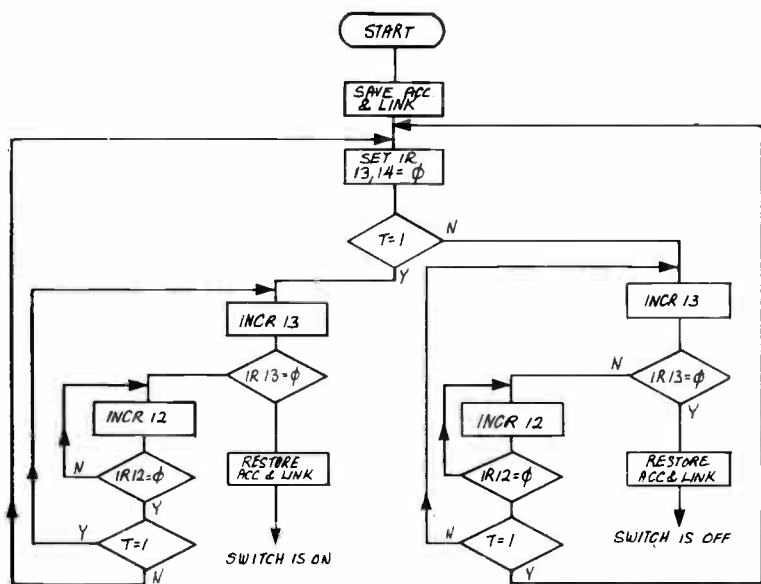


Fig. 4 Flow chart of MPU software branch decision replacing Fig. 3.

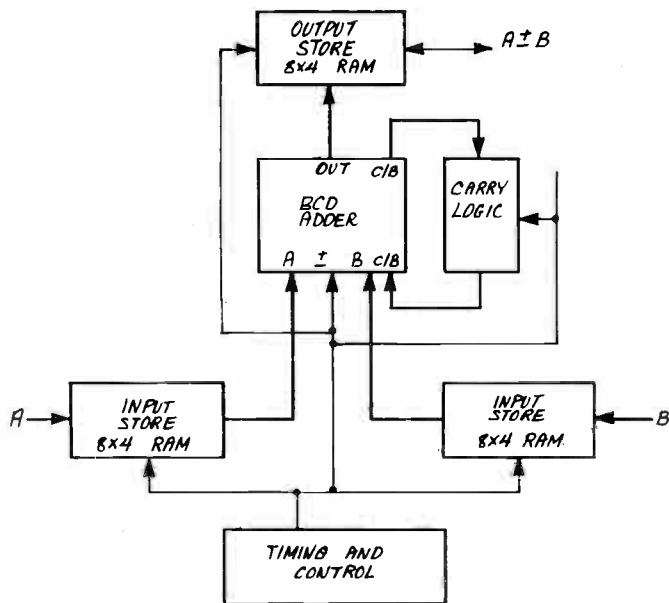


Fig. 5 Logic diagram of hardware adder (8 digit).

casting and will also spawn a variety of new products not currently available. The following list represents areas of current application.

- 1) Logging and reduction of transmitter and presentation data.
- 2) Specialized keyboard interpreters.
- 3) Film processing control.
- 4) Intercom routing.
- 5) Small presentation systems (radio and TV).
- 6) Script editing and display.
- 7) Cassette and reel tape controllers/editors.
- 8) Control assignment systems.
- 9) Timers and stop clocks—address code generators.
- 10) Video test systems.
- 11) Automatic test systems.
- 12) Network synchronization controls.

How a microprocessor works in a tape controller system

To illustrate the application of the device, consider that of the small tape controller shown in Fig. 7. This controller is required to interpret data from the command keyboard in order to perform operations of cueing, synchronization, rehearsing and recording on the machines and to maintain up-to-date data in the operational stores. Data enters the system from the data keyboard, time-code recovery, constant registers and remote data bus, with data leaving to command the machines and to write displays. From the previously discussed criteria we can readily partition the tasks into hardware and software and define the interface between them.

Time-Code Recovery At wind speed the bit interval is 6 microseconds and the frame interval is 1 msec in the worst case. The demodulation of the bi-phase signal and

continued on page 58

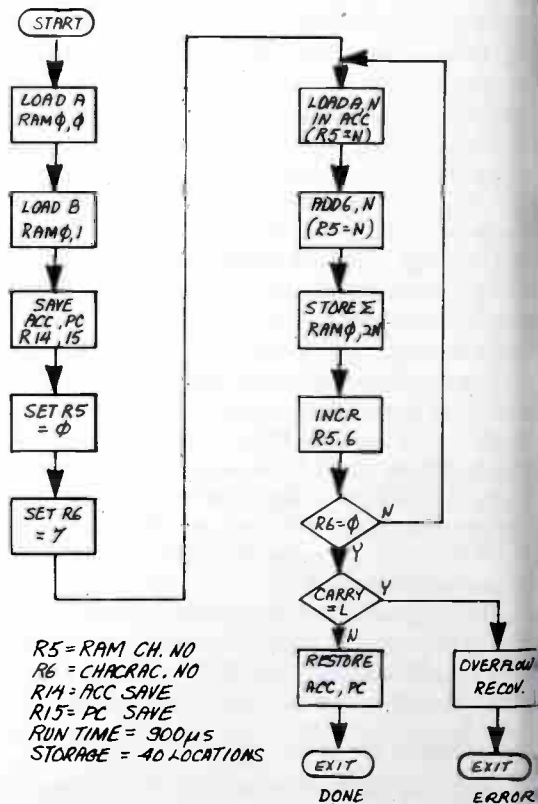


Fig. 6 Flow chart of equivalent software adder (8 digit).

Now a color camera coupler... battery operated!



GK-2000U sync coupler weighs 10 lbs. with 2 CCU's. Approx. 14" wide, 14" deep, 6" high.

"Let's have a CU on camera 2 . . . hold the LS on camera 1 and now a MCU on 2" . . . and so goes the direction.

A job for expensive broadcast equipment? Not if you have two JVC portable color cameras, a PV4800 tape deck, headphones, a hand mike and the all new GK-2000U which makes the two camera sync coupling possible.

Now you can get clean, noiseless, vertical interval color switching. Mix and match camera inputs when doing remotes . . . and all mind you . . . battery powered.

JVC has done it again. First in the field with a truly fine color portable and now the GK-2000U . . . the first battery or AC operated sync coupler.

Get a demonstration from your JVC video dealer and learn how you can dazzle the competitor or your customers with this new found video capability.

JVC Industries, Inc., 58-75 Queens Midtown Expressway, Maspeth, N.Y. 11378, Tel.: (212) 476-8010. • In Chicago: 3012 Malmo Dr., Arlington Hgts., IL. 60005, Tel.: (312) 593-8997. • In Los Angeles: 1011 W. Artesia Blvd., Compton, CA. 90220, Tel.: (213) 537-8230.

JVC Best by Design

JVC

JVC INDUSTRIES, INC

Circle 138 for literature
Circle 139 for a demonstration

JVC Industries, Inc.,
58-75 Queens Midtown Expwy.,
Maspeth, N.Y. 11378 • (212) 476-8010.
BM/E-276

Please send me information on

- 2 Camera synchronizer
- Camera
- VTR
- Complete system
- Please arrange a demonstration

Name _____

Title _____

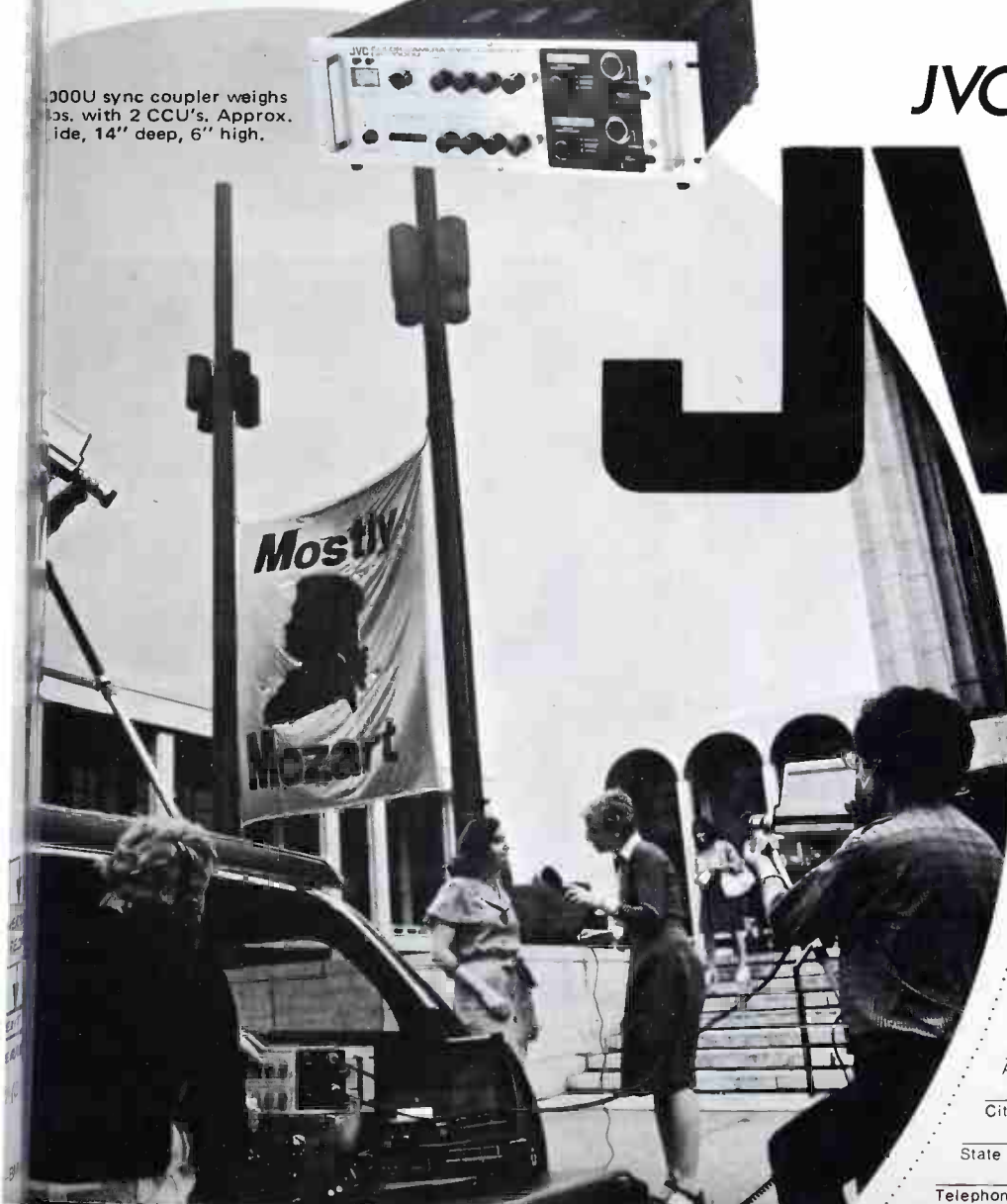
Organization _____

Address _____

City _____

State _____ Zip _____

Telephone _____



MICROPROCESSOR

serial-to-parallel conversion is a hardware task, and the program would then be able to read in the resulting eight 4-bit digits that are generated every frame along with a velocity character. Incidentally, with parallel data available in hardware, a very simple readout of current address is possible without processor overhead to generate output.

Command Keyboard The keyboard can readily generate the 4-bit characters (to generate 16 possible codes), and hence a minimum hardware configuration is desirable—continued on page 60

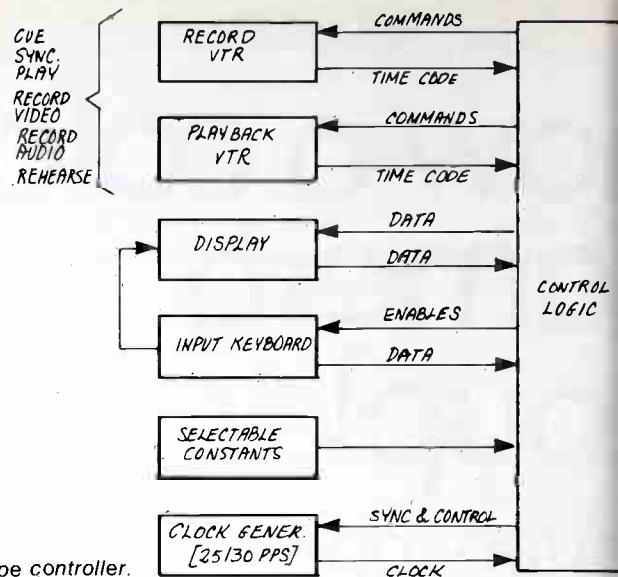


Fig. 7 Task outline for a tape controller.

Broadcast Equipment Makers Take Advantage of Microprocessors

The number of components that can be economically placed on a single silicon chip seems to double each year. A chip today can incorporate as many as 20,000 components (although 5,000 is more typical) and the cost per component is a fraction of a cent. Furthermore, semiconductor manufacturers are forever improving their yields and prices are now 1/10th that of a few years ago, meaning one can buy 8-bit N-channel devices for \$20-\$30. More suppliers are moving into the field and a price war will persist for some time. Fortunately, as prices drop, usage goes up and many users are now broadcast equipment manufacturers. In addition to Central Dynamics Ltd., a few companies that have been stressing the fact that their products include microprocessors have been EECO (see below), Harris (System 90 automation), SMC (DP-2 automation) and Ikegami (HK-312 studio camera).

Since a microprocessor is equivalent to the central processing unit (CPU) of a computer, it is a small step to a complete microcomputer: just add some memory, a master clock and input/output devices. Microcomputers are not merely smaller computers. Taking advantage of previous experience, microcomputer designers use the concept of the "stack" in which electronic registers are organized so that the subroutines called in by a program are handled on a last-in-first-out basis; i.e., after exercising one subroutine (or more) the microprocessor returns to the main program sequence. This means lots of computer power in a small package.

EECO has developed a very unique precision Electronic Audio Synchronizing/Editing System for Teletronics International in New York. The system conceived by Teletronics and designed by EECO is a "first" in the industry, providing automatic control of up to eight audio or video transports for searching, cueing, synchronizing and programmed audio editing.

Utilizing the SMPTE Edit Code and incorporating the latest technology in microprocessing, the system has the capability of controlling several different type transports (sprocketed and non-sprocketed) simultaneously from a remote control and display console.

The heart of the system is the microcomputer Model 8080 by Intel. With the microcomputer associated programmable memories and various interface circuitry, the entire system is housed in only two standard card files 7-in. in height.

This is EECO's second application of this technology. The BE460 Dual Cue Controller (designed for use with EECO's BE450 Wide Range Synchronizer) provides individual or simultaneous automatic cueing of two video or audio transports. The Dual Cue Controller incorporated the microcomputer.



EECO BE 460 dual cue controller uses microcomputer.



Harris System 90 Automation Controller uses microcomputer.



SMC DP-2 automation system uses microcomputer.

WHAT WE DO FOR YOU IN FILM,

When it comes to motion picture equipment, more and more people are coming to Camera Mart. All, for their own reasons.

Some come for the widest selection of equipment in the East. All the major brands, with most of the latest models in stock.

Others claim it's our rental equipment. And the nit-picking way it's maintained. Which is easier, truthfully, because the average age of our stock is younger than anywhere else.

Still others come for our service department; a group of single-minded fanatics whose only redeeming trait is an equipment fetish. Which we encourage with several thousand dollars of test gear, and the latest factory-training courses.

Whatever else they like about us, just about everyone agrees that the best thing about Camera Mart is our people: Smart. Friendly. And sharp with a pencil. Why not see what we can do for your motion-picture needs?



WE CAN DO FOR YOU IN VIDEO.

Visit us, and you'll find a huge selection of equipment, from the smallest portable VTR to network-quality camera chains.

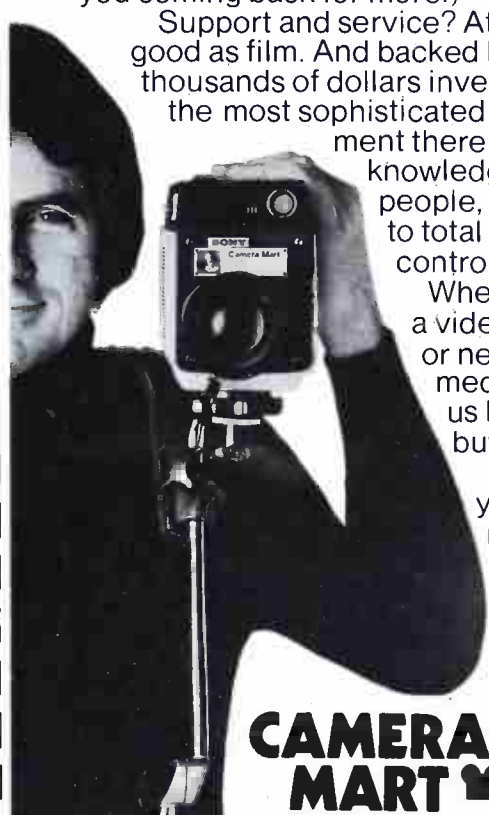
And just about everything in between. Whatever your needs, we can offer you off-the-shelf components, a special package... even a customized mini-system, tailored to special applications.

As with our motion picture equipment, you'll find we check out everything *before* you get it—rental or purchase(!)—to be sure you get all the performance you've bought. (And frankly, to keep you coming back for more.)

Support and service? At least as good as film. And backed by more thousands of dollars invested in the most sophisticated test equipment there is. Run by knowledgeable people, committed to total quality control.

Whether you're a video "veteran" or new to the medium, talk to us before you buy or rent.

We'll give you good reasons to know us better.



CAMERA MART 

The Camera Mart, Inc.

456 W. 55th St. New York 10019 (212) 757-6977

Yes, I'm interested... Tell me more about what you can do for me Film Video

NAME _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

PHONE _____

Circle 140 on Reader Service Card

Member Professional Motion Picture Equipment Association
pmpeo

SUSTAINING
SMPTE
MEMBER

MICROPROCESSOR

able to drive a decoder table in the program such that branches to the correct routines are performed. Speed of response is not critical to 10 msec or so, due to the noise elimination delays mentioned previously.

