

FEBRUARY 1979

\$3.00

BME

BROADCAST MANAGEMENT ENGINEERING

Panels Of 100 Survey Of Broadcast Industry Needs

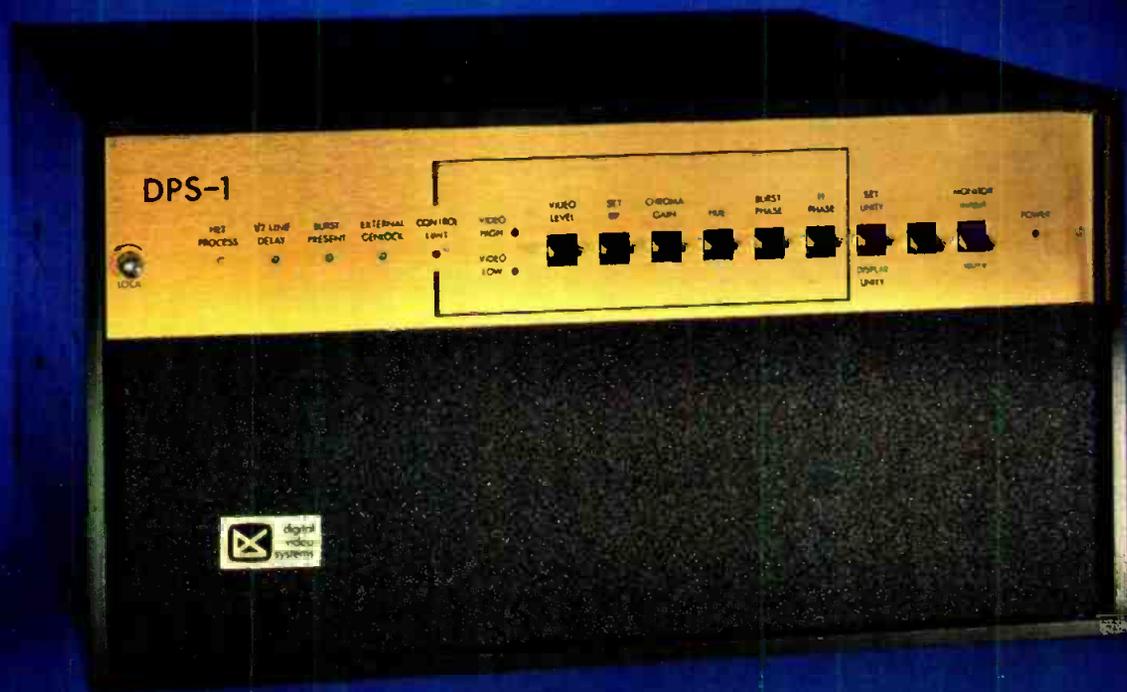
EARLY LINE NAB DALLAS

Special Report:

Digital Systems In Broadcasting

KUNH 2925853-NM-3781 A11
T W DENRPNK CE
316 CMU-U OF WASHINGTON
SEATTLE WA 98195
-AD

Introducing The Frame Store TBC. The DPS-1.



Over 3 million bits of random access memory, microcomputer control, digital comb filtering, and the basic DPS-1 Mainframe concept, all in one Frame Store TBC/Synchronizer, combine to create a truly significant advance in the state of the art.

A microcomputer provides 11 TV lines of hysteresis that eliminates motion discontinuities common in other systems whenever frames are deleted and added. It controls Freeze Frame or Field, periodically tests its own functions, and allows simple expansion for "optical effects".

Near perfect separation of luminance and chroma, for full bandwidth Freeze Frames and a picture that never shifts, are provided by the Picture Adaptive Digital Comb Filter.

Direct or heterodyne processing, a digital Vel Comp, DOC, and internal Test Signal Generator are all available in the DPS-1.

Ask your local distributor for a demonstration, using any of your 3/4 or 1 inch VTRs. Today!



Digital Video Systems, 519 McNicoll Avenue, Willowdale, Ontario, Canada M2H 2C9. Telephone (416) 499-4826.

Circle 100 on Reader Service Card

Editing is the essence of art.

A state of the art announcement coming next month.

cmx systems
ORROX

For further information, call or write Allan J. Behr,
ORROX Corporation, 3303 Scott Boulevard, Santa Clara, CA 95050
Phone: (408) 988-2000 Telex: 910-338-0554

Circle 101 on Reader Service Card



Digital technology in broadcasting is already bringing new images to the American audience. As more digital equipment is applied to television and radio engineering, further innovations are imminent. BM/E wishes to thank EUE/Screen Gems, NY, for use of their digital television equipment in producing this month's cover.

Publisher
Charles C. Lenz, Jr.
Editorial Director
James A. Lippke

Editor
David Hawthorne
Senior Editor
Robin Lanier
Senior Editor
Robert Rivlin
Associate Editor
James D. Uchniat
Assistant Editor
Eva J. Blinder
Creative Director
Gus Sauter
Director
Marketing Services
Richard N. Jones
Manager
Publication Services
Djuna Van Vort
Production Manager
Daryl Winer
Production Assistant
Aetna Dowst
Comptroller
Joseph W. Kutner
Reader Service
Ann Liewellyn
FCC Counsel
**Lovett Ford and
Hennessey, P.C.**

6 Broadcast Industry News

FCC grants test authority for AM stereo transmission: Plans for 11th International Television Symposium develop: CBS submits report to FCC critical of CP antennas for TV

25 Radio Programming & Production For Profit

There are a number of ways to make news pay off - here are some of them

28 BM/E's Program Marketplace

Profile of Automated Music Unlimited

33 TV Programming & Production For Profit

Capital Cities Productions: groups are producing the quality programming agencies say is so hard to find

41 Special Report: Digital Technology In Broadcasting Begins To Look Like A System

43 Digital Video Effects Provide Profound Changes

Broadcasters have the power to manipulate the image in ways never before possible

53 Digital Graphics Systems Become Super Versatile

The "granddaddies" of digital systems, digital graphics are now ultra-sophisticated

64 NBC Gets Closer To A Digital System

Studio 6B is mostly analog, but its accomplishments are largely due to digital devices

67 On The Way: Digital Audio With Great Gifts For Broadcasters

New technologies such as PCM laser discs and VTR adapters offer spectacular improvements

73 Designing Systems Using Dedicated Microcomputers

Peek over the author's shoulder as he programs a microcomputer

85 A Systems Approach To Transmitter Output Networks

A systems approach to broadbanding can result in a cleaner sound

93 BM/E's Panels Of 100 Survey Reveals Broadcasters' Greatest Areas Of Interest In Technology For 1979

Equipment manufacturers will answer broadcasters' needs in Dallas

104 FCC Rules & Regulations

Contest and promotion pitfalls

108 Speak Out

More on blankety-blank blanking

112 Great Idea Contest

Win a calculator - enter the Great Idea Contest

118 Broadcast Equipment

BM/E's survey of new products

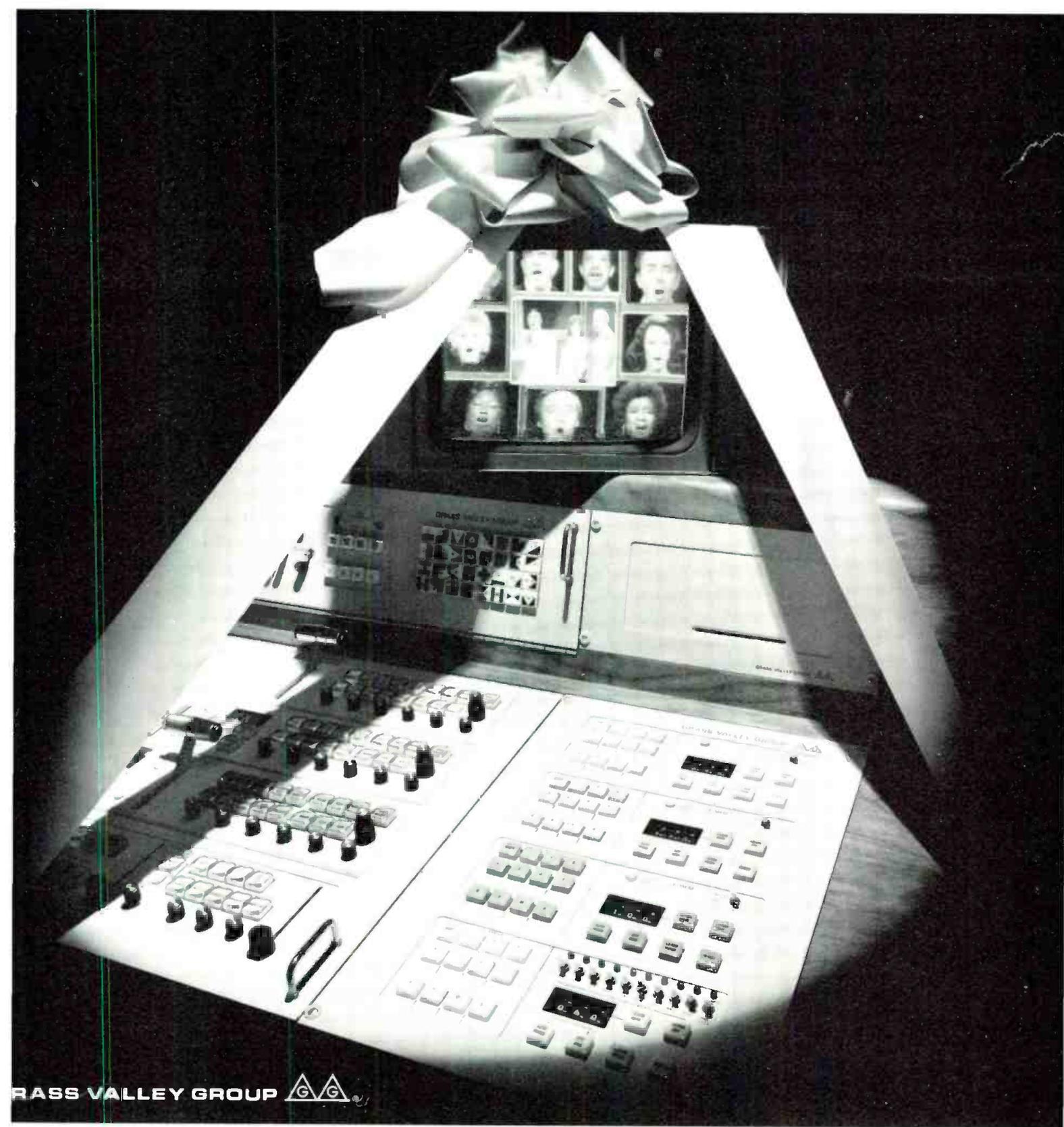
128 Business Briefs

BROADBAND INFORMATION SERVICES, INC.

295 Madison Ave., New York, N.Y. 10017, 212-685-5320, Telex: 644-001
Publishers of: **BM/E—Broadcast Management/Engineering**
BM/E's World Broadcast News



VBPA BME BROADCAST MANAGEMENT ENGINEERING is published monthly by Broadband Information Services Inc. (USPS 059280) All notices pertaining to undeliverable mail or subscriptions should be addressed to 295 Madison Ave., New York, NY 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 \$24.00 one year, \$36.00 two years. Foreign \$30.00 one year, \$48.00 two years. Air Mail rates on request. Copyright 1979 by Broadband Information Services, Inc., New York City. Controlled circulation postage paid at East Stroudsburg, PA.



PERFECT PACKAGE

Tie the world's most successful production switcher* to
 DVE (Digital Video Effects) and E-MEM (Effects Memory),
 and you have the most powerful teleproduction package
 available *today*.

More than
 ONE HUNDRED
 Series systems
 have been sold!

THE GRASS VALLEY GROUP, INC.

A TEKTRONIX COMPANY

Grass Valley Group Field Offices: WEST: 4419 Van Nuys Blvd Ste 307, Sherman Oaks, CA 91403 (213) 990-6172 • SOUTHEAST: 1644 Tullie Cir NE, Atlanta, GA 33029 (404) 431-4318 • NORTH CENTRAL: 810 W Bristol St, Elkhart, IN 46514 (219) 264-0931 • NEW ENGLAND & MID ATLANTIC: Station Plaza East, Great Neck, NY 11021 (516) 461-1311 • SOUTHWEST: 2639 Walnut Hill Ln Ste 143, Dallas, TX 75229 (214) 358-4229 • MIDWEST: 3585 N Lexington Ave Ste 374, Arden Hills, MN 55112 (612) 483-2594

www.americanradiohistory.com

BROADCAST INDUSTRY NEWS

FCC Grants Test Authority For AM Stereo Transmission

WSM, Nashville, and WGAR, Cleveland, have received authorization from the FCC to conduct over-the-air testing of the AM stereo system proposed by the Magnavox Consumer Electronics Co. Under the terms of the authorization, WSM and WGAR may announce the tests but may not use them for promotional purposes. During the test period, the two stations must comply with the requirements of Section 73.40 of the Commission's rules.

After completion, the two stations are to submit test results to the Commission for inclusion in the record of Docket 21313. It is expected that additional test authorizations will be granted to other proponents of AM stereo systems now under the Commission's consideration in Docket 21313.

Plans For 11th International Television Symposium Develop

Plans for the 11th International Television Symposium and Technical Exhibition continue to develop with the an-

nouncement last month by the symposium committee of topics to be discussed at the symposium and the names of more than 100 companies that have, so far, declared their intentions to present exhibits.

The Symposium and Technical Exhibition is scheduled to be held in Montreux, Switzerland, from May 27 to June 1, 1979. The event, which is held every two years, is expected to play host to more than 9000 persons intimately involved in international television, and more than 190 companies are expected to exhibit in the newly expanded convention facility.

The symposium committee, in an earlier announcement, explained that plans have been carefully drawn to insure that only the most important papers, on topics such as digital video, satellite distribution and broadcasting, cable television networks, and new uses of television receivers, be presented. Seventeen topic chairmen have been appointed to select a maximum of 45 papers from the hundred or more submitted. The symposium sessions have been designed so that "A" sessions provide the systems applications topics followed by round table discussions, and "B" sessions provide

papers on hardware related to the systems discussed in "A" sessions. Scheduling of the sessions makes it possible for an attendee to follow all aspects of a topic without schedule conflicts.

Travel arrangements for interested persons going to Montreux from North America have been organized through Swissair. Air fare for persons making arrangements at least 45 days in advance of their expected departure day could cost as little as \$440 roundtrip. Symposium officials recommend that interested parties contact Mr. Waldhorn at Swissair, 608 Fifth Avenue, New York, N.Y., telephone (212) 262-2041, or contact any Swissair office.

CBS Submits Report To FCC Critical Of CP Antennas For TV

CBS submitted a report to the FCC in late December claiming that CP transmission technology for television could significantly increase the levels of both tropospheric and ionospheric cochannel interference on some channels throughout the U.S.