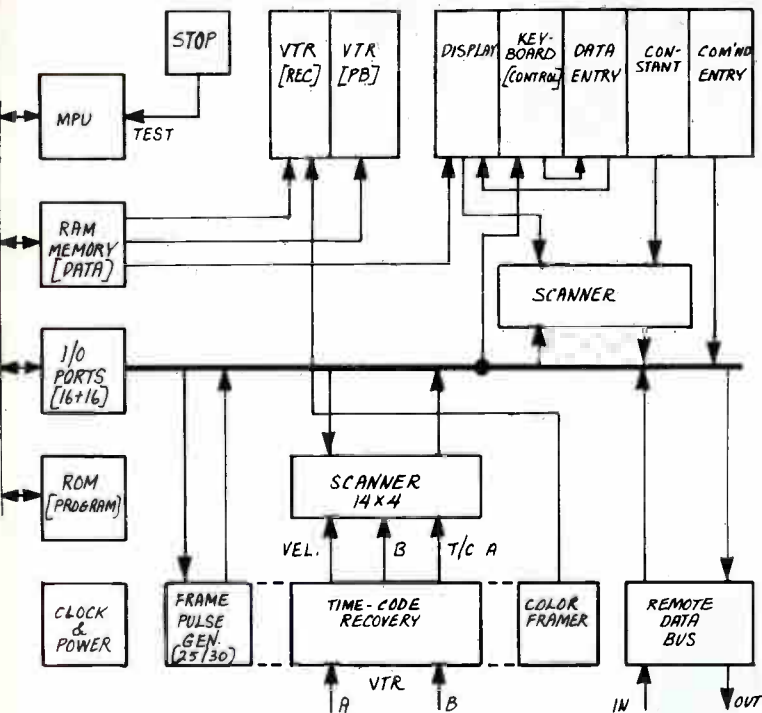


Fig. 8 Block diagram of tape controller hardware approach.

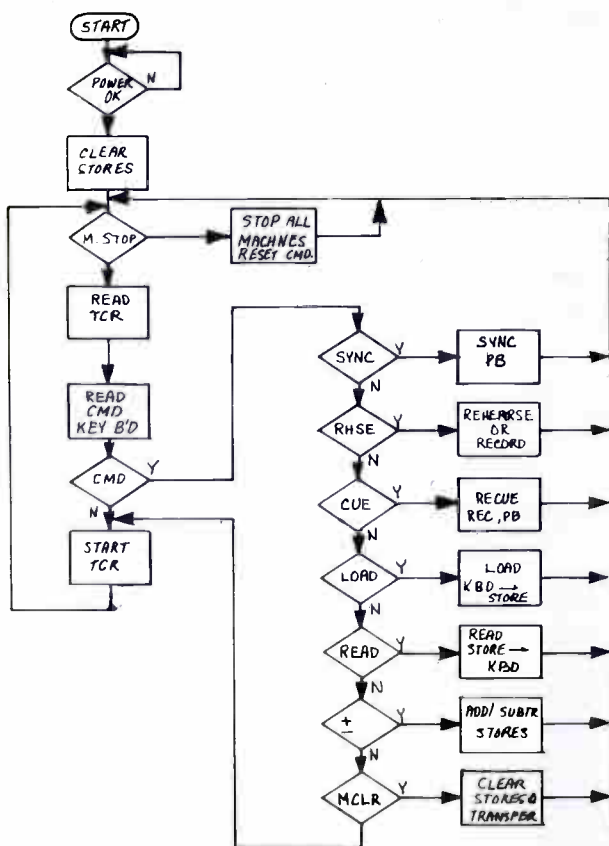


Fig. 9 Block diagram of tape controller software approach.

Data Keyboard and Display For consistency of software interfacing and simplicity of display, the data keyboard assembles 8 character messages in hardware which match, in format, the time-code, and, in fact, are handled in software in an identical manner. In this way the processor only requires a rather simple data handler program to read data and to load it into the various stores, making more efficient use of memory space. The processor unit can read the display very easily and echoes the data back to the display or shows new data in the normal time-code 8 format.

Constant Register For the reasons mentioned previously, the constant register is handled similarly to time-code in eight 4-bit characters.

Frame Pulse Generator The period of the frame pulse generator is 33 msec or 40 msec dependent on the system standard. To avoid the overhead of the program counting clock cycles, and to improve the precision (an accuracy of approximately one part in 10^5 is required), a hardware counter is used to count the crystal controlled clock used by the computer which operates at a rate of 750 KHz. The frame pulse generator is started by the program to achieve an initial positional accuracy of better than a millisecond and thereafter frame pulses are read by the program periodically in a manner generating a maximum jitter of approximately a millisecond.

Machine Commands A total of 14 commands is required for each recorder at a variety of levels and timings. The most critical timing relationships are those concerning synchronization and color-framing where a closed-loop on/off type of servo is established through the time-code and the program to bring the two machines close enough together that normal capstan servo locking can be restored while maintaining synchronism. To provide good performance a response delay of better than 5 msec is required, and this the program can readily achieve. The discrete commands are generated by the program as 4-bit characters which are decoded and processed in hardware to the appropriate timings and levels required by the outside world. To further simplify machine commanding, the program storage is so arranged that the commands and significant address storage locations for each of the two machines are stored at identical locations in the two RAM chips making programming very simple and fast using common routines.

The final hardware configuration is shown in Fig. 8, with the associated software shown in Fig. 9. The hardware consists of 6 module cards and a power supply mounted on a plug-in basis into a 5 1/4" high rack frame. Approximately 250 TTL chips are used in the design to provide the necessary random logic and data multiplexing. The program itself occupies eleven 256×8 read-only memory chips providing a total program storage of almost 3,000 8-bit words. The program contained in these chips operates in either the PAL or NTSC mode, selection being made by one of the programmable pre-set switches on the keyboard card. By substitution of alternate memory cards, programs for other applications such as synchronization, extended mathematics or diagnostics, can readily be used with the microprocessor.

The normal operating program operates without interrupts in a monitor loop, and interrogates the major inputs on each pass or in the appropriate task routines. The program is also self-starting at power-up as if the MASTER STOP button had just been pressed. Each task

continued on page 62

You won't need us . . .
but it's nice to know we're here!



Microtime's 24 Hour Service Line

If you have a problem,
call (203) 242-4242.

Help will be on the way.

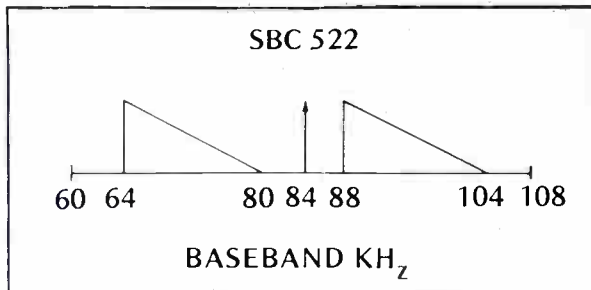
Microtime, Inc.
1280 Blue Hills Avenue
Bloomfield, Ct. 06002
(203) 242-4242 TWX 710-425-2390

MICROTIME

Circle 141 on Reader Service Card

www.americanradiohistory.com

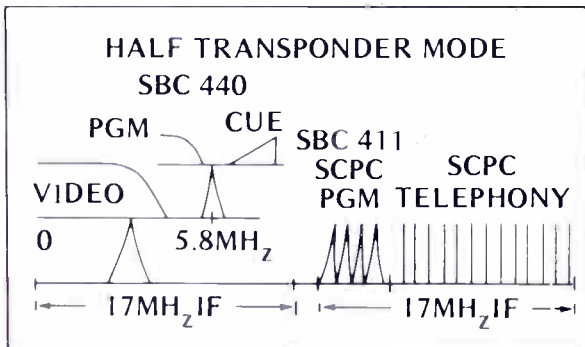
COASTCOM[®] DELIVERS STEREO PHONIC PROGRAM CHANNELS



The SBC 522 Stereophonic Program Terminal provides a stereo channel pair modulated into a single 60-108 KHz group which can be placed directly on a baseband for STL operation or translated into the standard multiplex hierarchy for transcontinental transmission.



The SBC 418 FM Program Audio Diplexer is made for the most demanding satellite and transcontinental broadcast networks where economical high quality program channels are needed in the 4 to 10 MHz range above the video spectrum. Two SBC 418 channels on the same baseband will provide stereo capability.



The SBC 440 Satellite TV Audio and Cue Channel Diplexer provides a program and a cue channel above PAL or NTSC video. An SBC 418 and SBC 440 on the same baseband provide stereo plus cue.

The SBC 411 is designed to provide single channel per carrier program audio transmission via satellite links. Two SBC 411 channels provide stereo capability.

For complete technical details and prices, contact:

COASTCOM

2346 Stanwell Drive Concord, California U.S.A. 94520
Telephone: 415 / 825-7500 TWX 910-481-5781

Circle 142 on Reader Service Card

MICROPROCESSOR

program is built up from various common sub-routines used by the other programs, and branches to the various tasks occur as a result of command inputs from the keyboard.

As a matter of interest, if a comparable hardware-only design were effected it would total approximately 800 equivalent chips, thus doubling the size of the system, doubling the power consumption, and significantly reducing the overall reliability.

As a result, the microprocessor-based design achieved is small, very easy to operate, flexible, and requires a minimum of staff training. The Fig. 10 shows the simple front panel controls that are used for most of the command and data entry functions.



Fig. 10 EDS-200 editor/synchronizer incorporating microcomputer.

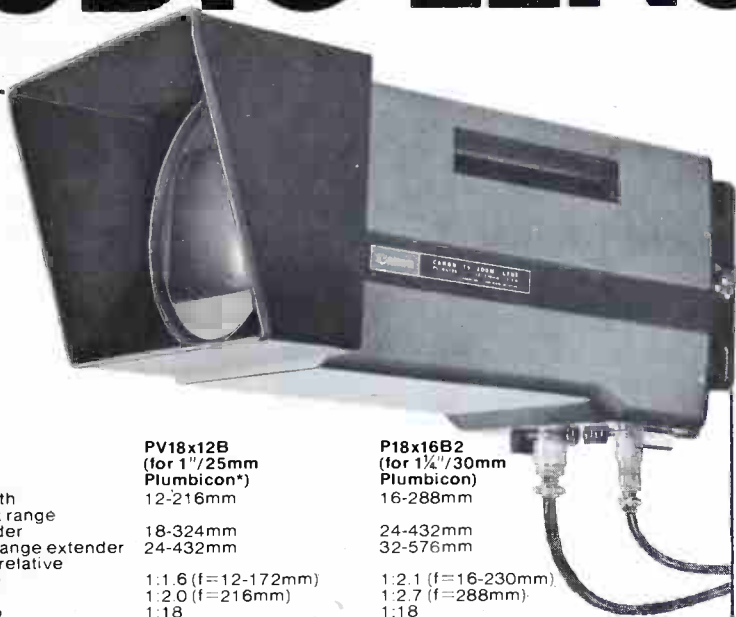
The microprocessor-based design is also highly acceptable from a maintainability point of view, due to the minimum package count that the design can achieve, coupled with the basic simplicity of a bus-oriented system. All components are readily accessible by the extraction of the plug-in modules.

Now and the future

The microprocessor can produce a very cost-effective and efficient system. Unquestionably it will find an ever increasing spectrum of applications in our industry for control and data reduction purposes. We have already designed it into a number of commercial systems manufactured at Central Dynamics and in all cases have been very pleased with the performance achieved. Some of these packages have now been in service for periods of up to 18 months and, apart from normal start-up problems, have proven to be thoroughly reliable and readily serviceable once the technicians involved have acquired a basic knowledge of bus-oriented processing.

We are certain that this is only the beginning and once the initial design is mature, the next step is to establish interconnected networks of these small processors to achieve, in a most economical fashion, larger processing job systems as more complete automation of the entire operations. There is no doubt that a network of interconnected intelligent controllers can provide the basic economy, high level efficiency, and freedom from domino-effect breakdowns that the professional broadcaster requires. Hardware and software will become available to perform the large task soon and we must soon consider standards for communications. Stand-alone intelligent controllers are already here. **BM/E**

CANON ANNOUNCES THE ULTIMATE STUDIO LENS



	PV18x12B (for 1 1/4"/25mm Plumbicon*)	P18x16B2 (for 1 1/4"/30mm Plumbicon)
Focal length	12-216mm	16-288mm
with 1.5x range extender	18-324mm	24-432mm
with 2x range extender	24-432mm	32-576mm
Maximum relative aperture	1:1.6 (f=12-172mm) 1:2.0 (f=216mm)	1:2.1 (f=16-230mm) 1:2.7 (f=288mm)
Zoom ratio	1:18	1:18
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:	103.2 x 77.4cm; 129.0cm diameter	
Tele:	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	400-700mm
Weight	17kg (approx. 37 lbs.)	17kg (approx. 37 lbs.)
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

© 1975, Canon U.S.A. Inc.

Circle 143 on Reader Service Card

FEBRUARY, 1976—BM/E

63

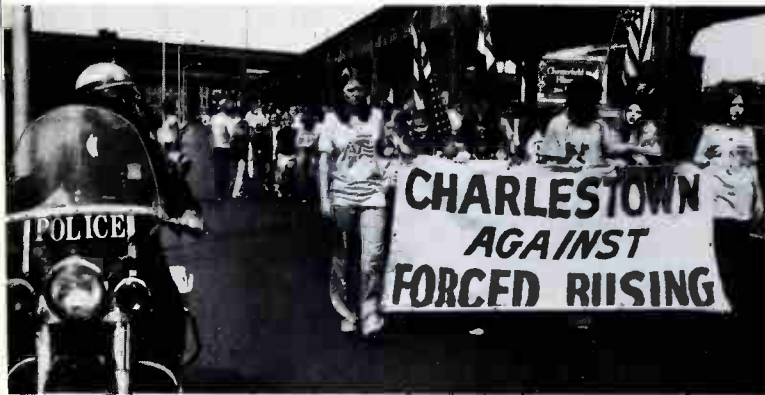
Radio's ENG

By Dave Graves

Electronic News Gathering for TV has dominated the spotlight this last year. But radio has been pushing ahead, too, and this report shows how WBZ Radio, a Group W station in Boston, can go on the air live from almost anywhere to deliver instant news. Says author Graves, "With TV moving in—and surpassing—radio's ability to bring a story to its audience as it happens, it's about time some stations woke up to the fact that telephone beepers don't make it."

Our reporters call it "the magic box."

It's WBZ Radio's answer to TV's ENG—a studio-quality remote broadcasting system that you can hold in one hand and use anywhere.



Protestors march against busing in Charlestown, providing the station with the first chance to test the new units.



From left to right, WBZ Radio Chief Engineer Norm Graham, WBZ News Supervisor Edward Bell and Comrex President John Cheney, testing prototype system in front of the station.

Comrex repeater unit, temporarily mounted in WBZ mobile unit during testing period.



The "magic box" is a custom-designed prototype, manufactured for WBZ by the Comrex Corporation of Sudbury, Massachusetts. It will shortly be followed into the field by four finished versions.

"We were looking for a system that would allow reporters to broadcast studio-quality sound while remaining completely mobile," explains WBZ News Supervisor Ed Bell.

"Up to now, radio reporters have had to put up with a variety of inadequate means of communication," says Bell. "There already are mobile units, but how many stories can you cover from a car? Walkie-talkies aren't even as good as telephone quality, and they're tough to use for interviews."

The Comrex system works by triggering the station's mobile unit radios, from up to a mile away. It has even been able to transmit from the center of Boston's steel and concrete City Hall. The unit itself is on the high VHF band, while the cars are on UHF.

Combined in the unit, which attaches easily to belts or a shoulder strap, are: a transmitter, cassette recorder, tone control unit and two receivers. It weighs about 1½ lbs. and it's 3¼ × 6 × 2-in. without the cassette; receivers are separate.

In a typical operating sequence, a reporter would turn on the Comrex, transmitting a tone burst. This would first turn on his mobile unit's 70 watt transceiver, then key its transmitter. The Comrex is set by the reporter at .1 watt for short distances, 1 full watt for longer ones.

The reporter can verify that the car radio is transmitting by listening to channel one of his receiver, then switching over to channel two, to hear the editor answer him. If for some reason the primary transmit channel is busy, another tone will switch the mobile unit radio to a clear channel.

The reporter tells the station what he wants to do. If he's going live, another control mixes WBZ air and his UHF receive channel. That way, he can talk to whoever's on the air and hear off-air cues from the editor at the same time.

The repeater unit in the car can also be attached to a telephone. A tone from the reporter will cause the repeater to automatically dial the station's hotline. This will allow the station to use the units outside the Boston area they plan to do so during the New Hampshire Primary.

The Comrex unit received a baptism of busing this

Author Graves is a member of the programming department at WBZ Radio, Boston, Mass.

All photos by James Nachtwey.

We Package Imagination

Yours . . . and ours!

We build switchers for the video production industry because we learned to build them for ourselves.

Our first switcher was our imagination. All the Video Controllers we produce now are designed with *your* imagination.

That's the secret of our success: we build what you need!

Every production manager knows pretty well his desires . . . and chief engineers know what set of "specs" will accomplish those requirements.

We are producers and engineers, too! We know how to translate your needs into a switcher that not only takes care of today's requirements, but is modular in design and pre-wired for tomorrow's capabilities.

No switcher in the industry is more versatile, with broadcast quality performance . . . at a lower cost.

You are the people that have determined the state of the art of video production . . . we are the people that are designing to . . . and beyond that state.

We also package computer and video production software with that same philosophy . . . Your imagination, and ours can build a better product cheaper, because it's designed for tomorrow, not yesterday. Try us with a set of switcher requirements . . . production, editing or master control, we think you will be excited with our answer.