After a protracted battle before the FCC in 1976, the Commission authorized CP on a permissive basis. At that time, CBS had made it known that it opposed such authorization since it felt that insufficient testing had been done to fully assess the impact of circularly polarized transmissions.

Since the "permissive" CP ruling was issued, about 10 such CP installations have gone on the air (see *BM/E*, November, 1978). Now, however, the CBS report, "A Comparison of Cochannel Interference Effects with Circular Polarization in the Television Broadcast Service," purports to show, through the use of mathematical models and test data, that further adoption of CP systems could lead to serious deterioration in some stations' signal quality.

The report suggests that tests be continued on CP for a period of six months to a year in order to determine the effects of CP under tropospheric and ionospheric characteristics that vary with environmental conditions. CBS is willing, according to the report, to actively support and participate in any all-industry effort to perform the rec-

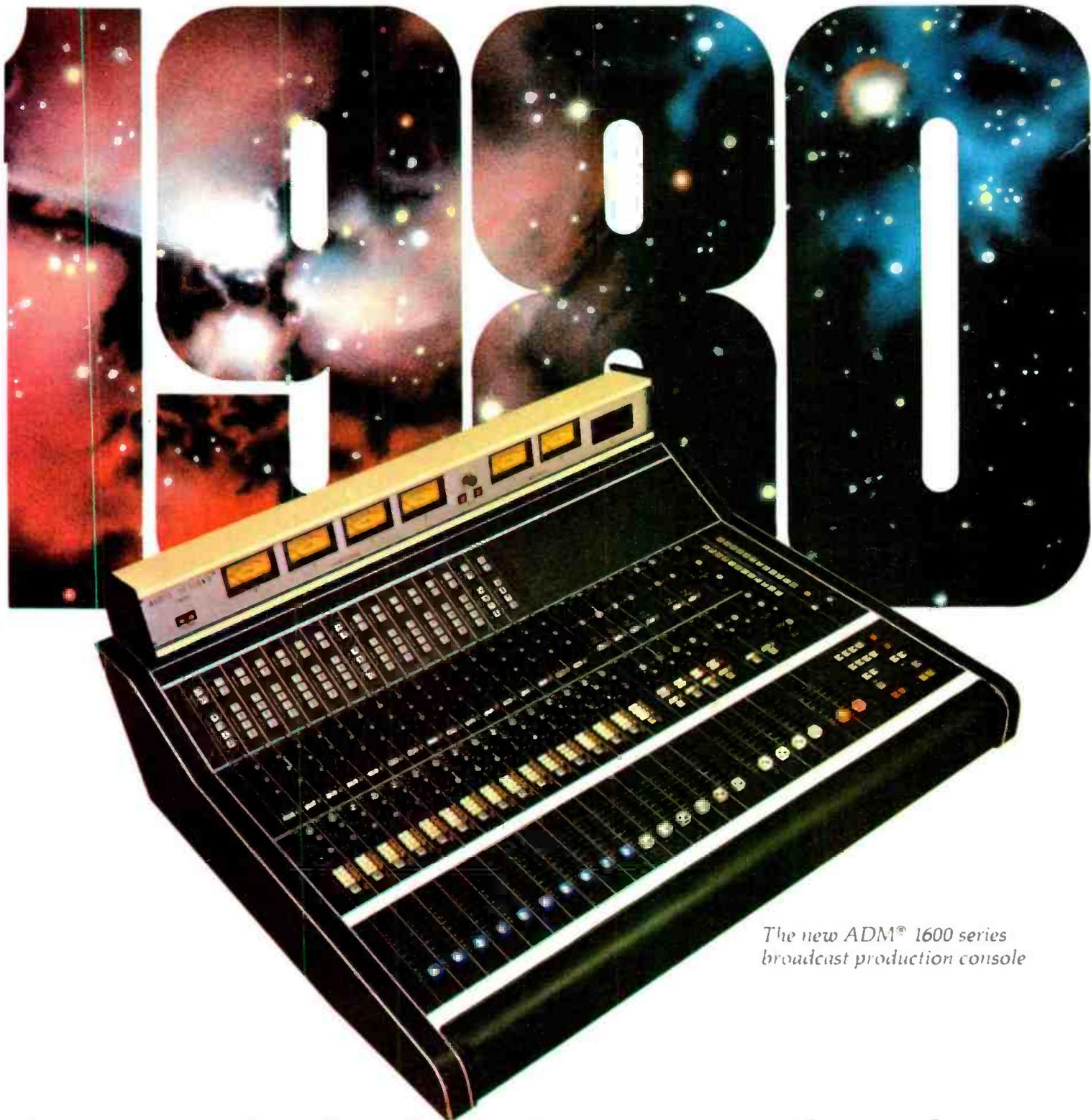
continued on page 8

NEC's First U.S. Transmitter Airlifted To WNE-TV Site

R. Dennis Fraser, corporate vice president and general manager of NEC's Broadcast Equipment Division, recently announced the purchase and installation of a 30 kW transmitter by WNE-TV, channel 31, Hanover, N.H. NEC manufactures a full line of TV and radio transmitters that have been installed around the globe, but this is the company's first delivery in the U.S.

WNE-TV's new transmitter was flown by helicopter from the foot of Mt. Scutney to the 3320-ft. summit. Station owner Paul Taft said, "All the gear went together like clockwork, thanks to NEC factory assistance during assembly." The WNE-TV staff was able to complete the FCC Performance Standards in two days. Taft commented, "Ease of operation and adaptability to remote control were important factors in choosing the NEC equipment for the hard-to-reach location."





*The new ADM® 1600 series
broadcast production console*

New! Audio for the '80's in a versatile package

Years-ahead design doesn't have to mean big in size. Audio Designs has created an entirely new generation of broadcast production consoles — engineered to anticipate the medium-market audio needs of the '80's.

The new ADM 1600 incorporates a wide range of features most requested by chief engineers around the country for medium-market broadcast and production facilities. It provides the same ease of operation and quality components found in our 3200 series and custom consoles. The ADM 1600 offers an array of capabilities for now and well into the next decade.

Our complete in-house design and manufacturing put so much quality into our audio consoles that we can confidently offer an exclusive 5-year warranty — the most comprehensive in the industry.

To learn more about how ADM can increase your audio capabilities, please contact Audio Designs and Manufacturing, Inc., 16005 Sturgeon, Roseville, Michigan 48066. Phone (313) 778-8400. TLX-23-1114. Southeastern Office: Phone (904) 694-4032.

AMPEX Distributed outside the U.S.A. by Ampex International Operations, Inc.

ADM

The Audio Company

News

ommended tests before extensive implementation of CP has occurred.

FCC To Explore Deregulation Of Domestic Receive-Only Stations

The Commission has begun an inquiry to examine the costs and benefits of its domestic satellite receive-only earth station regulatory program in order to determine whether the present program

can be improved or eliminated in light of the technical and policy changes that have been and will be occurring in satellite communications.

The FCC now requires a three-step process — frequency coordination, construction permit, and licensing — to be followed before putting a new station into operation. The Commission noted that frequency coordination, which assures that the station will not receive harmful interference, appeared to be the most time-consuming and perhaps the most expensive of the application procedures.

While the present regulatory program provides significant benefits, the Commission wishes to explore whether these benefits are worth the costs they impose upon both the applicant and the Commission. Possibly these benefits could be obtained at lower cost by modifying the present program. Alternatively, some users may prefer reduced benefits at lower cost.

Some of the matters on which the Commission would like comments include: the benefits and detriments of current policies; what changes should be made; should regulation distinguish between common carrier operated and non-common carrier operated receive only earth stations; and the extent to which international radio regulations affect the Commissions' flexibility to deregulate receive-only earth stations. At a later date, the Commission will release a comment and reply deadline.