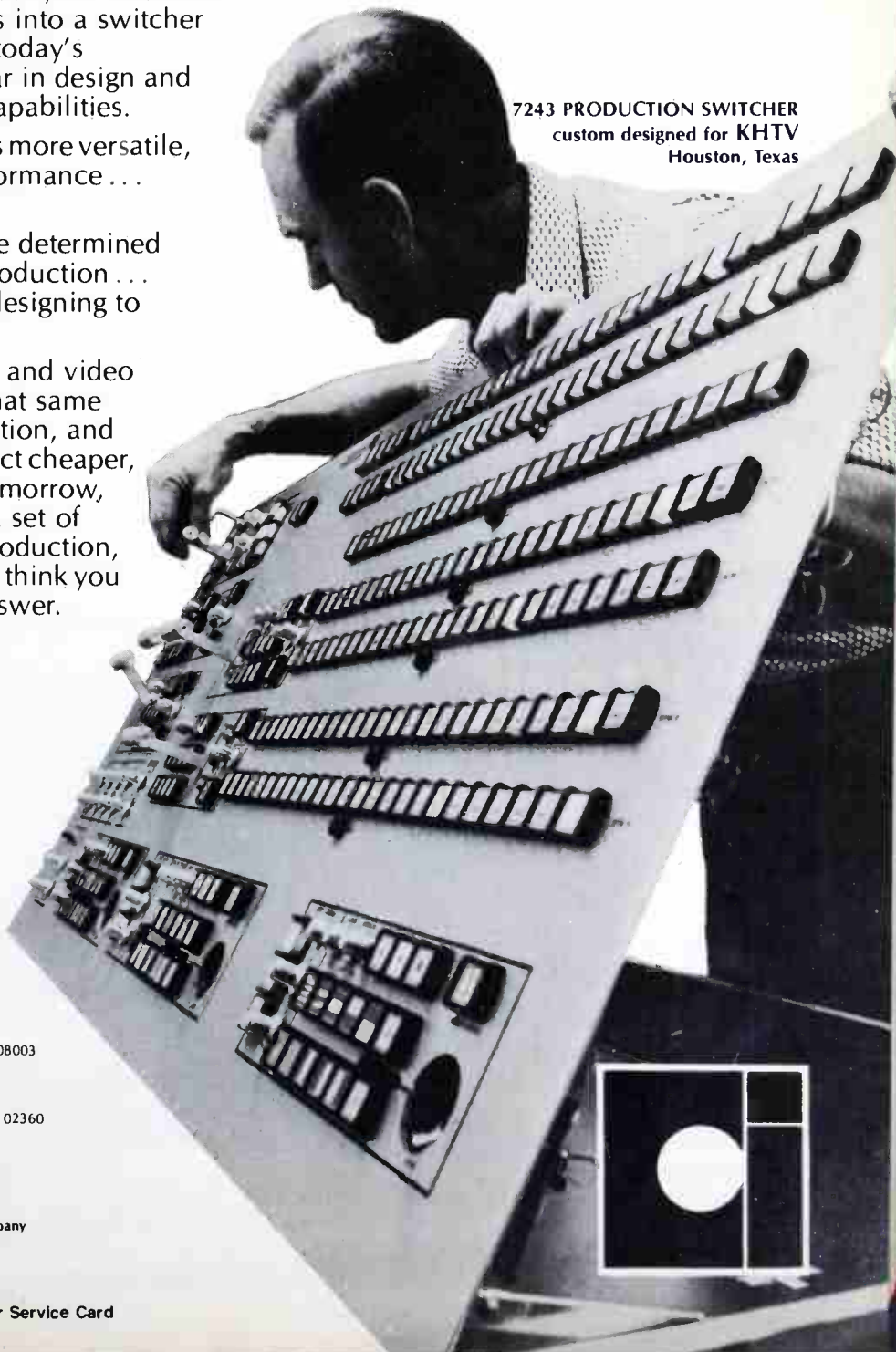
See US at NAB!

For further information call or write:
Vice President, Marketing,
Video Controller Division

COMPUTER IMAGE CORPORATION

2475 West 2nd Avenue,
Denver, Colorado 80223
(303) 934-5801

7243 PRODUCTION SWITCHER
custom designed for KHTV
Houston, Texas



Represented nationally by:

Communications Devices, Inc.
140 LaPalma Avenue
San Diego, California 92107
(619) 591-6614

Landy Associates
12 Buxton Road
Cherry Hill, New Jersey 08003
(609) 424-4660

Communications Devices, Inc.
140 LaPalma Avenue, Suite 203
San Diego, California 92107
(619) 591-6614

Landy Associates, Inc.
20 Winslow Street
Plymouth, Massachusetts 02360
(617) 326-6050

Denver
(303) 934-5801
(303) 934-6000

Radford Associates
3203 Lanier Drive
Atlanta, Georgia 30319
(404) 237-6097

Mer Electronics
1 Mile Road
Farmington Hills, Michigan 48024
(313) 215-2154

The Gene Sudduth Company
2809 Raintree Drive
Carrollton, Texas 75006
(214) 242-2690

Circle 144 on Reader Service Card

past September. Its first day of operation was also the first day of Phase Two desegregation in Boston. The unit was assigned to the station's education reporter, Harry Savas, who was covering Charlestown High School.

Security was tight around the schools where trouble was expected, particularly Charlestown, which was about to see its first bus. Federal Marshalls, State Police, Metropolitan Police and the Boston Tactical Squad were all there, dedicated to preventing anything—including reporters—from impeding the opening of school.

Cars had to be parked some distance from the school for safety reasons. It would be necessary for most reporters to leave their vantage points and dash to their cars in order to file.

The first buses rolled into sight about seven that morning, and the "magic box" got its first test. It passed with flying colors. Savas' live report, against the sounds of Charlestown and the rumble of the buses, was crisp, clean and studio quality. It literally put the listener into the middle of the story.

Later, when Charlestown mothers marched in protest, Savas was able to broadcast the confrontation between marchers and police. The sound was better than most cassettes—and it was live on the air.

"Immediacy is a radio's forte. It's about time we discarded the collection of telephone clips, inadequate walkie-talkies and the like. This system really makes our reporters a walking radio station, with the quality of sound, and ability to get to a story, that our listeners have a right to expect," says News Supervisor Bell.

Boston was still reeling from the impact of busing, when the Boston Teachers Union went on strike. A

negotiating room on the 9th floor of the Holiday Inn became the focal point. The lack of phones made elevator-riding the reporters favorite sport—except for Savas, who was able to score with repeated live interviews at the flick of a switch. When a negotiator would poke his head out the door with some new information, WBZ listeners would hear it live.

The station has discovered other things, beside new to use the Comrex on. When the Boston Red Sox held rally in City Hall Plaza the day after losing the seventh game of the World Series, the station was about to carry it live with almost no prior notice. The Comrex quality was good enough that a microphone stuck into a P.A. speaker delivered excellent sound.

WBZ's Chief Engineer, Norm Graham, who worked with Comrex President John Cheney to develop the units, points out that there's nothing extraordinary about any particular component of the system.

"A high power wireless mike, a tone control system, a mobile repeater—none of these things is revolutionary by itself. It was the idea that we were going to sit down and put together a total system, with nothing left out—that's the real innovation," says Graham.

WBZ's reporters are excited about the new system.

"The built-in cassette makes it a snap to do flawless wraparounds from the field," says education reporter Savas. The unit can mix sound from the tape recorder with that from the microphone live. It's a feature of the system which was added to the completed versions.

"It really frees you to concentrate on a story," says Savas, "Everything you need is right on your belt."

BM/1

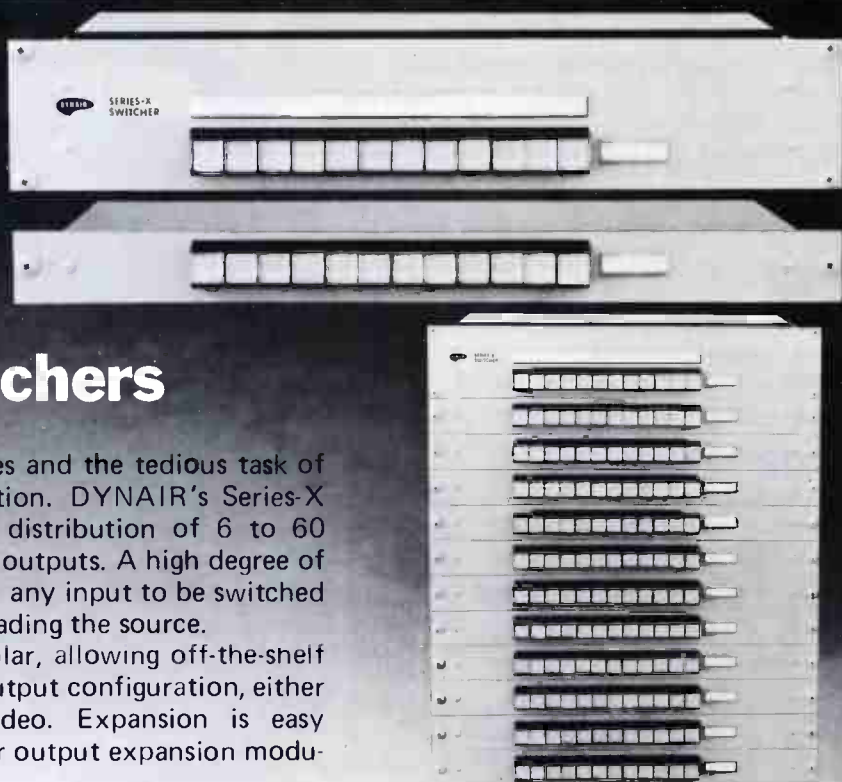
STILL the best buy ...DYN AIR's Series-X Switchers

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: 910-335-2040



Circle 145 on Reader Service Card

AKAI RELIEVES BACK PAIN.

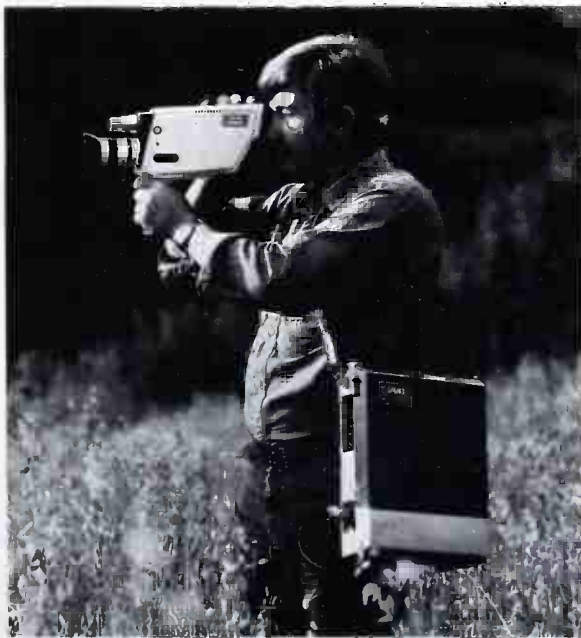
One of the common discomforts due to excessive videotaping is back pain.

Lugging around those 35 and 40 pound VTRs through crowds, down stairways, up stairways, up hills, steep hills.

Well, no more. Akai has a remedy — our new VTS-150B we call the Hustler.

The Hustler doesn't weigh 35 or 40 pounds like other recording units. It doesn't weigh half that.

In fact, it doesn't even



need to go on your back.

The Hustler is a 16 pound color videotape recorder you sling over your shoulder, and a 6 pound color camera you can carry in one hand.

No wonder 63 TV stations are now using our little Hustler.

The lightweight, two-piece, one-man operation that isn't a pain in the back — or anyplace else.

AKAI™

2139 E. Del Amo Blvd., Compton, Ca. 90220

Circle 146 on Reader Service Card

How To Set Up A Good Microwave Antenna System For ENG

by T.J. Vaughan

The problems in establishing a good microwave signal path for ENG are entirely different from those in setting up a fixed microwave link. This article describes the ENG problems, and their solutions.

Electronic News Gathering (ENG) has produced a requirement for a better understanding of the problems of transmitting TV signals from one location to another.

The ENG system consists of a microwave dish at the location of the news or remote origination point which transmits the signal to another microwave antenna centrally located in the city or community. The received signal is then connected directly (usually via telephone lines) to the studio for monitoring or editing and is either taped or fed directly to the transmitter for live transmission.

The ENG user would like the transmission of this microwave signal to be of the same high quality that he normally obtains with two microwave antennas used in a fixed path microwave communication link.

This is never the case. There are problems that are

peculiar to the typical ENG communication link. I want to discuss the main problems here, along with some solutions.

Establishing an ENG communication link

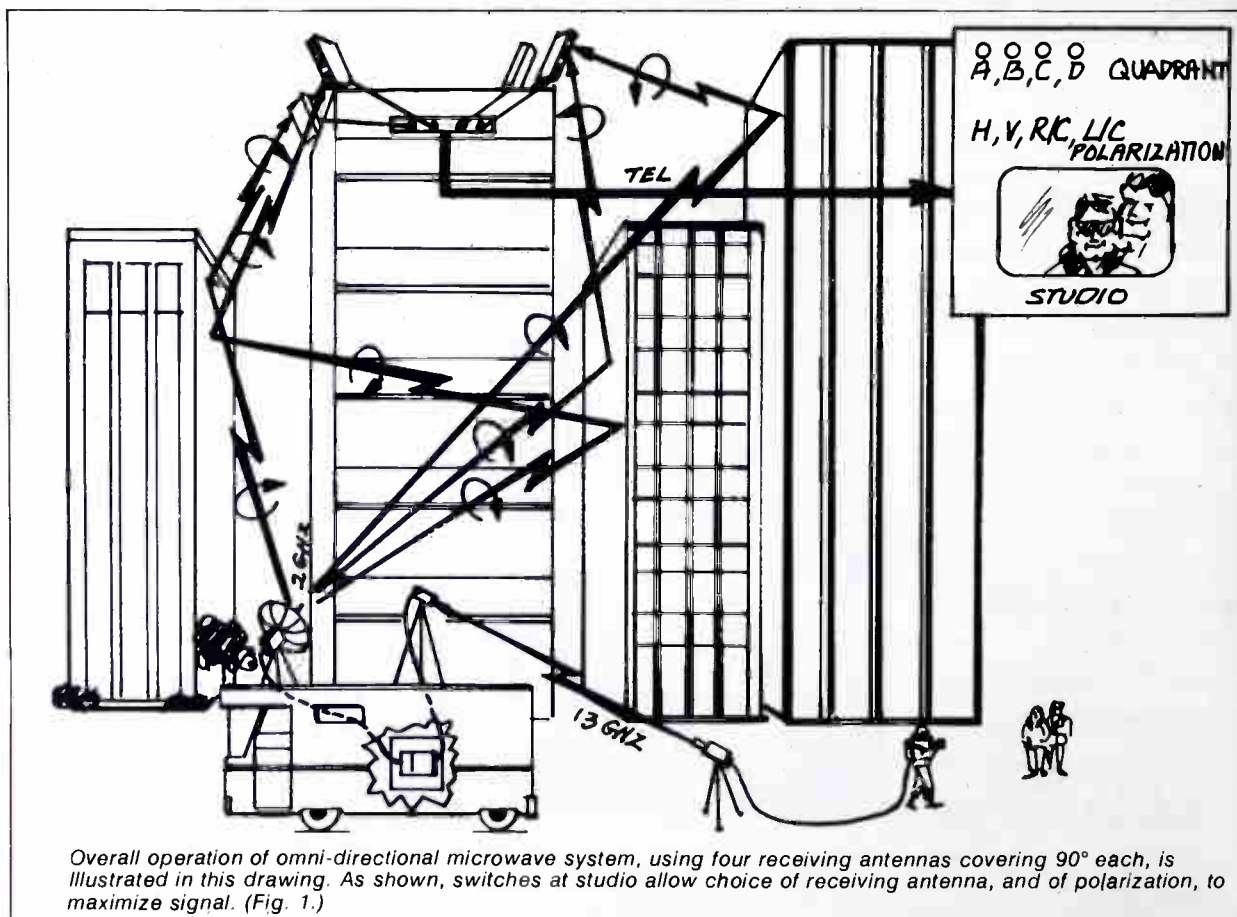
To establish a *fixed* microwave communication link you should follow several precise rules, for a good clean microwave path.

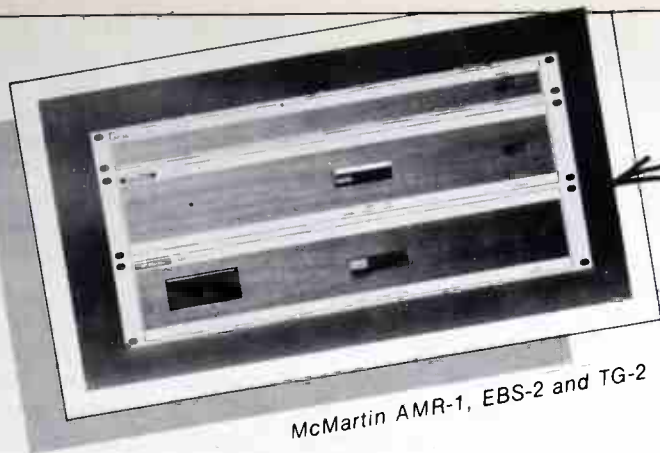
First the path length is established. Then a system gain analysis is performed. Transmitter power, receiver sensitivity, transmitting and receiving antenna gain is then determined to insure a satisfactory system fade margin. The site is surveyed first with maps and then with on-site inspections. An allowance is made for atmospheric refraction and the amount that the beam is "bent" is determined.

The path is analyzed using the "bent" beams to determine if objects (buildings, trees, etc.) within the beam will cause reflections or diffractions. This is called Fres-

continued on page 7

Mr. Vaughan is President, Micro Communications, Inc., Manchester, N.H.





This only LOOKS like more EBS!

McMarrin AMR-1, EBS-2 and TG-2

BUT TFT HAS IT ALL TOGETHER



Compare!

See the pluses that only \$46 more will buy:

	TFT Model 760 System IA at \$470*	McMarrin AM System at \$424*
AM Receiver	Frequency synthesized digitally-tuned to receive any of the EBS stations.	Non-crystal controlled, can receive one station only. (Additional receivers at \$99.50 each)
Dependability	Can be tuned to best operating station in EBS network.	Won't work if primary EBS station is off the air.
Installation	No additional wiring or calibration between modules. Easy to install.	Requires external wiring between units. Takes at least 3 times longer to install.
Rack Space	Requires 3 1/2 vertical inches of rack space.	Requires 8 3/4 vertical inches of rack space.
Built-in System Test	Yes	No

Specify the computer tested EBS system that's ready when it's delivered and ready when it counts...TFT Model 760.

* Based on manufacturer's list price as of Nov. 12, 1975.

Call Toll Free 800-538-6884 (Call Collect in California)

TFT TIME AND FREQUENCY TECHNOLOGY, INC.
3000 Olcott St., Santa Clara, California 95051, 408/246-6365

MICROWAVE ANTENNA SYSTEM

nel zone clearance and will result in a loss of signal. In many installations a preliminary microwave survey is made over the path to determine the extent of actual fades and how well the design parameter can be met. An RFI study must then be made to determine the extent of any interference and how to cope with it. Finally the antennas are installed and each antenna carefully bore-sighted to insure maximum transmission. In some installations this may include optimizing the polarization.

When setting up an ENG microwave system one does not have the *time or facilities* to establish an ideal path as just described. The basic philosophy of ENG or Live News is that the system must be set up quickly and a path established at almost any location in the city.

It goes without saying that this path may be anything but ideal. If the path is from the street to the receiving antenna located on a tall building the main beam may be partially or completely blocked by other buildings. The signal can experience severe degradation (as much as 20 dB), and in many cases depolarization (as much as 10-20 dB).

It should also be pointed out that just because you can see the antenna at the other end does not necessarily mean you have a good path. If the beam just grazes an obstacle (e.g., there isn't sufficient Fresnel zone clearance) there can be a loss of from 6 to 20 dB depending on the type of surface over which the diffraction occurs.

The path will usually be set up in a multiple reflection environment (see Fig. 1) and techniques must be used to extract the maximum signal from the air.

Two of the newer problems reported by ENG users are: depolarization and frequency selective cancellation. Both of these problems can be helped by using circular polarization.

Overcoming propagation problems

The standard practice for a fixed microwave communication link is to transmit linear and receive linear polarization. This has two distinct *disadvantages* for ENG:

- If the signal is depolarized due to multiple reflection, the received signal could be cross-polarized and there could be *no* reception.
- Two signals at the same linear polarization could arrive at different times (due to building reflection) resulting in severe ghosting.

Both of the above disadvantages can be overcome by using circular polarization.