More On AM Clear Channel And VHF Drop-In Proceedings

The Federal Communications Commission has adopted a further rule making notice in its ongoing AM clear channel proceeding by proposing to limit the coverage range of the existing 25 Class I-A clear channel stations in order to make room for additional AM stations. If adopted, the Commission's proposal would make room for an estimated 80 to 100 new unlimited-time stations in the Class I-A channels and some 25 additional unlimited-time stations that could be added to adjacent channels.

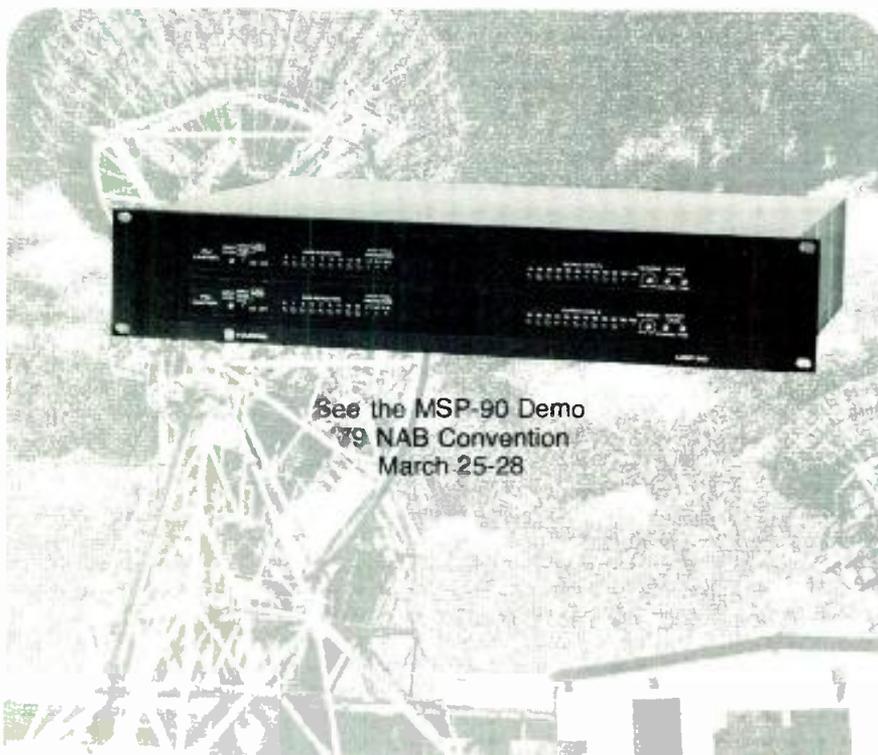
In opening the way for additional station assignments, the Commission hopes to settle the old issue of higher power for the dominant stations by maintaining the current ceiling of 50 kW power, and to look to additional AM and FM stations as the preferable means of providing for today's radio service needs, among the most prominent of which are enhancement of opportunities for minority ownership and operation of stations.

Chairman Ferris has suggested that new assignments be handled through either an auction or a lottery. The Commission proposes to accept applications for unlimited time facilities on the 25 clear channels which would serve either of the purposes set out in section 73.37(e)(2) of the rules, or merit waiver of those threshold requirements because they would help to remedy the dearth of minority-owned stations.

Section 73.37(e)(2) would permit the filing of applications which assure: that at least 25 percent of the area or population which would receive interference-free primary service at night from the

continued on page 10

From Harris Advanced Technology Comes the New MSP-90 Audio Processor



Harris advanced technology gives you high reliability with the new MSP-90. Select a combination of modules with the latest audio processing capabilities at surprising low prices.

Harris MSP-90 Audio Processor lets you set it and forget it.

Extensive LED metering...Over-drive indicator...Peak modulation adjustment 100% to 130%...RFI protection...Fully regulated power

supply ... eliminates problems with high line voltage or brown outs...12 dB of expansion...24 dB of compression...AM mono or stereo...FM mono or stereo...

Call or write Harris Corporation, Broadcast Products Division, Quincy, Ill. 62301 217/222-8200

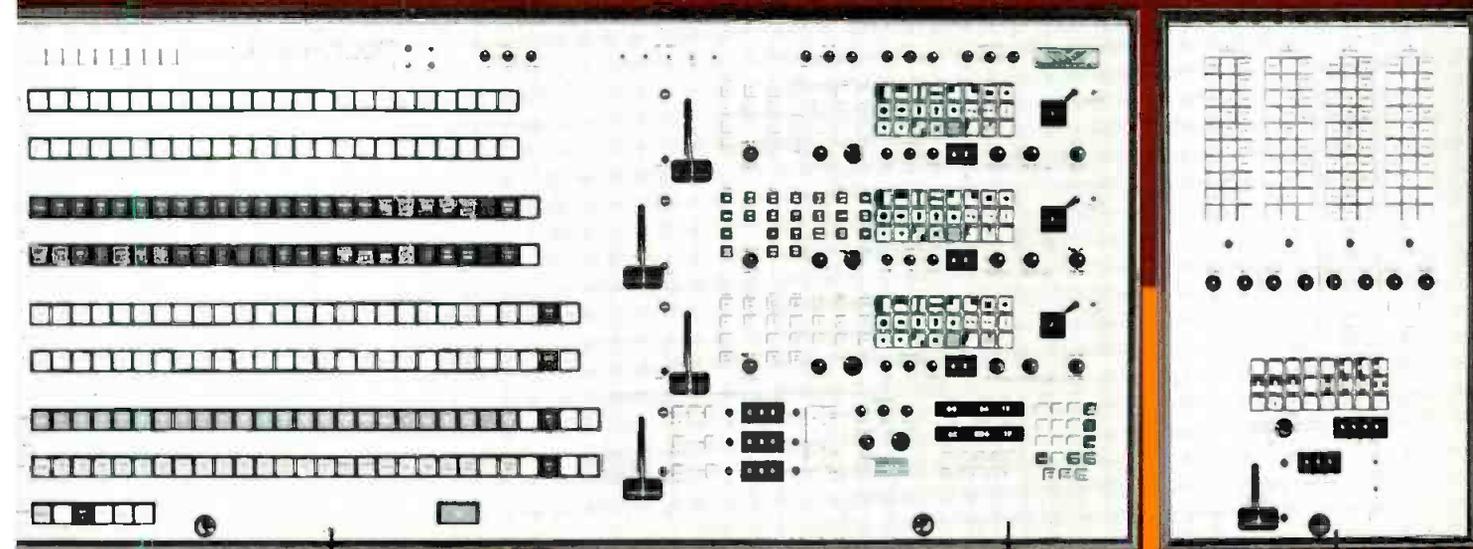


HARRIS
COMMUNICATIONS AND
INFORMATION HANDLING

Circle 102 on Reader Service Card

IF YOU DON'T HAVE 'SQUEEZOOM' YOU DON'T HAVE SWITCHING!

Vital has put it 'all together' for you!



VIX-114 VIDEO SWITCHER

- 12 to 24 Inputs and 4 to 10 bus systems
- Multiple keys on each Mix/Effect
- Auto Transition Control programmable in frames
- Interface for Editor and Computer control
- RGB or Encoded Shadow Chroma Key
- Varikey for Soft, Hard, or See-thru keys
- Digital controlled
- Many more advanced features fully described in the 114 Series brochure

PSAS Production Switching Automation System

- Controls the VIX-114 Series Switching Systems and SqueeZoom with smart microprocessor systems
- Autolearn or Endpoint Plotting with no time restrictions
- Unlimited floppy disk storage with 1875 events per diskette
- Editor Interfaceable
- Output controls for character generators, frame stores, camera shot box, and other TV devices
- Human engineered control panel fits in switcher control panel

SQUEEZOOM[®] is...