Maximum reception will occur for like polarization e.g., right circular to right circular or horizontal to horizontal. Gain for a circular polarized antenna is defined relative to the polarization of the same sense as is being transmitted. However, circular polarization can be received on a linear polarized antenna and a linear polarized signal received on a circular polarized antenna. In these two cases there would be, however, a 3 dB loss of signal as compared with the condition of maximum reception.

The most significant advantage of using circular polarization springs from the fact that the sense of circular polarization reverses when it hits a reflecting object (e.g., right circular becomes left circular and vice versa). This is not true of a linear polarized reflected

signal. Therefore if both ends of the link are of the same circular sense all first order reflected signal (ghosts) will be cross-polarized and discriminated against.

The law of reciprocity permits, in a multiple reflected environment, the roles of the transmitting and receiving antennas to be reversed.

This means that for any given path transmitting horizontal, vertical, right or left circular and receiving right circular will be identical to transmitting right circular and receiving horizontal, vertical, left and right circular.

Depolarization problems. It is possible to experience a complete loss of power if the signal at the receiving antenna is cross polarized from the transmitting antenna. The depolarization occurs because of reflection and edge diffraction and is not common to fixed microwave communication links. It is therefore necessary to: (a) Change the polarization of the receiving antenna until it is oriented with the polarization that exists in space; or (b) Change the polarization of the transmitting antenna so that after it undergoes depolarization it is then oriented with the fixed polarization in the receiving antenna.

Most ENG antenna systems have means of remotely controlling the polarization at either the transmitter or receiver and permit the station to optimize for not only the strongest signal but the cleanest from a ghosting point of view. Solid state RF switches using microwave PIN diodes are available making it possible to accomplish optimization so fast that it can be done while carrying program with no flicker or interruptions.

The availability of different polarizations for the transmission path will increase the path diversity and hence the probability of receiving a good signal.

Frequency selective cancellations. There is another problem peculiar to ENG systems. It is possible to have a path with a good video signal but a poor audio signal. The audio signal is usually on a sub carrier 7.5 MHz above the video carrier. The difference in frequency between the two carriers is sufficiently large so that reflections can be in phase at the video carrier and out of phase at the audio carrier, causing loss of audio. This in-an-out-of-phase condition will usually occur many times in the video pass band, but because of the wide video bandwidth the effect is not as severe as it is with the audio signal and its narrow band. Aggravating the audio problem is the fact that reflected signals of any magnitude will produce a shift of the carrier causing harmonic distortion. Both of these distortions can be reduced by conversion to circular polarization, eliminating either the even or odd reflections.

Three types of systems

There are three types of antenna now used with ENG systems: 1. fixed microwave dish, 2. rotating microwave dish, 3. omni-directional array.

A complete ENG system includes the 13 GHz link between the camera and the van and the 2 GHz link between the van and receiving antenna. The following discussion is based on a remotely-controlled multipolarized feed in either the transmitting or receiving end of the link.

Fixed receiving antenna. The microwave transmitting antenna is located on the van with a fixed microwave dish centrally located on a tower or building. This system can only be used when the tower is located far enough away from the city so that all possible locations

continued on page

DISCOVER

WHAT TELEMATION IS OFFERING THE BROADCASTER

Discover for yourself—

TeleMation, founded by video broadcast people, is dedicated to supplying you with the quality television studio and terminal equipment you demand. In our line of nearly 200 products, we are sure that you will find the exact equipment, and performance, you have been looking for.

Here, out of those nearly 200 products, we are showing a few examples:

- TCF-3000 Broadcast Film Camera
- TVS / TAS-1000 Video/Audio Distribution Switcher
- ☆ 525 Series Broadcast Terminal Equipment
- TED Television Event Display and TCG-1425 Character Generator
- ▼ TMC-1100 Monochrome Camera (keying)
- ★ TAA-525 Audio Distribution Amplifier

There are many more.
Let us tell you about them.



TM TeleMation
the discovery people

P.O. Box 15068, Salt Lake City, Utah 84115 — (801) 487-5399

TeleMation Broadcast Sales Offices Worldwide

Atlanta, Chicago, Los Angeles, New York, Salt Lake City

Beirut, Lebanon • London, England • Mexico City, Mexico • Rio de Janeiro, Brazil • Santiago, Chile

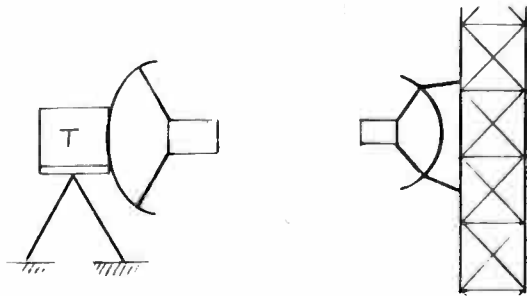
Circle 148 on Reader Service Card

MICROWAVE ANTENNA SYSTEM

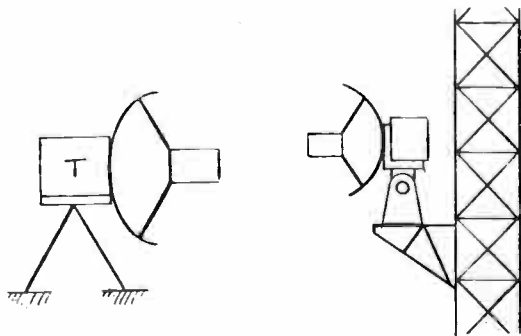
in the metropolitan area will be within the beam width of the antenna. The distance across the city the beam will cover (4 foot dish at 2 GHz) is ¼ mile at 5 miles, 1½ mile at 10 miles, and 3 miles at 20 miles distance.

Since the grazing angle will be very low, blockage can occur from low obstructions and homes.

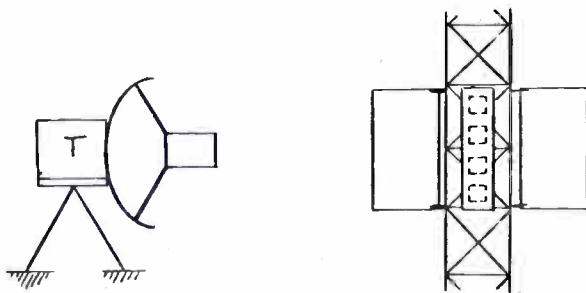
Some solutions to this have been to use a Cherry Picker or to bring the 2 GHz transmitter up to the roof of



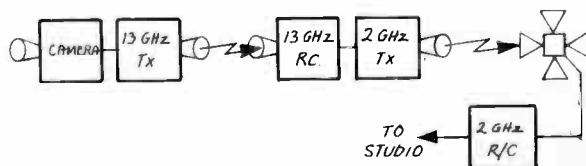
Systems for organizing ENG antennas are shown in the top three drawings. System in first (above) uses a fixed antenna on van, fixed antenna on central tower or building. It is usable only if all transmitting locations are within receiving antenna beamwidth.



Second system, using rotating microwave dish at central receiving location, allows use of narrower beam, higher antenna gain, with more discrimination against multiple reflections. However, wind loading is more serious, control and drive must be on tower, insurance is more costly, tower will shadow out at least 90° coverage.



Omnidirectional array at receiving position gives 360° coverage, with four antenna systems, each covering 90°. Choice of antenna and of polarization are by switch at receiving location. There is no need for personnel to climb tower for maintenance.



Typical ENG microwave system today, shown in simplified block diagram, includes a 13 GHz system from camera to van, a 2 GHz system from van to central receiving location, telephone lines from there to studio.

a tall building and radiate the 13 GHz signal from the street to the roof. This is sometimes done even in large cities like New York where the blockage is severe enough to prevent transmission from the street.

This is of course not an instant set-up and requires some preparation including permission from the building owner.

Rotating receiving antenna. The microwave receiving dish is mounted on an azimuth-over-elevation pedestal which in turn is side mounted on the tower. This has the advantage of remote positioning of the narrow beam to any azimuth angle. The control is from the tower base by means of a local/remote control unit (if personnel are at the location) or from a decoder (if unattended) connected via telephone lines to the studio.

The high gain and the increased high directivity will help discriminate against multiple reflections. Some of the disadvantages with this system are:

1. Survival wind loads are much less than the wind load of the tower alone.
2. Drive against wind is limited.
3. Output torque must be great enough to break away ice.
4. Insurance problems are associated with a rotating drive on the tower.
5. The tower will shadow the coverage area by at least 90°.
6. Control and drive must be located on tower.

Omni-directional array. The omni-directional array allows 360° coverage with no mechanical movement (e.g., complete solid state control). Four antennas are mounted about the tower with the pattern from each antenna overlapping.

It should be pointed out that in many remotes the maximum signal is not always in the direction of the mobile van. The reflected signal from the side or back can be stronger than the direct signal.

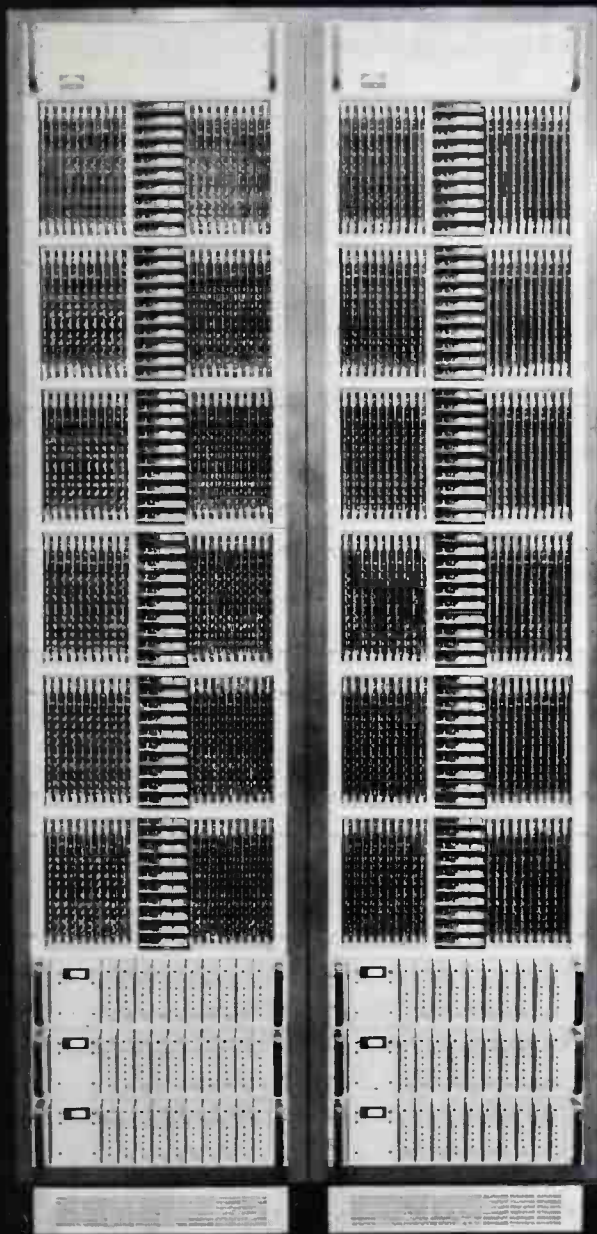
The location of the polarization selection can have a significant effect on cost and reliability in this system. If the polarization selection is performed at the transmitting antenna, as is possible with MCI series 94000, the receiving antenna will have fixed polarization. No switching will be required and all of the electronics can be removed from the tower. The signal from each receiving antenna would be connected to the quadrant selection switch at the base of the tower via separate RF lines. The quadrant switch at the tower base can be controlled by the operator viewing the picture; or if the location is unattended, the switch can be activated by an encoder/decoder combination.

The principal advantage is that station personnel or unqualified riggers would not be required to climb the tower to do periodic maintenance. RFI, environmental and lightning problems are greatly minimized and the reliability of the system is improved.

If the polarization selection is at the receive end only one RF line would be required from the quadrant switch to the receiver (assumed to be at the tower base). The switching matrix, driver circuits, logic circuits, an power supplies are all located in an interface junction box on the tower at the height of the transmitting antenna.

This approach is less expensive for very tall tower. The cost difference between one coax line and four lines can be significant.

BM/



THE ADC 900

A distribution switching system for those who demand the finest performance available today.

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

While designed for computer control, the system is supplied with the facilities to accommodate any conventional or non-conventional control scheme.

The 900 is the most flexible, versatile and superior system available today.

40 x 60 AFV



AMERICAN DATA CORPORATION

AN **AIRPAX** COMPANY

115 WYNN DRIVE, N.W. P. O. BOX 5228 HUNTSVILLE, ALABAMA 35805 TEL. 205-837-5180

1729 WILMONT DRIVE
ATLANTA, GA. 30329
404-633-2100

5504 WATERWAY
ROCKVILLE, MD. 20853
301-460-1454

3250 WILSHIRE BL. STE900
LOS ANGELES, CA. 90010
213-387-7756

2908 MULBERRY
PASADENA, TX. 77502
713-941-7272

AIRPAX ELECTRONICS

Cambridge Division
Cambridge, Md.

Circuit Breakers & Switches

Controls Division

Ft. Lauderdale, Fla.

Tachometry & Control Instrumentation

Circle 149 on Reader Service Card

National Public Radio Sends Signal Tones On Program Lines

by Michael Weiss

"NetCUE," a special tone-sensitive receiver using a phase comparison, can pick out the signal tones even if they are 10 dB down in the noise.

Rapid transmission of emergency announcements to radio and television stations has long posed a number of problems to networks of interconnected broadcast stations. Guaranteed fail-safe reception of fast-breaking news, program advisories, and schedule changes has been rare for two basic reasons: restrictions imposed by traditional equipment on the one hand, and the cost of the operation on the other.

As a result, alert systems now in use have been characterized by major flaws. In systems employing single tone cues, reception at stations generally has required interruption of network programming. In systems employing electromechanical relays, hardware usually has included slug-tuned coils that easily detune in transit to stations, demanding high-cost adjustment and maintenance at installation sites. And with three-tone systems currently used, operation has also proved too costly.

Now there is an answer to these problems in "NetCUE"—an alert system developed and recently patented by National Public Radio (NPR). The NetCUE system was designed by NPR Senior Engineer Wayne Hetrich as an inexpensive and reliable method for alerting stations of programming and operational changes. By sending a series of audio tones along normal program feed lines, decoders at member stations activate indicator lights and tape machines for recording the unscheduled announcements or program feeds. And the cost totals a mere \$100 per station for a NetCUE detector device.

The key to the NetCUE system is an electronic solid

state receiver that utilizes a phase-locked loop process for decoding the transmitted signals. When a desired input tone matches a reference tone inside the receiver, a control signal is generated, activating the lights and tape machines. Additionally, the control signal keeps the loop in lock, remaining super sensitive to the input tone's particular frequency, amplitude, and period.

To carry out these dual roles, the NetCUE receiver analyzes incoming transmissions using four basic building blocks: a phase comparator, a low pass filter, a DC amplifier, and a voltage controlled oscillator. The phase comparator matches the input signal from the interconnect line against the reference signal being generated by the voltage controlled oscillator. When the phases of the two frequencies are identical—indicating the presence of a cue tone—an output signal is created that, after filtering and amplification, becomes the control signal.

The precision of the NetCUE receiver permits translation of the desired signal even though it may be buried within the program content. In the presence of unwanted noise, the phase lock filter can effectively reduce side-band amplitudes while remaining locked on the fundamental frequency. Thus the NetCUE device can detect a cue tone from an environment that is as much as 10dB louder than the desired signal . . . even on low-quality class "C" telephone lines.

In contrast to the unique character of the NetCUE receiver, NPR's signalling unit is a triple-tone generator that can be replaced by any of a number of standard units. When sending the cue tones, three precisely controlled master oscillators are switched—independently o

Mr. Weiss is a staff writer for National Public Radio.



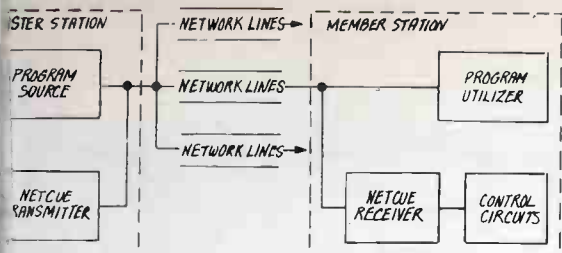
Still the industry's MOST POPULAR

VIDEO TAPE CONDITIONER

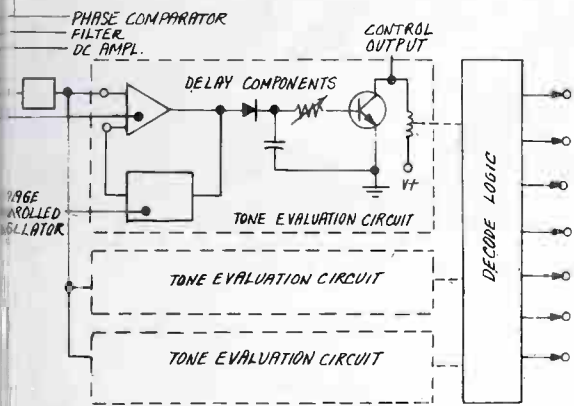
- Cleans and winds tapes
- Prolong tape life and reduce dropouts
- Hundreds installed worldwide
- Leasing program available

RECORTEC, INC. 777 PALOMAR AVE. SUNNYVALE, CA. 94086 TEL: (408) 735-8821 TWX: 910 339 9367

Circle 150 on Reader Service Card



Block diagram of NetCUE system shows how the signalling tones are sent over program lines to the special receivers at member stations. Phase comparison circuit allows receiver to pick signal tones out of noise or program material.



Block diagram of NetCUE receiver, with arrangement of the phase comparator, filter dc amplifier, tone evaluation circuits, and decoder logic. Incoming single tone is compared with reference tone in receiver.

combinations—to a mixer, buffer, line amplifier, and into the NPR interconnect lines. The result is a set of ten different cue tones from which to choose.

To prevent the false triggering of the NetCUE receiver in the presence of normal audio program, the signal frequencies are based on multiples of non-musical tones. The One tone (Q1) is at a frequency "in the crack" between the notes F and F# on the music scale. The Q2 tone is located an octave lower, and Q3, an octave higher than Q1. Though other formats and levels may be used, NPR sends normal NetCUE transmissions in five second bursts at +4dB.

What's the effect of each tone?

The Q1 tone activates an indicator light at each station to advise personnel that a program advisory announce-

ment will soon follow. The lamp remains on until it is manually turned off: even if no one is present when Q1 arrives, someone returning to the station's control room will be alerted to monitor the NPR feed line.

When the Q2 tone is transmitted, the NetCUE receiver closes a set of contacts which start the station's tape recorder. This automatic triggering relieves station personnel of monitoring daily performance tests or messages sent after the station's regular broadcast day. The Q4 tone cuts off the tape machine at the end of the feed.