- Frame Synchronizer
- Frame Freezer
- Video Compressor
- Electronic Zoom
- Very special Optical type effects
- Avoid FCC violations with Blanking correction
- Up to 4 channels on one screen
- Ask to see Demo Tape

NTSC or PAL

MAIN OFFICE:

700 N.E. 53rd Ave., Gainesville, Fla. 32601
Phone 904/378-1581 TWX 810-825-2370



VITAL INDUSTRIES, INC.

A HIGH TECHNOLOGY COMPANY

DORRELL BEAVERS Midwest
2644 North Seventh St.
Terre Haute, Indiana 47804
Phone 812/466-3212

ROBERT MCALL Northeast
34 Autumn Lane
Hicksville, N.Y. 11801
Phone 516/735-0055

GORDON PETERS Southwest
P.O. Box 912
Arlington, Texas 76010
Phone 817/467-0051

ERIC KING Southeast
Fox Hill Road
Lynchburg, Va. 24503
Phone 804/384-7001

BARRY HOLLAND West Coast
7960 West Beverly Blvd.
Los Angeles, California 90048
Phone 714/497-4516

Circle 103 on Reader Service Card

proposed station did not already receive such service from an authorized AM station or an authorized FM station; that the proposed station would provide the community designated in the application with a first or second authorized nighttime aural transmission service, and no FM channel is available for use in the community; or that at least 20 percent of the area or the population of the community of license receives fewer than two aural services at night

from authorized stations and no FM channel is available for use in the community.

In recognition of the absence of minority-owned broadcast stations and the deficiency that this condition represents in fulfilling the public interest objectives of the nation's broadcast service, the Commission said it would give attentive consideration to the merits of waiver requests by minority applicants. The Commission said that it believed this waiver process to be the method most conducive to advancing the goal of enhanced minority owner-

ship and operation of broadcast stations, while avoiding exclusions of non-minority applicants.

Under the Commission's proposals, the clear channel stations would have their broadcast areas protected only within a certain radius — either within the 750-mile radius of their sky waves or within the 150-mile radius of their ground waves. Comments on the proposed 750- or 150-mile limitations are due April 9, 1979.

On the subject of VHF drop-ins, the FCC has instructed its staff to develop proposals for studies on the effects of terrain shielding and directionalized antennas on predicted interference losses caused by such drop-in assignments. At the same December meeting where the Broadcast Bureau argued for the clear channel rule making, they also argued to deny four VHF drop-ins on the grounds that they would hurt UHF and cause considerable interference in all proposed markets (except Salt Lake City).

Commissioners Ferris, Fogarty, Washburn, and Brown argued that the staff research did not convince them of any adverse impact. Specifically noting mountainous terrain between Johnstown, Pa., where channel eight is proposed, and Lancaster, Pa., which has channel eight, WGAL, Washburn said that the staff had not gone out to measure interference on the mountains, but rather had relied on computers in Boulder for the information.

As a consequence of the meeting, the bureau was instructed to come back in January with a proposal to make such measurements in channel eight fringe areas and to consider the impact of home directional antennas in reducing interference.

**A Portable Earth Station:
The First Of Its Kind**

An application for the "first of its kind" portable high performance satellite earth station transmitter/receiver has been filed with the FCC by United Video, Inc. (UVI), Tulsa, Okla.

The innovative equipment will make video broadcasting available via satellite from any location to any other location and will allow producing stations or companies to telecast an event live anywhere in the world that is accessible by air, rail, or semi-trailer truck.

The portable system, the first of several to be built by UVI and contracted by Collins Division of Rockwell International, will be available to all types of networks as a truly portable high quality and economical satellite transmit/receive device. The basic system will be self-contained with collapsible dish and microwave tower. It is available in three options, depending on the user's

continued on page 12

**The Great
Microphone
Sale . . .**

We want to introduce you to our prompt service. We are equally proud of our unconditional guarantee of satisfaction. We figured it would take savings like this to help you start doing business with us. 1134 stations save money on 75 broadcast supply and equipment lines. Shouldn't you?

AKG	List	Cash	Sennheiser	List	Cash
D190E	— \$80	— \$58	MD-421-U	— \$300	— \$213
D1000E	— 90	— 64	MD-441-U	— 418	— \$294
ELECTROVOICE		Shure			
635A	— \$66	— \$46	SM-7	— \$335	— \$227
667A	— 324	— 229	SM-11	— 66	— 47
RE10	— 120	— 85	SM-57	— 108	— 77
RE16	— 198	— 139	SM-58	— 138	— 98
RE20	— 330	— 233	SM-82	— 215	— 154

Luxo LM-41 Mike Arm - List \$39, Cash \$25.

Prices are cash - with - order,

UPS prepaid and expire 3-31-79.

Stations concentrating most of their purchases with us receive a significant benefit — write for details.

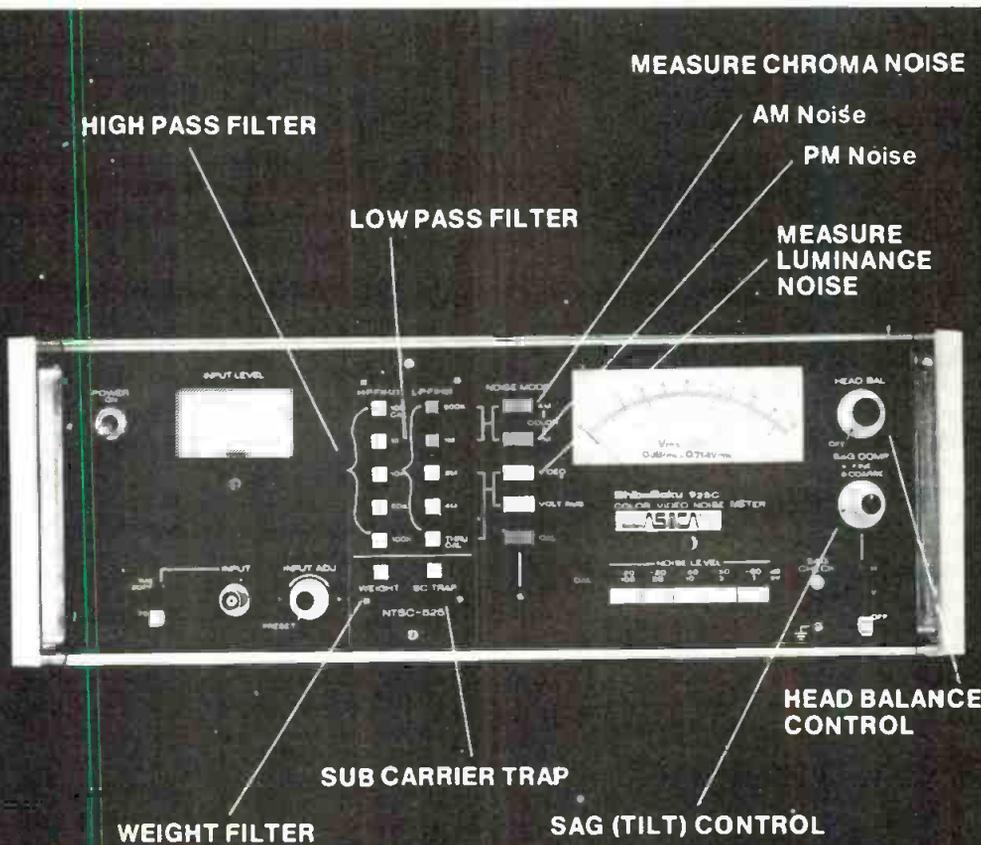


P.O. Box 590/Leesburg, Virginia 22075 Phone 703-777-8660

broadcast consultants corporation

Circle 104 on Reader Service Card

MEASURES CHROMA NOISE AND LUMINANCE NOISE



World's first Instrument to Measure Chroma Noise Generated in Color and Black and White Television Transmission Equipment, TV Cameras, VTRs, Video Disc Units, Digital Image Processors.