Of the other four NetCUE tones, only two have been designated for specific functions. The Q3 tone activates an indicator light to denote an upcoming advisory on technical matters, while the Q6 tone notifies stations of upcoming transmissions from the Emergency Broadcast System (EBS). At present, the Q5 and Q7 tones are still available for other applications.

The history of the NetCUE operation dates back to January, 1973, when National Public Radio completed its first performance test of the system along NPR's "East Round Robin" interconnect of 60 member stations in the central and northeastern United States. Simulating a worst-case transmission mode, a signal was sent from NPR Master Control in Washington, D.C., along more than 3,000 miles of AT&T cable back to a NetCUE receiver located in the NPR Master Control. For two months, the receiver was subjected to cue tones in a variety of noise environments. Throughout this period the receiver continued reliably to detect the NetCUE signals, and conversely, *not* to respond to normal program audio, discrete tones, or slow frequency scanning sweeps.

Following these tests, NetCUE receivers were sent to NPR's then-150 interconnected stations for installation. Each station was sent a receiver kit with an accompanying instruction manual for assemblage, much like a "Heathkit" package. Directions were geared specifically towards stations with limited technical resources.

Once assembled, the units weigh approximately three pounds, and fit onto a standard 19" by 3.5" rack panel. The completed units are then bridged across NPR's 600 ohm interconnect line, with circuit contacts connected to station indicator lights and audio recorders. Some stations have utilized ancillary circuits for providing indicator lights in rooms outside the engineer's control

Still the industry's MOST DESIRED

VIDEO TAPE EVALUATOR



- Tape evaluation at 16 times speed
- World wide customer base
- Standard in the industry
- Leasing program available

RECORTEC, INC. 777 PALOMAR AVE. SUNNYVALE, CA. 94086 TEL: (408) 735-8821 TWX: 910 339 9367

Circle 151 on Reader Service Card

NET CUE

center—for example, the station manager and program director's offices—to be certain that emergency announcements are always monitored.

Today the NetCUE devices are in operation at the 175 interconnected stations in the NPR system, and used daily on a regularly scheduled basis. In the morning, a news feed from the British Broadcasting Corporation is transmitted following the sending of Q1 and Q2 tones, with the Q4 signal stopping the recorder after the last news outtake. This process is repeated during the afternoon for a conference call that details scheduling information and programming advisories.

When irregularly-scheduled announcements require transmission during NPR's programming feeds (approximately 30 hours weekly over the interconnect), the NetCUE system is used during one-minute station breaks on the hour. There is still the capability to send barely-audible cue tones simultaneously with a program feed, but that emergency power has never had to be implemented.

Outside of NPR, the NetCUE system may soon prove compatible with new EBS plans for signalling AM, FM, and TV stations about the broadcasting of national emergency announcements. In 1971 the National Industry Advisory Committee (NIAC) recommended the replacement of the present EBS (formerly CONELRAD) Attention Signal by a two-tone transmission standard. This proposal was repeated during NIAC deliberations last year, with officials defining tones at frequencies of



Inventor of NetCue system, Mayne Hetrick of NPR, holds a completed receiver ready for rack mounting.

853 and 960Hz under specified time and amplitude characteristics.

As these requirements set for the EBS appear to be met by NPR's NetCUE system, it is likely that NetCUE will find acceptance in an even wider variety of network usage than the one currently enjoyed by National Public Radio.

Map at right shows member stations of National Public Radio with the various network assemblies in use.

The End Of Pedestal Problems



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

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

Camera operators enjoy the ease of



operation made possible by dual eight inch wheels overall light weight and smooth camera balance. Maintenance people enjoy the sealed ball bearing permanently lubricated wheels and low maintenance requirement of the annual, one point lubrication. Available with a wide variety of options (shown here with cable guard side skirts), the P-50 is the ideal instrument for the modern television studio.

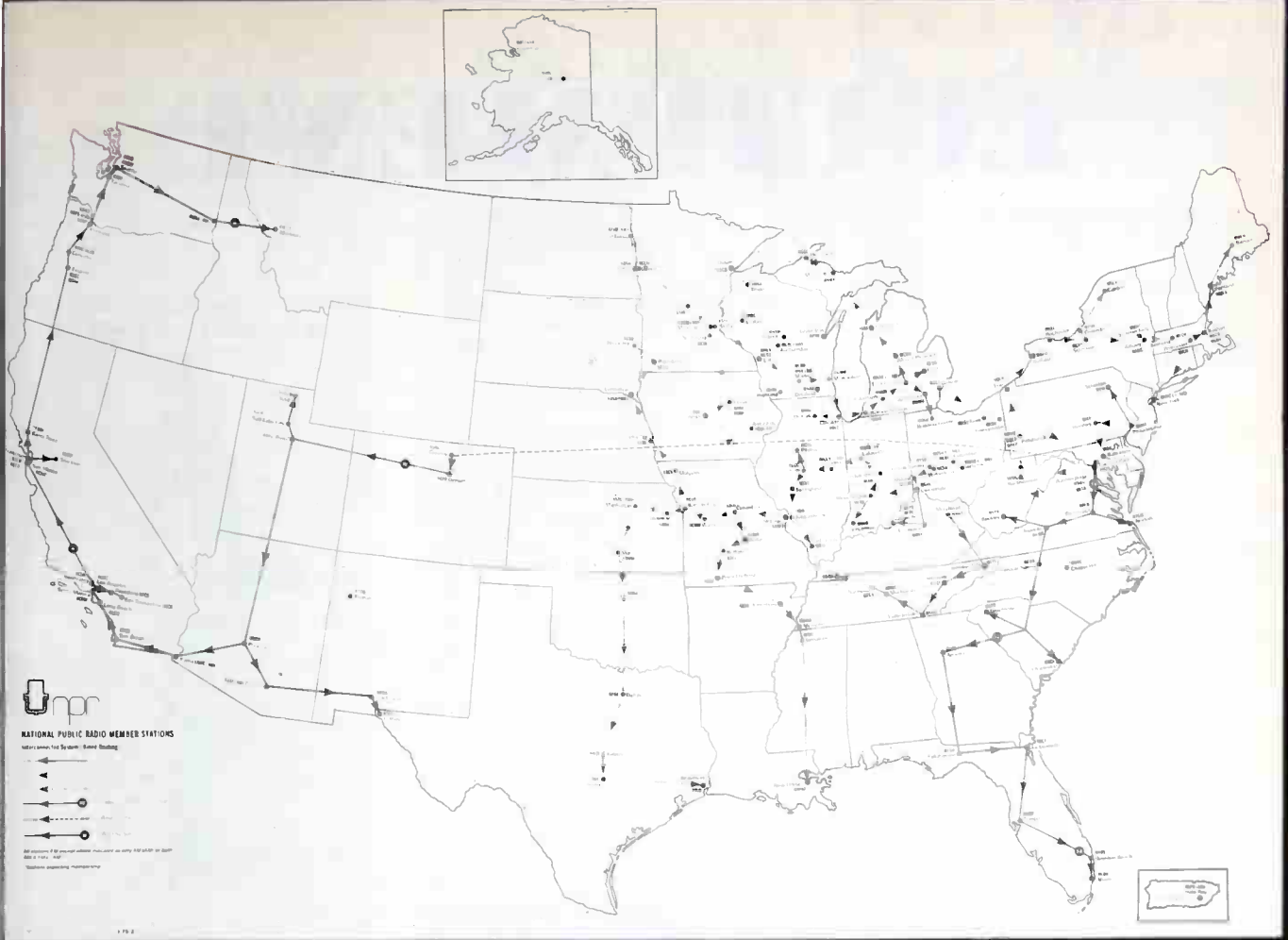
Television Products Co., Inc.

9016 Aviation Blvd., Inglewood, CA 90301

See us at NAB—Listec Booth 30

Telephone: (213) 776-327

Circle 152 on Reader Service Card



Rosebud & MAP are making beautiful music together.

When Richard Alderson of Rosebud Recording Studios, New York saw and heard our Model 3000 Variable Parameter Equalizer he was impressed!

So impressed that he asked what other console modules we had for the board he was building. So we showed him.

The final result, proudly shown here is Rosebud's new 20 input 16 track console. They built it themselves using MAP's Model 8422 series plug-in modules and Models 3000 and 3100 Equalizers.

So if you're thinking about a new console, do what Richard Alderson did... take a look at Modular's complete line of nine great console modules. (listed below.)

Whether you choose one module or all of them, you'll be impressed too.

Call or write Rick Belmont or Martin Gittleman for technical assistance on putting together your next console.

- **MODEL 8422-1** 8422 Module less mixing amplifier
- **MODEL E8422** Echo/Delay—Send/Receive Module
- **MODEL C8422** Control Room Monitor Module
- **MODEL S8422** Studio Monitor Module
- **MODEL T8422** Communications and Cue Module
- **MODEL MB8422** Input Module Mother Board
- **MODEL 3000** Variable Parameter Equalizer
- **MODEL 3100** Graphic/Shelf Equalizer
- **MODEL CL-20** Compressor-Limiter



MODULAR
AUDIO PRODUCTS, Inc.

A UNIT OF MODULAR DEVICES, INC.

1385 Lakeland Ave., Airport International Plaza · Bohemia, New York 11716 516-567-9620

Circle 153 on Reader Service Card

www.americanradiohistory.com

BROADCAST EQUIPMENT

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

SMPTE TV edit code reader automatically reads and decodes time code data over a range of 1/5 real time to 40 times real time, in both forward and reverse directions and provides front panel display of time code. Model SP-425 operates with both b&w or color (drop frame) formats. Some standard options: parallel outputs, generator mode of operation, combined reader/generator. \$2,000. DATAMETRICS, INC. **300**

WWVB time synchronizer, Model SP-465, provides a method for disseminating time and frequency information in sync with NBS station WWVB. Time sync accuracy of 1 ms and frequency synchronization of 1 part in 10^{11} is obtainable. DATAMETRICS, INC. **301**

SMPTE miniature time code generator, the model SP-105, enables video tape recording on portable VTR equipment (reel-to-reel and cassette) via time-code-editing systems. The generator includes display, preset control and operating controls. The unit derives power (+12 Vdc ± 3 V @0.1

COMING IN MARCH

NAB Pre-Convention Issue

Will preview new products that will be highlighted by manufacturers; Themes of booths; Products manufacturers will be featuring; Booth numbers to help you organize your time at the convention.

A) and an NTSC video input for synchronization from the recorder. The output code is in standard SMPTE drop-frame format and is compatible with the normal tape audio track input. \$1,795. DATAMETRICS, INC. **302**

Transmitter load package covers range 60 Hz-2 GHz, continuous power up to 40,000 watts. Model CPTC-30K requires 208/220 VAC, single phase. VSWR is 1.1:1 from 60 Hz to 1 GHz, 1.15:1 from 1-1.5 GHz, and 1.20:1 from 1.5 to 2.0 GHz. A spare resistor is supplied; additional resistors are priced under \$100. ELECTRO IMPULSE INC. **303**

Audio-visual programmer dubbed the Universal Pulser functions as a: sinewave generator, audio-visual programmer, pulse control and counter circuit and low-frequency filter. The programmer is compatible with all single-pulse film/slide show formats.



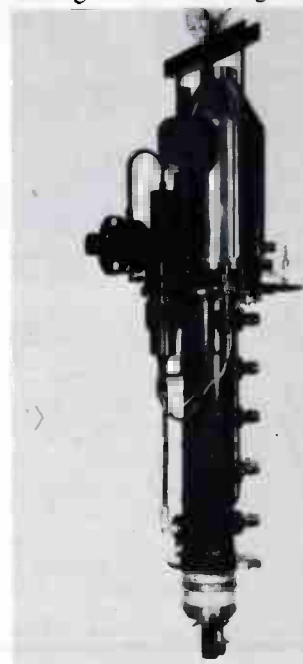
including audible systems (700 Hz, 1 kHz), inaudible systems (50 Hz, 120 Hz), and systems which require a 150 Hz stop pulse. \$399.95 TAPEHEADS **304**

Dynamic headphone, the DT100 series, by Beyer, is available in two versions. The DT100.1 leaves one ear open for monitoring ambient noise necessary under certain live performance situations; the DT108 uses a similar headphone and includes a directional boom microphone. Prices: \$45 (DT100.1); \$63.50 (DT108). REVOX CORP. **305**

Background music library called the Index Series, is a recompilation of the Chappell Background Music Library with the selections organized on one LP per subject. The series includes 36 12-in. discs. \$145. plus \$5 for postage and handling. MUSICUES CORP. **306**

Integral-cavity UHF-TV klystron line includes three series of tubes delivering from 10 kW up to 44 kW of peak-of-sync, video-carrier output power. Tube bandwidth (-1 dB) is 8 MHz; load VSWR is rated at 1.1:1. The

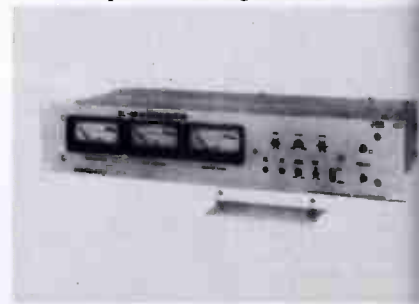
tubes have electrically-isolated modulating anodes. For a given beam cur-



rent, only the cavity frequency and the focusing-electromagnet current are adjustable. The tubes are cooled by circulating water and vapor-phase techniques. THOMSON-CSF **307**

Audio Switcher for mono or stereo uses a card frame construction with two 24 x 10 matrices per frame. Optional remote gain control is available with six outputs. COMMUNICATIONS TECHNOLOGY, INC. **308**

AM broadcast limiter, Model BL-40, provides adjustments for tailoring the modulation envelope to any program format or transmitter characteristic. Independent adjustments are provided for rms and peak limiting and for variable



positive overmodulation up to 125%. All critical adjustments are located behind a removable security panel. A limiting by-pass switch is furnished. URI **310**

Color Monitor, Model UMT-1206, has a 90° one-gun color picture tube. All color set-up controls are located on the front panel. Standard features include loop-through BNC connectors with termination switch and a parallel connected 8-pin plug for VTR monitoring. Pulse cross is provided as an option for viewing the vertical and horizontal display of sync, burst, blanking, test and reference signals. Bandwidth of the monitor is 4.2 MHz. \$25. UNIMEDIA 309

Color production console, Model PC-1, is self-contained and can be interfaced with Sony tricon color cameras. The console includes four in-line monitors for camera 1&2, pre-view and master, a special effects generator with six inputs, matt, key, colorizer, diamond, circle, and corner inserts. An audio mixer offers four



output channels with built-in audio monitor amplifier. The console package includes tripods, headsets, and all cables. \$19,995. LINES AUDIO-VIDEO SYSTEMS 311

HF television transmitter, the TT-20FL, outputs 50 kW visual power plus 1 kW aural power on channels 2-6 from a pair of 25 kW transmitters operating in parallel. The units may be operated independently. RCA BROADCAST SYSTEMS 312

Bandpass filter, the Model BPFa, is available for each low-band, high-band and mid-band VHF TV channel. Six-stage bandpass filter plus two phase-cancellation traps provide a bandpass specification of 5.3 MHz on channels 2-6 and 5.0 MHz on channels 7-13. Trapped-carrier attenuation is 60 dB. LONDER-TONGUE LABORATORIES, INC. 313

Automatic Pay-TV programmers, the Telepro series 300, provides cassette-recorded programs of greater than 30 minutes in length without interruption. The programmers cycle either two or three VCR's for auto operation. Features include: pre-roll; check rewind before play and auto rewind after play; clean audio and video switching; operation according to VCR manufacturer's suggested sequences.

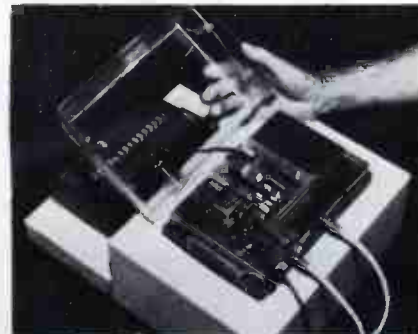


The programmers operate with most VCR's. \$1,120. Delivery in stock to 30 days with quantity discounts available. CHANNELMATIC ELECTRONICS 314

Phantom powered studio condenser microphones are acoustically similar to the other MKH series mics with A-B powering but now operate with 48 V. Three models with different directional characteristics are offered—MKH 416: 40 to 20,000 Hz frequency response, narrow supercardioid/club-shaped directional pattern, signal-to-noise ratio of 73 dB at 94 dB SPL, \$529; MKH 406: cardioid pattern; 132 dB SPL, \$495; MKH 816: shotgun, confined club-shaped pickup pattern, 50 to 20,000 Hz frequency range, \$629. SENNHEISER ELECTRONIC CORP. 315

Dynamic unidirectional moving coil microphone, the Model 3500, has a 40 to 18,000 Hz frequency response. The mic may be used either stand-mounted or handheld. Overall dimensions are 6.3 in. long x 0.945 in. dia. Termination is via Cannon XLR type connector; impedance is 600 ohms. \$165. REVOX CORP. 316

Single-channel mid-band converter/descrambler, the Model DST-



1C, will convert and descramble channel H to channel 2 or 3. The converter is crystal-controlled and the terminal is continued on page 80

CDL/DA's



* shown

VIDEO EQUALIZING* PULSE

Specifications

- So good they have been the "standard equipment" in a major Network for 8 years.

Flexibility

- Electrically and Mechanically interchangeable
- 6 outputs
- Loop through input

Reliability

- Self-Powered
- Drift-free operation
- Thousands in use today throughout the world.

Rugged

- Extruded milled aluminum housing with stainless cover.
- Mount in rugged frames: 10 DA's per 3 RU frame and 3 DA's per 1 RU frame.

Price

- Superior performance and quality at competitive prices.

Availability

- Stock to 30 days.

For immediate additional information call:

Canada: 514-697-0811
U.S.A. (N.J.): 201-767-1300
Chicago: 312-991-4720
Los Angeles: 213-789-0574



CENTRAL DYNAMICS LTD
Circle 175 on Reader Service Card

DON'T MIX THE GOOD
SOUND WITH ANYTHING
BUT THE BEST



THE
MODEL 6444 STEREO AUDIO
CONTROL CONSOLE

Micro-Trak's new 6444 Professional Audio Console; The console to pick for your small studio, remote, portable or production four channel, stereo board. With its two turntable, two microphone, and three auxiliary inputs coupled to four high quality mixing channels, it makes the ideal choice for that, use everywhere, broadcast console.

Totally professional from design...to application of the highest quality components...to its heritage from a company that's been providing broadcasters with the finest audio equipment for over thirty years, the 6444 has it all.....

Smooth pots...FET audio switching Panel laid out for the Pro...Metered plus four dBm output, balanced to drive 600 ohms...Monitor output... Inbuilt cue amp and speaker...noise so low its virtually not there... Built to take all you can give it and still come up swinging

And best of all the 6444-BT is only \$895.00 and our mono version, the 6454-BT is only \$745.00

See your Micro-Trak dealer for specifications, or write directly to our marketing department, or

SEE US AT NAB BOOTH 815

MICRO-TRAK



620 RACE STREET
HOLYOKE, MA. 01040

Circle 155 on Reader Service Card

PRODUCTS

field retrofitable to permit descrambler operation in conjunction with CATV set converters in the future. Delivery is March 1976. JERROLD ELECTRONICS 317

Sub-miniature concentric twinax-triax (TPS size) family of connectors, jacks, plugs and receptacles are designed for digital, video pair, carrier base-band and noise-free guarded circuits. TROMPETER ELECTRONICS, INC. 318

Modular electret condenser microphones are built around a common power module which houses part of the electronic circuit, battery and LED voltage monitor. The system features three screw-on heads with shotgun, cardioid and omnidirectional characteristics which may be purchased separately. Mic power module uses a 5.6



volt battery or draws power from a phantom setup. Price of the ME 80 Shotgun head is \$108; cardioid (ME 40) is \$78; the omnidirectional (ME 20) head is \$55. SENNHEISER ELECTRONICS CORP. 319

Universal female coaxial connector, type GF, mates with conventional F- and G-style connectors. The connector consists of an outer conductor with combined threaded fore section and smooth rear section with spring flaps to make contact with push-on connectors.



The inner conductor uses a clip-style contact. BLONDER-TONGUE LABORATORIES, INC. 320

Voice frequency transmission test set, the Model 8002, is designed for checking reference test levels on voice frequency channels and determining idle noise on these channels. A 1 kHz oscillator with switchable output levels of -16 dBm, 0 dBm, +7 dBm from a 600-ohm source is built in. The meter ranges from -60 dBm to +20 dBm in 10 dB steps and may be used in F1A or C message weighting. \$410. DANTEL 321

Low noise audio tape cassette, the series FL, is said to measure 3 dB less noise over a spectrum ranging from 100 Hz to 20 kHz. Prices start at \$2 for the C30FL (15 minutes/side). FUJI PHOTO FILM U.S.A., INC. 322

Monochrome 17-in. video monitor, the Model 17M922, features 15 MHz video bandwidth and a horizontal resolution above 800 lines. The 114° deflection crt is equipped with a standard P4; other phosphors are available. SC ELECTRONICS, INC. 323

Audio Interference Filter, the LINX-60L, is a digital comb notch filter which operates by removing each element of noise (the fundamental and harmonic frequencies of the ac line) from the desired audio signal. The comb consists of 1 Hz notches attenuating the input up to 55 dB at up to 250

Take a "Q" from us!



Get the smallest cart machine available
Get automatic fast-forward standard
Get quiet, cool operation
Get the configuration to fit YOUR needs

RAPID-Q T.M.

FROM

GARRON ELECTRONICS

1216 KIFER ROAD, SUNNYVALE, CA 94086

(408) 736-8737

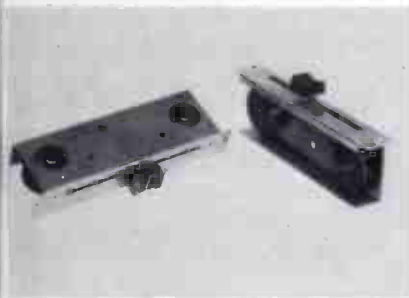
Circle 156 on Reader Service Card

separate points. Notch bandwidth is switch selectable (0.5, 1, 3, or 6 Hz); the reference input is switch selectable from the line, external, or extracted from an audio input source; the lock range is rated at 40 to 80 Hz. XETRON CORP. **324**

Coaxial cable stripper, the Cablematic Coax Cable Stripper, comes in three models for preparing RG-58/U, -59/U and -6/U cable sizes having solid or foam dielectric. Stripping is a two- or three-step process. ANIXTER-RUZAN **325**

Rechargeable power pack, the Porta-Pac II, is a dedicated battery system for RF Communications front-mount radios. The cells power a 5-watt radio for 9 hours between charges; an integral 115/230 Vac charger restores the cells as the radio operates. Typical recharge time from full discharge to 90% full charge is 4 hours. HARRIS CORP. **326**

Quadraphonic rotary-slider fader consists of two sealed potentiometers driven by a common linear slide mechanism. Model F66820 (1,000



ohms) and F66821 (10,000 ohms) are stock items; other resistance values from 100 ohms to 5 megohms with linear, audio clockwise and counter-clockwise, modified linear, modified log and special tapers are offered on special order. Working attenuation is

65 dB, tracking is rated at ± 1.5 dB between elements (0-40 dB range) at a maximum continuous power of 0.5 watt. A cue switch is available as an escutcheon panel and a colored control knob. ROBINS/FAIRCHILD **327**

Self-compensating signal-to-noise audio squelch operates directly on the audio signal. Sound Off is inserted anywhere in the audio line and will squelch the signal whenever speech or



other information is removed. An ac power supply is built in. KAHN COMMUNICATIONS, INC. **328**

Multimeter features 3½ digit capability, is designed to measure true rms AC voltages. A circuit-breaker current overload protects the instrument. The Model 7003 has 5 functions, 26 ranges, 2000-count capacity, 0.4-in. 7-segment LED display. An internally-mounted battery is optional. \$295. Battery option, \$45. SYSTRON-DONNER CORP. **329**

Low-mass phono cartridges, designated MK II, is offered in three series: the Super XLM MK II with Shibata stylus, the XLM MK II, and VLM MK II with elliptical stylus. The induced-magnet cartridges track as low as 0.75 grams and are offered with stylus brush, screws, screw driver, warranty registration and specification sheet. Retail prices are: \$125 (Super XLM MK II), \$100 (XLM MK II), \$75 (VLM MK II). AUDIO DYNAMICS CORP. **330**



Tape Recording Electronics

Modern recording capability for new or old machines. 3-speed EQ, separate EQ for optional SYNC amp. "Linearized" record amp and phase-corrected reproduce circuitry for lowest distortion. Self-contained, fully remotable. Adaptable to most professional recorders. Model 375, \$690.

INOVONICS Innovative Electronics for Recording and Broadcasting
INCORPORATED 1630 Dell Avenue, Campbell, California 95008 (408) 374-8300

Sportscaster Headset... Color, Action, Hands-free Mobility

Combine the finest omnidirectional dynamic boom mike with an equally high performance binaural headphone and you have the superior Sportscaster headset... the Telex CS-90. For live broadcasts, from the station or on remotes, with cue and program monitoring and hands-free convenience. The audience hears every word, clearly, crisply, with crowd noise for background color and atmosphere. Circumaural ear cushions screen out noise in the immediate area so that special acoustic facilities are unnecessary. Supplied with convenient in-line, mike-muting "push-to-cough" switch. The Sportscaster headset. Color, action and hands-free mobility. For complete information please write:



PRODUCTS OF SOUND RESEARCH

TELEX

COMMUNICATIONS, INC.

9600 ALDRICH AVENUE SOUTH

MINNEAPOLIS, MINN. 55420 U.S.A.

Europe: 22, rue de la Legion d'Honneur

93200 St. Denis, France

Canada: Telak Electronics, Ltd., Scarborough, Ontario

Circle 159 on Reader Service Card

Finest Cassette Duplicators at any price



combination system
includes open reel and cassette master

Ease of operation; you don't have to be a professional to use it. High frequency response; obtain broadcast quality at 8 or 12 times speed. Complete expandability; add reel or cassette slave units as needed. This equipment is designed for continuous heavy duty use.

Write or call for an illustrated brochure covering Pentagon's full line of duplicator systems and premium cassettes.



4751 NORTH OLCOTT, CHICAGO, ILL. (312) 867-9200



Super C-1
Cassette Copier
Ideal for duplicating
from 1 to 100
cassettes in a hurry
at an extremely low price.

- One button operation
- Automatic Rewind
- 16 times speed, 30 i.p.s.
- Track selection

Circle 158 on Reader Service Card

Announcing VTC-1000



All-new Mastering Video Tape

\$160.00 per hour*

From the Video Tape Company—the firm that promptly supplies any of your video tape needs! Prices lower than all competition—including Program Duplicating Stock @ \$125.00 per hr./ Spot Duplicating Stock @ \$1.00 per min.*—(22 min. max. length) 100% guaranteed. VTC-1000 promises: low dropouts hi signal-to-noise excellent color performance extended headwear exceptional durability each reel tested end-to-

end. Lowest prices. Guaranteed quality. And immediate, personal attention to every video tape product or service you need.* And we'll pay the freight anywhere in the continental U.S. with each order of 6 or more reels! (In California, add 6% for sales tax.)
Call collect: (213) 985-1666



4212 Lankershim Blvd.
N. Hollywood, Ca.
91602
Keith Austin, Pres.

See Us At

NAB

Booth 404

Circle 160 on Reader Service Card

As mentioned earlier, there will be a new audio cartridge system at NAB. The Beucart Division of UMC Electronics, long a supplier of motors for this application, has decided to produce a complete machine. Units are extremely compact. Type 10 for A-size carts measures 5¾-in. wide by 3½-in. high. Type 20, for up to C-size cartridges, is 10½-in. wide.

Stereo phase performance and stereo phase enhancement will be the theme of the exhibits of Fidelipac and Rapid-Q, respectively. Micro-Trak will feature a compact 6444 stereo console for remote work and System D audio control consoles.

At least two companies will be intriguing broadcasters with head-worn microphones. Shure has a new model, the SM-12, for sports and news announcing. The mike boom can move 20° in any direction and length adjustment has a 3½-in. range. T.E.A. will be showing the Amplivox headset-microphone combination. New in this line is the Traffic Watch headset for on-air commentary from a helicopter or light plane.

Belar sent in an interesting announcement that said it would show new devices "deemed necessary for the accurate analysis of the broadcaster's on-the-air signal."

In lighting, Mole-Richardson will display some new 1200 W to 4000 W BMI Mole Solar Arc lights.

Many broadcasters can also get their first glimpse of DICE (Digital Inter-Continental Conversion Equipment). This all-digital system for NTSC/PAL/SECAM conversion will be shown by Marconi.

Getting Around Chicago

Chicago's seven and a half million residents simplify directions in their city by dividing it into the North, West and South Sides. You would do well to follow their example. At the same time, Chicagoans long ago dubbed the downtown area, "The Loop," referring to the encirclement of the city's business district by an elevated rail route.

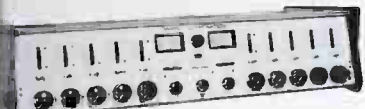
Since McCormick Place—at 23rd Street and Lake Shore Drive—is nearer the South Side, chances are you'll be staying in the Downtown area, or in one of the several hotels

on Managers:

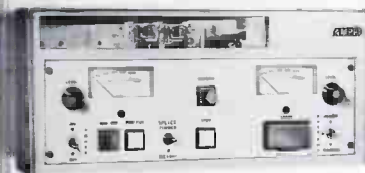
AMPRO HAS PROVEN THAT YOU CAN DO IT . . .

We have designed a line of Audio Consoles and Cartridge Tape Equipment that has all the technical features and reliability of the most expensive equipment on the market. The only difference is in the cost of our equipment. It allows you to do well within your budgets.

Before you sign that purchase order for your new Consoles and Equipment, have your CE check out AMPRO. Financing available to qualified buyers. Call collect for details.



40 Input, 10 Channel Stereo Console



Stereo Recorder/Reproducer with Splice Finder Option

AMPRO CORPORATION

850 PENNSYLVANIA BLVD.
FEASTERVILLE, PA 19047
(215) 322-5100

National Equipment For Broadcasting Professionals

See us at Booth #812, NAB
Circle 161 on Reader Service Card

BM/SCA/TV

Transmit still TV pictures on the 67 kHz subcarrier channel for:

- instructional programming
- community services
- storecasting

Contact us for hardware specifications.

cv

Colorado Video Inc.
P. O. Box 928
Boulder, CO 80302
(303) 444-3972
TWX 910-940-3248
COLO VIDEO BDR

Pioneers in compressed video

Visit us at Booth 105 at the NAB Show

Circle 162 on Reader Service Card

NAB CHICAGO

located within a few minutes of the convention center, e.g. McCormick Inn.

The following listings do not comprise all the hotels in town—a recent count yielded some 127 hotels offering nearly 40,000 rooms—but as a representative selection it should prove helpful in making your advance plans:

Getting To Downtown Chicago

Chances are you will be arriving in Chicago by air at O'Hare International, the world's busiest airport, which is served from all over the country by Allegheny, American, Braniff, Continental, Delta, Eastern, North Central, Ozark, Piedmont, TWA and United Airlines, as well as by more than a dozen international carriers. The city's other gateway, Midway Airport, also handles various flights of Delta, Piedmont and Southern.

Meigs Field, located on a man-made peninsula just off-shore from McCormick Place handles private traffic plus various commuter and local service carriers such as Air Illinois.

Continental Air Transport runs a regular limousine service to downtown Chicago from O'Hare (\$2.60 one-way) and from Midway (\$3.00 one-way). Taxis run about \$10 one way from either O'Hare or Midway, and about \$2.50 from Meigs Field.

If you feel like splurging a little, Chicago Helicopter Airways, located in Concourse H-K of Terminal 3 at O'Hare operates regular service to Meigs Field for \$10.80 one way, and it's a dramatic introduction to the city.

Taxi rates are comparable to those found in other major cities, i.e. 50¢ for the first one-tenth mile, and 10¢ for each additional one-fifth, which means that the meter keeps clicking off 10-cent increments via a secret communication system it has with the wheels and the clock, all of which is totally unverifiable by the passenger anyway!

When you arrive at McCormick Place, be certain to pick up your complimentary copy of BM/E's **Chicago Survival Guide**, the latest in our continuing series of guides to convention cities. Supplies were limited in Las Vegas last year, but our subsequent Atlanta Survival Guide, prepared for the NAFMB Convention was more widely distributed and very well received.

The Chicago edition will serve you as a program guide for the convention, as well as an invaluable source book chock-full of shortcuts and insider's tips all aimed at making your stay in Chicago as rewarding as possible. In the meantime, make your reservations early!

BM/E



Disco use challenges a cartridge... that's why Stanton is the overwhelming first choice of disco pros

Discotheques represent one of the most grueling professional situations for a pickup that can be imagined. Not only must the cartridge achieve a particular high level of sound excellence, it must do so in the "live" environment of back cueing, slip cueing, heavy tracking forces, vibration and potential mishandling... where a damaged stylus means much more than lost music, it means lost business.

The Discotheque is a commercial venture. It must have as little "down time" as possible... that is why disco operators look for durability and reliability in their equipment. And, that is why leading dealers and professional distributors recommend the Stanton product for this purpose.

Stanton has two cartridges eminently suited to Discotheques, both designed with optimum ratios of vertical stylus force, compliance, stylus shank strength... the calibrated 681SE, which possesses superb audio performance, and the more modest 500AL. Both are tough. Both perform beautifully, and dependably. And that's what a Discotheque needs.

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

Write today for further information to:
Stanton Magnetics, Inc. Terminal Drive,
Plainville, New York 11803.



STANTON

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

Circle 163 on Reader Service Card

full-time **KGBS-AM**, Los Angeles 50,000 Watt transmitter . . . **Multi-point Distribution Service (MDS)** will be utilized to deliver pay-TV programming to viewers in Memphis, TN and New Orleans, LA beginning early this year . . . **Scientific-Atlanta** from has completed arrangements for a 15-year loan for \$6 million the Equitable Life Assurance Society . . . **Data Communications Corp.**, oper-

ators of the Broadcast Industry Automation System (BIAS), have opened an "Instruction and Training School" to provide courses for new station personnel unfamiliar with the BIAS system, refresher courses and in-depth training . . . The **National Video Center** has joined the Videotape Production Association.

The first Canadian high power VHCM (AML) system, purchased by Alberta Government Telephone Co. from **Theta-Com** was placed in operational service within 30 days after

being ordered . . . Two new continuous-wave operated room-temperature aluminum gallium arsenide injection lasers and a continuous-wave operated injection laser system have been announced by **Electro Optics and Devices, RCA Solid State Div.**

Teleprompter Corp. now has pay-CATV service operational in 24 cable systems serving 447,000 subscribers and during December 1975 introduced Home Box Office to seven of its systems . . . **Owensboro Cablevision** and its parent organization, Owensboro On The Air, Inc., have initiated the first pay-TV earth station in the Midwest comprised of an Andrew's earth station antenna package and Jerrold's Scramble/Descramble System.

WNGE-TV, Nashville, began broadcasting 24 hours a day, six days a week on Dec. 31, 1975 . . . **Deluxe Laboratories** has initiated Pickup Express Processing Service from Chicago to Hollywood with free pickup and delivery and 48-hour turnaround. For information call Media Air Cargo 312-649-9337

Teleprompter Manhattan CATV now has live, color cablecast facilities for its public access channels . . . **The Anixter-Pruzan Field Showroom**, a specially outfitted van, is now making calls on CATV systems, telephone and communications firms and electrical utilities around the nation.

F&B/Ceco has a new repair service facility for all editing, projection and laboratory equipment at 1041 N. Highland, Hollywood . . . **The Practising Law Institute** has released "Current Developments in Copyright Law-1975" course handbook, a two-volume set. For information contact the PLI at 810 7th Ave., NY, NY 10019, 212-765-5700.

People

Ronald H. Fried has been elected President and Chief Executive Officer of International Video Corp., Sunnyvale, Calif. . . . **Thomas J. Cel** has been named President of Digital Graphics Inc., a Rockville, Md. based technology firm specializing in, among other things, computerized graphics.

William H. Butler has been named President and Chief Executive Officer of Commercial Electronic Inc. (CEI) . . . **Shigehiko Hori** has been appointed President of JVC America by Victor Co. of Japan . . . **Nyal D. McMullin** has been elected President of Consolidated Video Systems.

Steven A. Bell, General Manager of WLVI-TV, Boston, has been elected Vice President of Kaiser Broadcasting

Lawrence M. Ryan has been elected a Vice President of Conrac.

\$19⁹⁵ NEW
3/4" U
60 MINUTES
ea. **VIDEOCASSETTES**

30 Min.	\$15.50
20 Min.	\$13.95
10 Min.	\$12.00

GUARANTEED RECONDITIONED AND NEW VIDEOTAPE

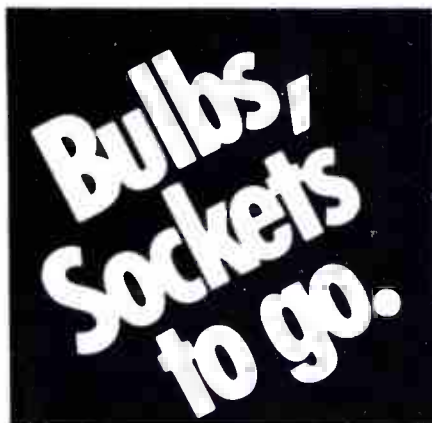
ALL FORMATS • LOWEST PRICES

Studio Tape Exchange Inc.