Measure the value of this unique instrument*, Model 925C Video Noise Meter, and you'll see why it has been purchased by a major USA network. It measures chrome band noise with a single color signal of desired level that contains both a sync signal and a color burst signal. Chroma noise can even be split into AM and PM components which can be measured separately. Unbalanced 2 head of VTR can be corrected for proper measurement.

A must for every station and production house in TV. Write for information.

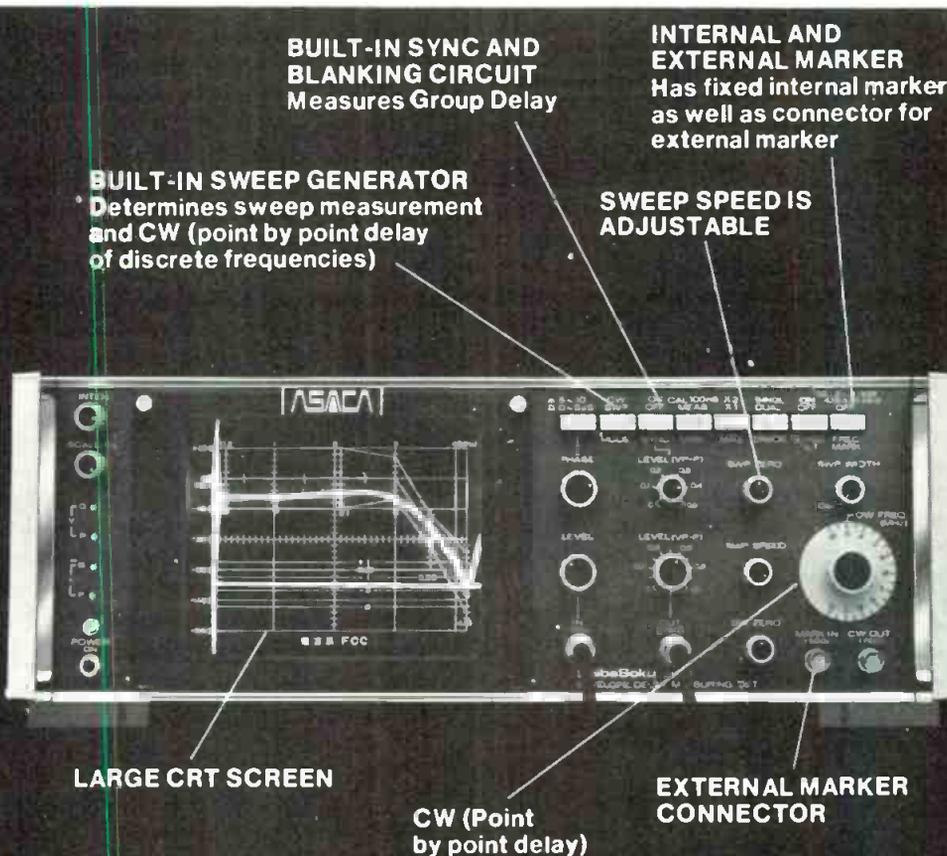
We create change

ASACA

ASACA CORPORATION OF AMERICA
1289 Rand Road, Des Plaines, Ill. 60016
Phone (312) 298-4380

*Product of SHIBASOKU—
sister company of ASACA

MEASURES GROUP DELAY IN TRANSMISSION SYSTEMS & LINES



At last! The Envelope Delay Measuring Set You've Always Wanted—But Which Technology Couldn't Develop Until now! Compare Performance With Equipment Selling For \$14,000.00. Our Price—Only \$6,500.00!

Our envelope Delay Measuring Instruments* feature large CRT screens, built-in sweep generators and allow spot frequency delay measurements from 200 KHz to 10 MHz. Check out Models 763 NA and the new 201-1. Both are NTSC or PAL compatible. The 201-1 adds a built-in sync generator and blanking mixer.

Don't you delay in getting full information. Write.

We create change

ASACA

ASACA CORPORATION OF AMERICA
1289 Rand Road, Des Plaines, Ill. 60016
Phone (312) 298-4380

*Product of SHIBASOKU—
sister company of ASACA

Circle 105 on Reader Service Card

needs.

The first option is a satellite uplink station for use in the continental U.S., equipped with a six-meter antenna and fiberglass shelter for electronics mounted on a flatbed trailer. All primary systems are redundant, including transmitters, high power amplifiers, low noise preamplifiers, and frequency agile receivers. The system also includes telephones (fixed and mobile), lighting, climate control equipment, all

tools, and test equipment to monitor performance. Multiple program audio channels (up to three) will also be available.

The second option, similar to the first, is configured to be transportable by air, ship, or rail. This option also utilizes developments in antenna technology which will make the six-meter antenna compatible with all satellites in the 4/6 GHz frequency bands.

The third option is a redundant, frequency agile, duplex terrestrial microwave system for use in areas where the station cannot be located adjacent to a

remote event because of frequency congestion.

UVI executive vice president Roy Bliss said that the package is "turnkey," and that his company will handle everything from transportation to turn-on and operation, including all frequency coordination, interference studies, and FCC or Intelsat approvals for each new location. Bliss also commented, "With enough of these systems, we can be practically anywhere in the nation on a 12-hour notice without the client every having to hassle arrangements with several different carriers or trying to figure out the most economical method to broadcast from a specific location." Bliss said that his company has been studying the need for such a system for two years, and a combination of upgraded technology and "very encouraging" conversations with major and special interest networks provided the incentive to develop the venture. Rates for the equipment and personnel package will vary greatly between one-time, one-location charges and multi-year exclusive use contracts.

Third Class License Exams Dropped

In a major deregulatory move in December, the FCC decided to no longer require tens of thousands of individuals who want to perform operations at AM and FM stations to take FCC examinations. The Commission's staff estimates that this move will save the FCC up to 17 person-years of effort in its field offices.