Nancy Gordon (212) 265-3740
366 West 46th Street
New York, NY 10036

Renée Ross (213) 466-8101
6424 Santa Monica Blvd.
Hollywood, Ca. 90038

Circle 164 on Reader Service Card



We're now national distributor of sensational new OSRAM HMI bulbs.

And still the country's biggest in-stock source of GE and Sylvania bulbs and sockets for studio, theater, tv and A/V. Now plus Leecraft sockets, too.

We specialize - we've got it all for you!
Send for 108-pg. stage/tv Lighting Handbook (50¢ mail and handling, please).

Nationwide service for over 25 years.
Same-day shipment anywhere in US.

Rush delivery in Manhattan.

(212) JUDson 6-1620

BARBIZON ELECTRIC

426 W. 55, NYC 10019

Circle 165 on Reader Service Card

From 10 to 1000 or more tapes a day

you get clean like-new erasures on a Model 70.

Designed for professional and commercial users concerned with quality and production speed, the Model 70 pays for itself quickly on both. Erases up to 7" reels, audio cassettes and video cassettes. Unique belt transport is key to rapid erasure cycle.



GARNER INDUSTRIES
4200 N. 48 St.
Lincoln, NE. 68504
402/466-1816



Circle 166 on Reader Service Card

A COMPACT WITH ALL THE OPTIONS



The ROBINS/FAIRCHILD Model 659A, EVERBERTRON, is a complete dynamic reverberation system designed to enhance Broadcast/Production or Recording Studio sound.

With solid state electronics and high performance electro-mechanical delay lines in two separate enclosures, the EVERBERTRON is compact in size yet loaded with features. Continuous reverb controls, VU metering, selectable delay times, 3 band equalization and mute control . . . to name a few. All in 1/2 rack space.

EVERBERTRON! Designed to fit your bank and priced to fit your budget.

FOR COMPLETE DETAILS, CALL OR WRITE SAM JONES.

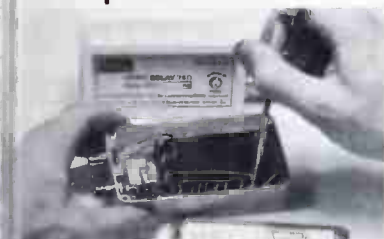
ROBINS & FAIRCHILD

A Robins Industries Corporation
Austin Boulevard, Commack, N.Y. 11725
(516) 543-5200

Circle 167 on Reader Service Card

Speed Up Your SWITCHERS

NEW Video Delay replaces cable



MATTHEY TYPE No. UN097

FEATURES

- 75Ω Passive Delay
- Adjustable Delay without Switches
- 3ms Trim by Screwdriver Adjustment
- BNC Connectors
- Video Performance
- Delay Range 15ns min. to 665ns max.
- Replaces up to 437ft. of coax.

Television Equipment Associates, Inc.

WILL PEGLER 516 • 628-8068

Box 1391 • BAYVILLE, N. Y. 11709



Circle 168 on Reader Service Card

FEBRUARY, 1976—BM/E

NEW LIT

For copies of these literature offerings, circle number for appropriate items on Reader Service Card.

A four-page product information bulletin, EPD MCA 5.06, details an **automatic on-line television image enhancer**. The bulletin lists features, specifications and ordering information for the series 6000 image enhancer. Corning Glass Works **250**

Bulletin No. 292 outlines the features of a new **audio coupler**, Model No. 395P1, which interconnects the standard 1/4-in. phone plug to the mini 9/64-in. plug. Switchcraft **251**

New product bulletin No. 293 highlights a **subminiature phone jack series** which measures 5/16 × 11/16-in. The Micro-D Jax features molded box construction which locks internal parts in place. The terminal configurations are offered in 2-conductor shunted, printed circuit or solder lug styles. Switchcraft **252**

A six-page leaflet describes ways to **protect records** from deterioration through the use of the Lencoclean record cleaning system. Uher of America, Inc. **253**

A revised and expanded handbook on optical characteristics of cathode ray tube screens is offered by the Electronic Industries Association (EIA). The formal title of the 236-page edition of the popular "phosphor book," JEDEC Publication No. 16-C is **Optical Characteristics of Cathode Ray Tube Screens**. This revision, the first since August 1971, updates the phosphor data to include the latest registrations as well as incorporated materials relating to new types of phosphor screens, new color limits, and new measurement techniques. To order, send \$22 (per copy) to Standards Sales Office, EIA, 2001 Eye Street, N.W., Washington, D.C. 20006.

A 16-page condensed catalog covers **high voltage vacuum components and instruments**. Major specifications for vacuum interrupters, vacuum contactors, and high voltage instruments are listed. ITT Jennings **254**

Application Note 192, **Using a Narrow Band Analyzer for Characterizing Audio Products**, is available free of charge and shows how to use low-frequency wave and spectrum analyzers to measure distortion, fre-

continued on page 86

We guarantee the unique individually tested

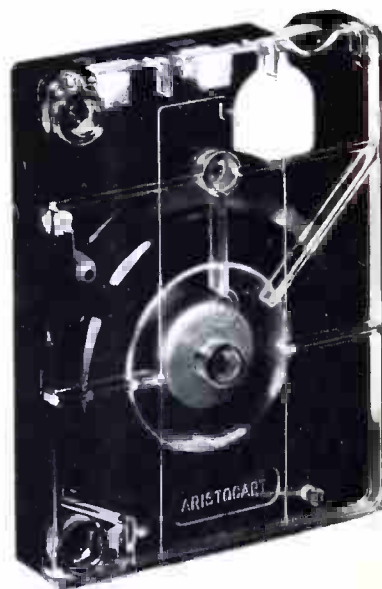
ARISTOCART

will deliver a consistently higher standard of voice and music reproduction than you'll get from any other cartridge on the market.

SPECIFICALLY:

Aristocart's exclusive internal guidance system delivers reel-to-reel fidelity — 20Hz to 15kHz — for the life of the tape. Phase stability is better than 90° to 12.5kHz with any properly aligned machine. Wow and flutter have been minimized.

Every Aristocrat cartridge is factory tested before shipment for phase and frequency response. We **replace at our expense any cartridge which fails to perform within areas indicated.**



believe your own ears

Switch to

ARISTOCART

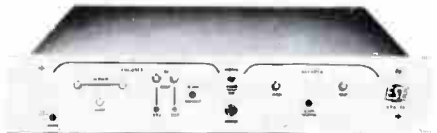
A DIVISION OF WESTERN BROADCASTING LTD.
505 Burrard Street, Vancouver, Canada V7X 1M6
Tel.: (604) 687-2844

Distributors: U.S.A. — McCurdy Radio Industries Inc., Buffalo, N.Y. — IGM, Bellingham, Wash. CANADA — McCurdy Radio Industries Ltd., Toronto, Ont. — E. A. Varah Ltd., Vancouver, B.C. GREAT BRITAIN — Selkirk Communications Limited, London, Eng. AUSTRALIA — Syntec Electronic Distributors, Pty., Castle Cove, N.S.W.

Circle 169 on Reader Service Card

EBS

Encoder/Decoder SYSTEM



\$250



THE ESE EBS-76 WITH AUTOMATIC GAIN CONTROL, efficiency, economy and specifications that meet or exceed all basic FCC requirements.

ENCODER FEATURES

- Output level to +18dBm balanced into 600 ohms.
- Automatic 22.5 second timing. (Adjustable)
- Switching of both sides of program line.
- Crystal controlled tones.
- Remote control capability.
- Reliable C-Mos circuitry.
- Stereo line switching available.
- Valid closed circuit testing with single switch.

DECODER FEATURES

- Automatic Gain Control makes tone levels equal from all sources — accepts any input from 100mv to 5v without adjustment.
- Built to work with existing EBS radio.
- Derives tones from speaker or tuner output.
- Adjustable delay.
- LED's on PCB indicate each tone received for easy adjustment.
- PLL-linear and C-Mos IC's for reliability.

FCC type-approval pending. Kit version may require certification of performance by station engineer. **WRITE, WIRE OR CALL TODAY.**

505½ CENTINELA AVENUE • INGLEWOOD, CALIFORNIA 90302 • (213) 674-3021

Circle 170 on Reader Service Card

MC MARTIN announces LOW FM MONITOR PRICES

FM MODULATION TBM-3500B



with STEREO or SCA (TBM-2200A or TBM-2000B)\$2,625.00
 with STEREO and SCA (TBM-2200A & TBM-2000B) 3,950.00
 for "OFF-AIR" drive, add the LL-35B 180.00

FM MODULATION and FREQUENCY TBM-3700



with STEREO or SCA (TBM-2200A or TBM-2000B)\$2,810.00
 with STEREO and SCA (TBM-2200A & TBM-2000B) 4,135.00
 for "OFF-AIR" drive, add the TBM-2500C 533.50

Compare features, prices and see us at Booth 609, NAB/76

McMartin

4500 South 76th Street Omaha, Nebraska 68127 (402) 331-2000 telex 048-485

Circle 171 on Reader Service Card

NEW LIT

quency response, wow and flutter, signal-to-noise ratio and cross talk of high-quality audio products. The 16 page brochure discusses various types of distortion that occurs in audio equipment; methods of measurement are shown. Hewlett-Packard Co. 25

A 12-page booklet highlights **safety equipment** for CATV systems, telephone companies and electric utilities. Products from a number of safety equipment manufacturers are featured. The guide references safety equipment from aerial bucket hardware to wheel chocks. Anixter-Pruzan 25

A guide to training and informational programs in the video format known as the **Video Bluebook** catalogs over 5,000 programs for video users by publisher, title and subject classification, indicating the form in which each program is available. There are also 500 suppliers of video services listed in the directory. Programs for business, government and industry account for half of the subjects in the bluebook. General interest subjects that are business-related represent the other half in the 370-page directory. The guide is available from Knowledge Industry Publications, 2 Corporate Park Drive, White Plains, N.Y. 10604. The cost per copy is \$29.50.

A technical bulletin reports on **low cost doubly-balanced mixers** for communications systems, navigational aids, quality laboratory test equipment and other wideband signal processing applications. The 4-page bulletin provides performance specifications of the model CM-1 as well as theory of operation, complete instructions for use as a balanced modular (bi-phase) amplitude modulator, attenuator, phase detector and pulse modulator switch. Vari-L Co. 25

A 24-page product directory and show form catalog is available on **digital multimeters, voltmeters, thermometers, differential voltmeters, calibrators, ac and dc standards, programmable power sources, power supplies, frequency synthesizers, timers and frequency standards, electronic counters, automatic test equipment and voltmeter accessories.** John Fluke Co. 25

An 8-page brochure describes **cabinets, small cases, racks, consoles and electronic desks** in various combinations of sizes, styles and colors. Optima Scientific-Atlanta, Inc.

A 53-page booklet, ET-1300, contains descriptions, electrical specification diagrams and photographs of the line of CATV **broadband communi-**

tions equipment, including solid-state trunk and distribution amplifiers, multi-taps, modules, power supplies, floor and outdoor passives, pilot carrier generators, and a new series of op line filters. GTE Sylvania 259

supplemental list updates all prices a professional motion picture equipment catalog, No. 10, which is available free. Alan Gordon Enterprises 260


4-page brochure describes a time de synchronization system which automatically locates cue points and controls sync of any two quad or int-track video and multichannel audio tape recorders. Using the SMPTE edit code, some Dual Cue/synchronizing applications are illustrated in test and block diagrams. IBCO 261

Mini-Documentary—Serializing TV News, by Stanley Field, is a 2-page mini handbook written to show the local (and/or independent) television station how to produce this program format. Equipment and techniques for undercover shooting and recording and other news-gathering situations are explained. The advantages and disadvantages of film and videotape are detailed. Aerial photography, crane shots, infrared, miniaturization techniques, and undercover tips are outlined. Written or transcribed air scripts for eight mini-documentary series are also offered for study. The price is \$12.95 hardbound. Tab Books, Blue Ridge Summit, PA 214.

Need a down-to-earth book on logic and digital electronics, but can't hack the formulae found in most texts? Digital/Logic Electronics Handbook, by William L. Hunter, offers explanations and how-to examples for the experimenter. Basic digital circuitry, logic symbols and their meanings, integrated-circuit logic devices, and digital light-emitting diode circuits are covered. The chapter on logic applications delves into simple digital instrument build-its. \$9.95, hardbound. Tab Books, Blue Ridge Summit, PA

Teachers and aspiring students of the film and TV industries may find Motion Picture Market Place a useful reference work. The directory provides the names, addresses and telephone numbers of production and equipment services and professional talent nationwide, including Puerto Rico and the Virgin Islands. Some listings: agencies, literary and talent agents, business managers, camera equipment, major studios and music, props and scenics. Pre-publication price is \$11.50 plus tax. Foothill Press, Box 951, Pasadena, CA 91101.

**AUTOMATIC
RELEASE**



**SERIES 3000
CART MACHINES**

LOW POWER CONSUMPTION — less than 45 watts; no damage to your tapes.

STANDARD FEATURES — headphone jacks, transformer output, FET switching, remote control socket.

OPTIONS — all tape speeds, secondary and tertiary Cue tones, fast forward, mike input.

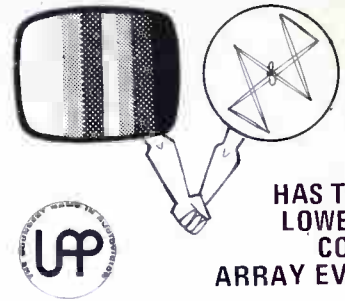
FULL RANGE OF MODELS — available in mono and stereo, record and playback, all cartridge sizes, desk and rack mounting.

Spotmaster[®]

**BROADCAST
ELECTRONICS, INC.**
— A FILMWAYS COMPANY —
8810 BROOKVILLE ROAD
SILVER SPRING, MD. 20910
301-588-4983 TWX 710-825-0432
CABLE "SPOTMASTER"

Circle 172 on Reader Service Card

COLORBARS & a VECTORSCOPE GO HAND IN HAND



**HAS THE
LOWEST
COST
ARRAY EVER**

- ★ The VM3 NTSC VECTORSCOPE
- ★ R/BS9 Complete NTSC SYNC GEN. (2 sets of outputs) with Genlock & COLORBARS GENERATOR
- ★ R/DB8 Driven Encoded COLORBARS GENERATOR
- ★ R/GB8 Standalone Encoded COLORBARS GENERATOR
- ★ R/CS2 NTSC SYNC GENERATOR (2 sets of outputs) with Genlock
- ★ All units are portable and rack-mountable, and include self-contained power supply.

Ultra Audio Products

BOX 921 BEVERLY HILLS, CALIF. 90213
(213) 276-2726

Circle 173 on Reader Service Card

Cut cart handling in half.



Model SF-1 Splice Finder: \$370.00
Model SFE-1 With Bulk Eraser: \$395.00

Our automatic cartridge tape splice finder is a real labor saver. It cuts handling time by up to 50%, allowing busy engineers and DJ's to do other jobs at the same time. This superior machine processes all NAB standard A, B, and C sized cartridges by locating tape splices and stopping the tape within one inch beyond the capstan. The automatic process eliminates the noise effect of recording over the splice, which is especially annoying to broadcast advertisers. A handy bulk eraser is added to the Model SFE-1 splice finder to conveniently save additional studio space. Each machine is a trim 16½" x 6" x 10" rated at 15 IPS, 117 VAC, 60 Hz., 250 watts. Ask about it.

UMC **SENSTROL DIVISION**
UMC ELECTRONICS CO.

460 Sackett Point Rd. North Haven, CT 06473

Circle 174 on Reader Service Card

BM/E CLASSIFIED MARKETPLACE

CLASSIFIED ADVERTISING RATES

DISPLAY CLASSIFIED ADVERTISING: \$32.50 per inch 1x; \$30.00 per inch 6x; \$27.50 per inch 12x. ALL OTHER CLASSIFIED ADVERTISING 35¢ per word; minimum \$3.50. BLIND BOX NUMBER: \$1.00 extra charge. Replies sent to address below will be forwarded to you. PAYABLE IN ADVANCE; send check with order. CLOSING DATE: 5th of 2nd month preceding issue date.

BM/E, Monterey and Pinola Avenues, Blue Ridge Summit, Pa. 17214 Phone 717/794/2191

EMPLOYMENT OPPORTUNITIES

PRODUCT MANAGERS

We offer several positions of responsibility in our organization for your product line marketing management talent. Proven experience earns exceptional income with corporate benefits, promoting our lines to dealer and national rep organizations. These opportunities require 50% travel, and present future growth potential in our growing operations.

BACKGROUND MUSIC PRODUCTS: Marketing background in sound contracting necessary.

AUDIO/BROADCAST PRODUCTS: Exposure to broadcast field practices and marketing essential.

Send resume in detail, giving salary requirement and references.

Roger Taylor

TELEX COMMUNICATIONS INC.
9600 Aldrich Avenue South
Minneapolis, Minnesota 55420

An Equal Opportunity Employer

Women will be considered equally with men.

HOME BOX OFFICE, A SUBSIDIARY OF TIME, INC. — THE NATIONAL TERRESTRIAL AND SATELLITE PROGRAM DISTRIBUTOR TO THE CABLE INDUSTRY, IS LOOKING FOR AN EXPERIENCED TV & AUDIO ENGINEER WITH BACKGROUND IN MICROWAVE, CABLE & PAY TV HARDWARE. DUTIES INCLUDE SIGNAL QUALITY CONTROL & INTERFACING WITH CABLE SYSTEMS. 30% TRAVEL IN THE NORTHEAST ANTICIPATED. SEND RESUME TO MR. GEORGE GILBERT, DIRECTOR OF NETWORK OPERATIONS, TIME/LIFE BUILDING, ROCKEFELLER CENTER, NY, NY 10020.

CHIEF ENGINEER, first class. Must know audio and FM stereo. Possible management of background music operation. Send resume and references to Box 276-1, c/o BM/E Magazine, Blue Ridge Summit, Pa. 17214.

EQUIPMENT FOR SALE

FOR SALE:

- 1 IVC 870 1" Color Video Recorder Editor
1 IVC 825A 1" Video Recorder — color
1 Spectra Vision Backspace for above
Good to excellent condition. \$7500 package, or best offer.
- 1 Sony VP 1000 Video cassette player — \$500.
- IRCA 25" Color monitor receiver — \$380.
- 130 3M 460 & 461 (IVC — Ampex Format — High energy tape) (½ hour and 1 hour reels) Good to excellent condition. Best offer.

Contact John E. Rock, Sun Life of Canada, Wellesley Hills, Massachusetts, Phone 237-6030.

AEL DFM Exciter and stereo generator. In excellent condition. Removed working for replacement by new generation equipment. Available immediately. Contact Dick Johnson, 1044 Westwood, Faribault, Minn. (507) 334-6735.

FOUR CONRAC MONITORS model CYB21. Excellent condition. \$750 each. Package price \$2,895 or best offer. Rod Hall, (213) 677-5575.

EQUIPMENT FOR SALE (Cont'd)

AVAILABLE:

Complete turnkey recording studio, midtown New York location. Possible long term lease on space and long term equipment lease, or outright equipment purchase. 5,500 sq. ft. studio fully equipped with 24 in-16 out Audio Designs and misc. musical instruments. Vocal booth.

Mixdown/screening room with ann. booth for voice over with 35 mm. and 16 mm. film projectors equipped for direct projection or CCTV for scoring. Complete set-up of several 35 mm. and 16 mm. film dubbers and recorders (Magna-Tech) including 4-track pickup recorder. All dubbers interlock with projectors.

Many film accessories such as synchronizers and splicers. Also small equipped voice studio with console and tape machines.

Three "live" echo chambers.

Box #276-1 for details

BM/E, 295 Madison Ave. NY, NY 10017

EEO EDITING SYSTEM — modified to SMPTE standards. Now operating in system with 2,000 B record and AVR-1 playback. Excellent inventory of 85 spare cards, spare control electronics and EEO generator. \$6500 or best offer. Rod Hall, 213/577-5575.

TV MOBILE UNIT — 40 ft trailer complete with eight PC-100 Norelco color cameras (tri-ax and digital), one Ampex VR-1200B videotape machine, one Ampex HS-100 slo-mo disc unit, Conrac monitors, Electro-Dyne audio console, and more. Twin Air conditioners. Tractor. Will sell in any configuration or equipment individually. Write: Television Enterprises, 2583 Cadadium Drive, Atlanta, Georgia 30345. Telephone: (404) 939-1549.

BROADCAST AND RECORDING EQUIPMENT: Scully, V.I.F. International, Metrotech, Langevin, Electro-dyne, Q.R.K., Micro-Trak, MRL, Nortronics, McMartin, U.R.E.I., E.V., A.K.G., Stevenson, Gately, D.B.X., Advent, Altec, Fairchild, Audio Designs, 3M, Magnecord, Telex, Inovonics, Nagra, Uher, Tape-A-Thon, Package Deals, Installations, Service, Request Flyer. Weigand Audio, Middleburg, PA. 17842. (717) 837-1444.

MICA AND VACUUM transmitting capacitors. Large stock; immediate delivery. Price lists on request. SURCOM ASSOCIATES, 1147 Venice Boulevard, Los Angeles, Calif. 90015. (213) 382-6985.

WHATEVER YOUR EQUIPMENT NEEDS—new or used—check us first. We specialize in broadcast equipment. Send \$1.00 for our complete listings. Broadcast Equipment and Supply Co., Box 3141, Bristol, TN 37620.

SPOTMASTER PARTS—24 hour service—repairs and rebuilding of your equipment. Franchised SPOTMASTER repair service. COMMUNICATION MEDIAS/BROADCAST COMPONENT DISTRIBUTORS, P.O. Box 54, Allentown, PA. 18105. (215) 437-0907.

For Sale. Television STL system Raytheon KTR 2 7 Ghz dual link for audio and video complete with antenna, trans. line and 8' x 12' reflector. Also TR 22 High Band color video tape machine. Write WXON-TV, Box 2020, Southfield, Mich. 48075 or call (313) 355-2901.

Broadcast mixer for remote out of studio programming. Can be used as inexpensive second console for college and small radio stations. D.J.s can now originate programming at home. Simultaneous mixing of two stereo phonographs, a tape machine and a microphone. Preets for all inputs with built in monitor headphone amplifier. Send for literature. \$325. Professional discount, use letterhead. G.L.I. Box 2076, DEPT BM/E, Brooklyn, N.Y. 11201. Phone: (212) 873-6992.

Solid state audio modules console kits, power amplifier kits, power supplies. Optal plug-ins, mic. eq. line, disc, tape play, tape record, amplifiers. Audio & tape bias oscillators. Over 50 audio products. Send for free catalog and applications. Opamp Labs, Inc., 1033 N. Sycamore Ave. Los Angeles, Calif. 90036. (213) 934-2566.

EQUIPMENT FOR SALE (Cont'd)

USED Broadcasting and recording equipment, audio and video. Write or phone for FREE list. Television Enterprises, 2583 Cadadium Dr., Atlanta, Georgia 30345. (404) 939-1549.

SPOTMASTER, FIDELIPAC, RUSSCO, ROH, ELECTRO-VOICE, OTARI, RAMKO, SCOTCH, STANSON, NORTRONICS, SHURE, SENNHEISER, TELEX, MAGNECORD AND VIKING are all items distributed and serviced by COMMUNICATION MEDIAS/BROADCAST COMPONENT DISTRIBUTORS, P.O. Box 54, Allentown, Pa. 18105. (215) 437-0607. "Sudden Service" our specialty.

AMPEX, SCULLY, TASCAM, all major professional audio lines. Top dollar trade-ins. 15 minutes George Washington Bridge. PROFESSIONAL AUDIO VIDEO CORPORATION, 342 Main Street, Paterson, N.J. 07505. (201) 523-3333.

One stop for all your professional audio requirements. Bottom line oriented. F.T.C. Brewer, Box 8057, Pensacola, Florida 32505.

EQUIPMENT WANTED

Used RCA TTU-30 UHF Transmitter tunable to Channel 50 preferred. R. Moffett, KOCE-TV, 15744 Golden West Street, Huntington Beach, Calif. 92647.

PROGRAM SERVICES

"FREE" CATALOG... Everything for the Deejay! Custom J.D.'s, Promos, Airchecks, Wildtracks, Books, FCC Tests, Comedy, and more! Write: Command, Box 26348-A, San Francisco 94126.

VIDEOCASSETTE RELOADING SERVICE. Reload your damaged ¾" videocassettes at a considerable saving. Call or write for a quote. All cassettes reloaded with new 3M tape. American Cassette Corporation Division of J.D. Ivey Corporation, P.O. Box 2751, Orlando, Florida 32802. (305) 843-8982.

INSTRUCTIONS

First phone through tape recorded lessons at home plus one week personal instruction in Washington, D.C., Atlanta, Boston, Detroit, New Orleans, Minneapolis, Seattle, Denver, Portland, Los Angeles. Proven results. Our 17th year teaching FCC license courses. Bob Johnson Broadcast License Training, 1060D Duncan, Manhattan Beach, Calif. 90266. 213-379-4461.

BUSINESS OPPORTUNITIES

NEW PATENTED MATV NEEDS PART-TIME INSTALLATION SUPERVISION YOUR CITY. I MADE \$200.00 PER DAY IN FEES. SEND RESUME: MELVIN COHEN, 1620 N. FEDERAL HIGHWAY, BOYNTON BEACH, FLA. 33435. ENCLOSE 13¢ ADDRESSED ENVELOPE.

PROFESSIONAL CARDS

Midwest Engineering Associates
Consulting Engineers

F.W. Hannel, P.E.
BSEE; MSEE

6934A N. University, Peoria, Illinois
61614
(309) 692-4233

RALPH E. EVANS ASSOCIATES
Consulting Telecommunications
Engineers

AM-FM-TV-CATV-ITFS

3500 North Sherman Boulevard
MILWAUKEE, WISCONSIN 53216
Phone: (414) 442-4210

Member AFCCE

ANNOUNCING:

THE MANUAL FOR THE THIRD REVOLUTION.

ENG/FIELD PRODUCTION HANDBOOK— GUIDE TO USING MINI VIDEO EQUIPMENT.

Electronic News Gathering is here today. It is being brought in by a flood of new mini-equipment—light-weight, high quality video cameras and videotape recorders.

It is the Third Revolution in TV, comparable to the quad videotape development of the 50's and the explosion into color of the 60's.

The ENG wave can only roll bigger and faster, but that is not all the new mini-equipment will do. It will generate a wave of instant, "anywhere" inexpensive documentaries, commercials, video for business and personal communications. Mini-equipment offers a new production technology: studios-without-walls, editing without engineers, professional results at amateur costs. This Electronic Field Production will be another video revolution.

This Manual is the first publication that describes the new mini-equipment in full detail, and provides a complete user's guide to both of the new technologies—ENG and Field Production.

This book is skillfully edited for the technical and non-technical reader alike; broadcasters and non-broadcasters. It's a great compilation of facts for the experienced hand, it's a primer for managers, directors, engineers and technicians looking at all electronic news and field production for the first time.

Ten big chapters: 1. the ENG/EFP revolution and where it's going 2. ENG systems in use 3. significance of all electronic systems 4. mini-portable cameras 5. portable videotape recorders 6. tape editors 7. time base correctors 8. microwave links 9. program audio and intercom 10. future developments.

**JOIN THE
REVOLUTION NOW
AND RECEIVE FIRST
COPIES OFF THE PRESS**



BME

BROADCAST MANAGEMENT ENGINEERING

295 Madison Ave. New York, N.Y. 10017

Please send () copies of ENG/Field Production Handbook at \$9.95 per copy.

Name _____

Address _____

City _____ State _____ Zip _____

Total Amount \$ _____

N.Y.S. Residents 7% Sales Tax _____

Total enclosed \$ _____

Foreign orders: add \$1 for postage & handling.

On the Air®

with a full range of high reliability

TV TRANSLATORS

TV TRANSMITTERS

TV AMPLIFIERS



21 Commerce Drive • Montgomeryville, Pa. 18936
(215) 368-2600 TWX 510-661-7265

Circle 182 on Reader Service Card.

EBS

COMPLETE PACKAGE

ONLY
\$295



Footproof Digital Logic Circuitry
Requires only 3 1/2 inches in rack
Crystal-Stabilized Encoder & Decoder
Status Indicators - Self Test Provision
No Troublesome Front Panel Adjustments

+14 DBM 600 OHM Bal. Output
Automatic Program Switching
Remote or Local Control
FCC Certified & Type-Accepted
2 CH. XTAL Controlled AM Receiver Avail.

INQUIRE ABOUT SPECIAL OPTIONS AND GROUP DISCOUNTS

RIVERS ASSOCIATES, INC.

P.O. Box 58 - Leominster, Mass. 01453
(617) 537-4821

Circle 176 on Reader Service Card

From 80 years of experience
comes the finest AM & FM
Broadcast Transmitters
ever manufactured.



CSI ELECTRONICS INC.

2607 River Road
Cinnaminson, New Jersey, 08077 Telephone: (609) 786-1060

Circle 177 on Reader Service Card

ADVERTISERS INDEX

Acrodyne Ind. Inc.	67
Akai America Ltd.	75
American Data Corp.	83
Ampro	83
Aristocart	83
Barbizon Electric Co.	84
Belar Electronics	12
Broadcast Electronics	17, 87
Cablewave Systems	31
Camera Mart	58
Canon, U.S.A. Inc.	63
Capitol Magnetic Products	15
Central Dynamics Ltd. ...	23, 35, 43, 78
Chyron Telesystems	36
CMX Systems	3
Cohu Electronics	7
Colorado Video Inc.	63
Comprehensive	37
Computer Image Corp.	65
CSI Electronics	90
Datron, Inc.	8
Datavision Video Products	46
Dynair Electronics, Inc.	66
Eastman Kodak	9
ESE	86
Garner Electronics	84
Grass Valley Group	5
Harris Corp.	33
IGM, Div. of NTI	39
Ikegami U.S.A.	16
Inovonics, Inc.	81
International Tapetronics Corp.	14
Jampro Antenna Co.	38
JVC Industries, Inc.	57
Lenco Inc., Electronics Div. ...	Cover 3
3M Mincom Video Products	21
McCurdy, Inc.	Cover 2
McMartin Industries, Inc. ...	22, 32, 86
Microtime, Inc.	61
Microtrak	80
Modular Audio Products, a unit of Modular Audio Div.	77
Moseley Associates, Inc.	47
Pacific Recorders & Engineering ..	39
Pentagon Ind., Inc.	82
Potomac Instruments	22
Rapid Q	80
RCA Broadcast Systems	26, 27
Recortec, Inc.	45, 74, 75
Rivers, Inc.	90
Robins Fairchild	84
Schafer Electronics Corp.	24
Scott Buttner—Coastcom. Div.	67
Shintron Co., Inc.	24
Shure Bros., Inc.	51
Sony Corp. of America	10, 1
Sound Technology	11
Sparta, Div. Cetec Corp.	11
Stanton Magnetics	81
Studio Tape Exchange	84
TeleMation, Inc.	53, 71
Television Products	71
Telex Communications, Inc.	87
Thomson CSF Labs, Inc.	21
Time & Frequency Tech., Inc.	61
T.V. Equip. Associates Television	83
Ultra Audio Products, Inc.	87
UMC Electronics	87
Varlan, Elmac Div.	21
Video Tape Co., The	81
Videomax Corp.	1
Videotek, Inc.	5
Ward Beck Systems, Ltd. ...	Back Cover
Wilkinson Electronics	3

BM/E READER SERVICE CARD February 1976 Issue

Use this FREE postpaid Card for more information on the products described.

NAME _____
 TITLE _____
 STATION OR COMPANY _____

ADDRESS _____
 CITY _____ STATE _____ ZIP _____

PHONE # () _____

Tell us what you like or dislike about the issue _____

What articles would you like to see? _____

100-249: ADS 250-299: LITERATURE 300-399: EDITORIAL

100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119
120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139
140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159
160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179
180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199
200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219
220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239
240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259
260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279
280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299
300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319
320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339
340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359
360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379
380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399

Use until May 31, 1976

BM/E READER SERVICE CARD February 1976 Issue

Use this FREE postpaid Card for more information on the products described.

NAME _____
 TITLE _____
 STATION OR COMPANY _____

ADDRESS _____
 CITY _____ STATE _____ ZIP _____

PHONE # () _____

Tell us what you like or dislike about the issue _____

What articles would you like to see? _____

100-249: ADS 250-299: LITERATURE 300-399: EDITORIAL

100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119
120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139
140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159
160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179
180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199
200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219
220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239
240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259
260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279
280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299
300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319
320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339
340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359
360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379
380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399

Use until May 31, 1976

COMPLIMENTARY SUBSCRIPTION QUALIFICATION CARD

Would you like to receive BM/E Yes No

Name _____ Title _____

Station or Co. _____

Street _____

City _____ State _____ Zip _____

If this is an address change, affix label

My company is: (Please check ALL items which pertain to your firm.)

- AM Station(s)
- FM Station(s)
- TV Station(s)
- Instructional TV or CCTV
- Campus Limited Radio
- ATV Facilities
- Telephone Company
- Program Sources
- Recording Studios
- Government
- Consultant
- Lawyer
- Distributor/Manufacturer dealer
- Other (please specify) _____

Are you responsible for more than one station or facility?
 Yes No

Is this your business address? Yes No

If not, please give us your business address below so that we can avoid sending duplicate copies.

Name _____

Station or Co. _____

Street _____

City _____ State _____ Zip _____

Your signature _____

Date _____

FIRST CLASS

Permit No. 665

Duluth, Minnesota

BUSINESS REPLY MAIL

NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

POSTAGE WILL BE PAID BY



Broadband Information Services, Inc.

P.O. BOX 6058

Duluth, Minnesota 55806



FIRST CLASS

Permit No. 665

Duluth, Minnesota

BUSINESS REPLY MAIL

NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

POSTAGE WILL BE PAID BY



Broadband Information Services, Inc.

P.O. BOX 6058

Duluth, Minnesota 55806



FIRST CLASS

Permit No. 665

Duluth, Minnesota

BUSINESS REPLY MAIL

NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

POSTAGE WILL BE PAID BY



Broadband Information Services, Inc.

P.O. BOX 6056

Duluth, Minnesota 55806



DID YOU KNOW - - - - -

That Lenco Has A Complete Line of Quality Video Terminal Equipment on The Shelf For Immediate Delivery?

DIGITAL COLOR SYNC GENERATORS

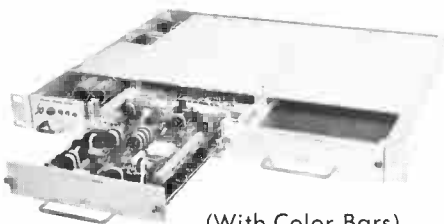


(With Dual Outputs)



(RS-170 or Helical Genlock)

NTSC COLOR ENCODERS



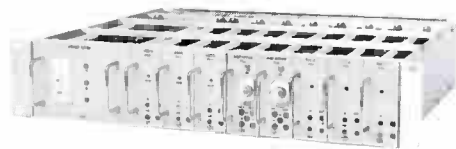
(With Color Bars)

COLOR STABILIZING AMPLIFIERS

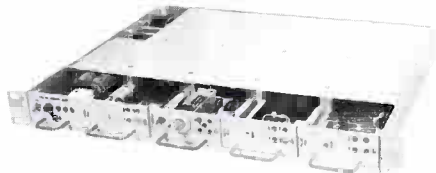


(Video AGC & Chroma Control)

VIDEO, PULSE, SUBCARRIER DISTRIBUTION



8 Unit Frame



4 Unit Frame

VIDEO PRESENCE DETECTOR



(A-B Automatic Video Switch)

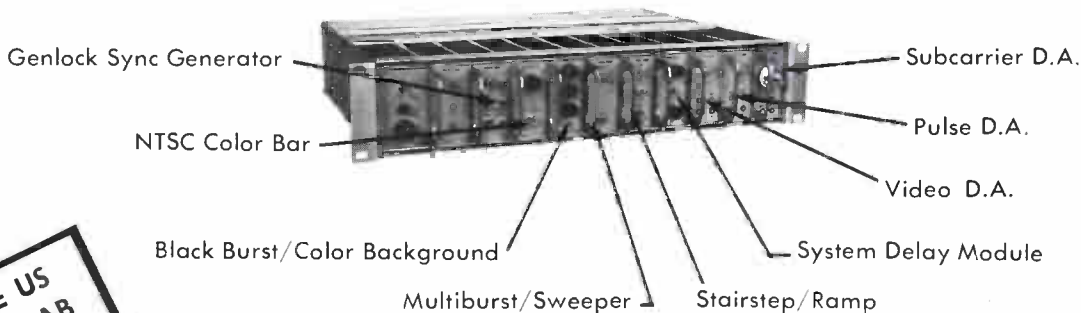
BLACK BURST/BAR DOT GENERATOR



(Valuable Stand Alone Unit)

300 SYSTEM

(9 of 29 Shown)



SEE US
AT NAB
CHICAGO
BOOTH
#707



FOR THE FIRST TIME—YOU HAVE THE CHOICE!
"QUALITY WITH RELIABILITY AT A REASONABLE PRICE"

LENCO INC. ELECTRONICS DIVISION
 319 W. MAIN ST., JACKSON, MO. 63755
 314-243-3147

460

SERIES



*Unmistakably
Ward-Beck*



Tomorrow's Technology Today.

Ward-Beck Systems Ltd., 841 Progress Avenue, Scarborough, Ontario M1H 2X4
Telephone (416) 438-6550. Telex 06-23469

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

Circle 179 on Reader Service Card