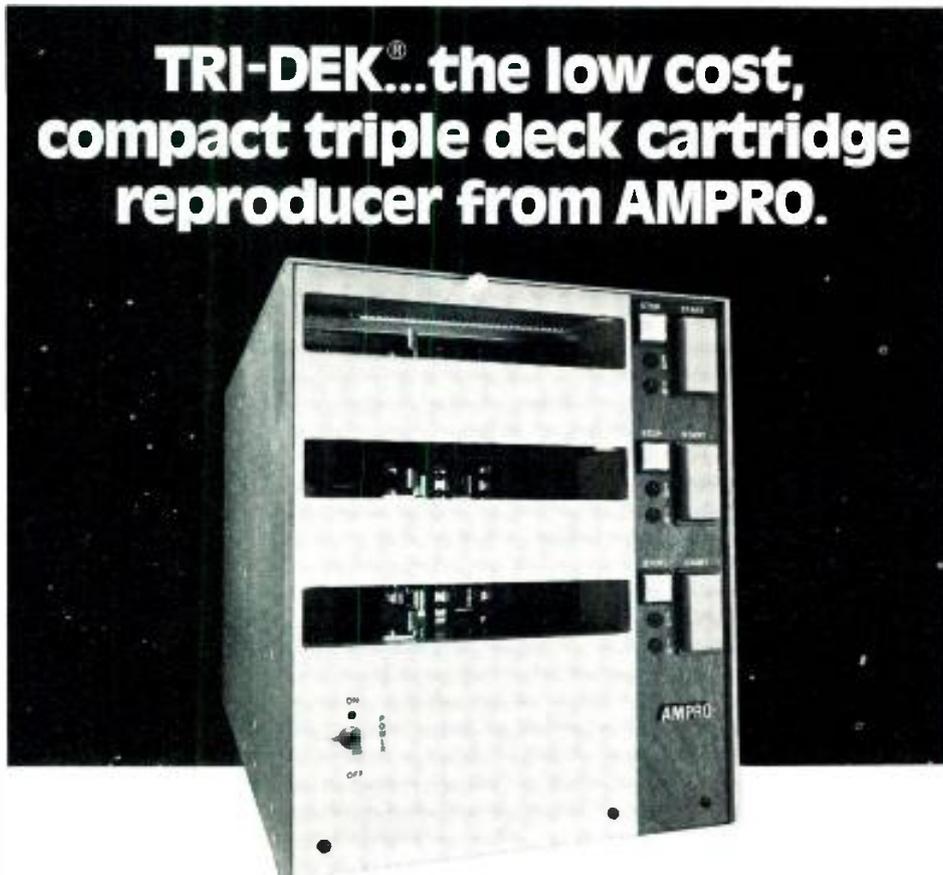
In the amendment to Part 13 of the rules, to become effective February 9, 1979, the Commission said anyone holding any class of commercial radio operator license, including the Restricted Radiotelephone Operator Permit, would be allowed to perform routine technical operations of all FM and virtually all AM stations.

Previously, most operators needed at least third-class permits endorsed for station functions, which could be obtained only after passing an FCC-administered examination. With the deletion of the broadcast endorsement, the Commission said, examinations would no longer be required and the endorsement would not appear on renewed third class permits. The FCC noted that this change did not apply to AM stations having a critical directional antenna array.

FCC Acts To Improve UHF

The FCC has issued a further interpretation of its antenna requirements for TV receivers which spells out a third condition under which a common UHF/VHF TV receiver antenna will meet the re-

continued on page 15



TRI-DEK...the low cost, compact triple deck cartridge reproducer from AMPRO.

It works harder for you with 4 exclusive features:

- 1. SELF ALIGNING PINCH ROLLERS** automatically adjust for mechanical misalignment. Prevents tape slew, poor stereo phasing and excessive tape wear common to all other cartridge equipment.
- 2. INDIVIDUAL PLAYBACK DECKS** share only the power transformer and motor.
- 3. TRANSPORT DECKS ARE PLUG-IN** and interchangeable for easy cleaning and alignment. NO wiring. NO soldering. NO mess!
- 4. CIRCUIT BOARDS ARE REAR ACCESSIBLE** for simple adjustment and replacement and interchangeable with Ampro single deck systems.

You get maximum reliability with a completely independent operating system for *each* deck...audio playback, cue detection, logic control and power supply regulation. Record option available.

Don't settle for less than Ampro perfection. Take a closer look for yourself. Send for a FREE brochure on TRI-DEK.



AMPRO BROADCASTING INC.

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

Circle 106 on Reader Service Card

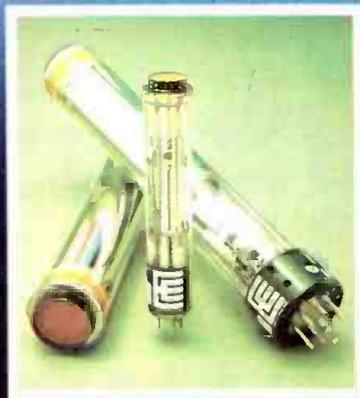
IMAGE INVOICE

At EEV...Your Image Is Our Business.

To meet this challenge, we developed the highest quality color camera tube available today.

You know it as Leddicon[®], a lead oxide tube which is the acknowledged best tube for your image.

We could list all the outstanding features and specifications, and many other good reasons why you should use our tubes, but...



[®]Registered Trademark of
EEV Lead Oxide Camera Tubes

the features *you* consider most important are...

Leddicons assure you dynamically faithful pictures over a long life, and they are rugged.

That is why Leddicons are used in virtually every country, and by the major networks and camera manufacturers worldwide.

For the very best image, call or write for all the facts about our Leddicon tube family.

Also ask about our Vidicons... the image standard for color telecine.



EEV, INC.

7 Westchester Plaza, Elmsford, NY 10523, 914-592-6050, TWX 710-567-1215

In Canada: EEV CANADA, LTD., 67 Westmore Drive, Rexdale, Ontario M9V 3Y6, 416-745-9494, TELEX 06-965864

In Europe: English Electric Valve Co. Ltd., Chelmsford, England CM1 2QU Tel: 0245 61777, TELEX 851-99103

Members of the GEC-English Electric Groups of Companies

Circle 107 on Reader Service Card

See us at NAB
Booth 326



NEC'S "drop-in" 30 KW UHF transmitter at WNNE-TV

Because of the mountainous nature of WNNE-TV's northern New England market, they needed to locate their tower and transmitter on Mt. Ascutney, 2,170 feet above average terrain.

It's 34 miles by road from their studio. The last mile to the transmitter site is a steep, narrow, twisting trail. Figure an hour-plus travel time in nice weather.

But from November to March the site is accessible only by snowmobile and snowshoe.

Due to the remote location of the transmitter, NEC's reputation for high reliability was an important factor in weighing what brand to buy. The use of high-powered transistors and high-gain tubes have reduced the total number of tubes used. Solid-state exciter/drivers offer additional reliability and high-standard color characteristics over conventional transmitters.

Size and service accessibility were also important to the Mt. Ascutney installation. WNNE-TV's transmitter had to fit in their half of a 42' x 24' building. NEC's plug-in modules simplify maintenance and eliminate the need for external cabinet racks. Sync/video ratio, white limit, visual and aural modulation depth and output power adjustments may be made at the front of the exciter. For reliability, performance, and price, it came down to NEC.

Let us "drop in" to discuss your transmitter needs.

Call us today at:

800-323-6656

In Illinois, call (312) 640-3792

NEC

Nippon Electric Co., Ltd.

NEC America, Inc.

Broadcast Equipment Division
130 Martin Lane
Elk Grove Village, Illinois 60007

Circle 109 on Reader Service Card

27813BED

quirements of Section 15.65(b).

The condition permits the use of a splitter external to the TV receiver provided that: (1) the splitter is permanently connected to the antenna terminals or to the terminals of the transmission line from the antenna; (2) the splitter is provided with four lugs designed to fit under the four screw terminals conventionally provided as the antenna terminals of the receiver and is arranged so that it can be connected in only one way; and (3) the splitter is arranged so that it is not possible to leave the UHF antenna terminals unconnected. Section 15.65(b) applies to all TV receivers manufactured after July 15, 1978.

The Commission has also recently terminated its inquiry to determine ways to improve the legibility of on-the-knob UHF channel displays and is concurrently adopting two inquiry notices that together will provide a more comprehensive framework for investigation of the question of UHF channel readout.

In General Docket No. 78-391 (an inquiry on improvements to UHF TV reception), the Commission will study the effect of the UHF channel readout on UHF viewing. In General Docket No. 78-392 (technical improvements to television receivers and certain transmission standards), the Commission will explore the possibility of requiring electronic tuning.

General Docket 78-392 will also inquire into the most economical way to improve television reception and to increase the use of the radio spectrum. The improvements under consideration in this proceeding have the potential for providing better reception of existing UHF TV signals and may permit the reduction of the UHF "taboos" (areas where UHF TV assignments are restricted because of interference problems). Comments are due by July 1, 1979.

In yet another action, the FCC has denied a petition by the Consumer Electronic Group of the Electronic Industries Association (EIA/CEG) for reconsideration of the Commission's August 1 order requiring reduction of the maximum UHF noise figure for television receivers from the present 18 dB down to 14 dB for all new model sets beginning October 1, 1979, and a further reduction to 12 dB effective October 1, 1982.

EIA/CEG argued that the imposition of a 14 dB limit on new models was arbitrary in view of the Commission's expressed intention to adopt new procedures for measuring TV receivers' noise figures, and that receiver man-

continued on page 18

A case for the MNC-710CP

5" Viewfinder gives you a clear picture of what you're shooting

Heavy application of LSI micro-circuits in pre-amp, processing amp, and encoding reduces weight and lowers power consumption

Fujinon 9-108 mm Macro Zoom Lens f/1.7 with automatic servo iris and zoom offers versatile performance (other lenses available)

Remote Production Control with genlock AC operation, master pedestal, servo iris control, R. B. pedestal, R. B. gain, intercom amplifier, plus cable compensator circuitry

Paint Box features master pedestal, servo iris control, R. B. pedestal, R. B. gain, and built-in intercom



NEC

DISTRIBUTED EXCLUSIVELY BY

cinema E products
CORPORATION

Call (800) 421-7486

24 HOURS—7 DAYS

Nippon Electric Co., Ltd.

NEC America, Inc.

Broadcast Equipment Division

130 Martin Lane

Elk Grove Village, Illinois 60007

2/81ABED

Circle 109 on Reader Service Card



Ikonami ML-11

“The real disaster is when your ENG camera doesn’t work.”



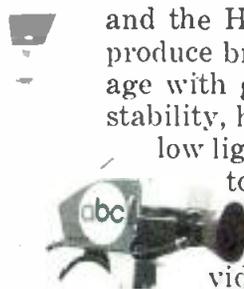
Talk with a broadcast TV news cameraman and that’s what he’ll tell you. And that’s why more TV news teams use Ikegami ENG cameras than all others combined. When you get only one chance to cover a news event, a dependable Ikegami is the one ENG camera to use.

ENG cameras are dependability and colorimetry. Everything else is icing on the cake. And the Ikegami combination of dependability with ruggedness, light weight, image stability, and simplified controls, is why all three networks used the Ikegami HL-33 and HL-35 ENG cameras at the 1976 Democratic and Republican Conventions. And why they were used at the 1976 Summer Olympics.

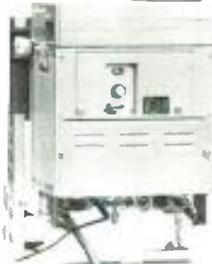
Now we have two cameras that are even better: the Ikegami HL-77 and HL-37. In the HL-77 we’ve done away with the 26½-lb backpack and tucked its functions inside the camera body — and still reduced the HL-77’s weight (less lens, but with viewfinder) to a pound less than the HL-35 head alone. The HL-77 weighs in at 13½ lb. In the HL-37 we’ve split the package so the head weight (without lens) is even less, and the shoulder-sliding process pack comes to 6½ lb.

Both cameras use three 2½-inch Plumbicon* pickup tubes, and f/1.4 prism optics. The viewfinder is 1½ inches. And everything else that made the HL-33 and HL-35 the real winners at the conventions is still there — just smaller and lighter.

Both the new HL-77 (the *Ike*)



and the HL-37 (the *Mini-mate*) produce broadcast-quality coverage with good color, brightness, stability, high sensitivity even in low light, and reduced lag due to bias light. Both can feed video and audio to a local or remote video tape recorder, or via microwave transmitter receiver for remote pickup.

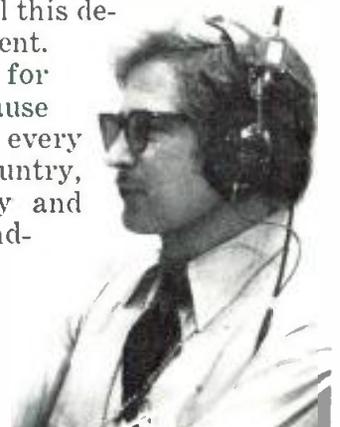


For microwave transmission from our HL-33 and HL-35 ENG cameras to a remote pickup point, we offer the Ikegami PF71 portable microwave relay system. This backpack unit transmits the video signal on the 13-GHz microwave

band; audio and command signals on the 950-MHz uhf band. Maximum range is about 1800 feet with omni antenna, 3700 feet with 60-degree horn, two miles with a 20-degree horn.

For the sound portion of the program, the Ikegami PFM-091 wireless microphone system is used to transmit program audio and receive intercom audio. It includes a compact transmitter and receiver worn on the belt, a miniature condenser microphone, and a small headset/whip antenna.

We’ve got the specs on all this dependable portable equipment. Just write for them, or ask for a demonstration. And because we have distributors in every major area across the country, you can get fast delivery and service. If you want dependability, you get it from Ikegami. More people do.



Ikegami

Ikegami Electronics (USA) Inc., 29-19 39th Ave., Long Island City, N.Y. 11101 • (212) 932-2577

Circle 111 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 μ V/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) 589-2662

Circle 112 on Reader Service Card

AM STEREO - NOW!



SYSTEM 16
BROADCAST
MIXER

WHY WAIT?

Our elegant mixer has a metered mono output, so you can convert to stereo now, but continue to broadcast in mono until FCC system approval. In the meantime, you'll be monitoring in glorious stereo sound — imagine the impact on a client entering your lobby! Why Wait? Start using stereo now.

\$8250 price includes 8 mixers (expandable to 16) with 3 metered stereo outputs and 1 metered mono output. Additional mixers \$365 each.

**BROADCAST
AUDIO ASSOCIATES**

11355 PYRITES WAY
RANCHO CORDOVA, CA 95670
(916) 635-1048

Circle 113 on Reader Service Card

News

ufacturers should be allowed one full year after adoption of such measurement procedures to comply with the 14 dB limit.

EIA/CEG objected to the ruling and argued, among other points, that the 12 dB limit was not technologically feasible and that it was not equitable from a systems standpoint, in that consideration should be given to increasing the field strength of UHF broadcasters.

The Commission said that it had noted in its report and order in this proceeding that lowering the maximum noise figure below 14 dB without reducing the selectivity would require significant new engineering work. Because of its recognition for the need of this new work, the Commission said it did not order an immediate lowering of the noise figure to 12 dB. The Commission emphasized that the 12 dB limit was essentially based on its forecast of future developments and added that in a fast-paced field such as electronics, it could reasonably expect to see improved noise figure performance without reducing selectivity — if design engineers concentrate on this objective.

NAB To Establish Investment Fund For Minorities

The National Association of Broadcasters' Task Force on Minority Ownership is seeking to establish an investment fund to assist minorities in purchasing broadcast facilities. Task Force chairman Donald A. Thurston, president of Berkshire Broadcasting Co., North Adams, Mass., stated, "By combining equity and guarantee commitments, the fund could generate transactions in excess of \$300 million."

Contributions will be solicited from individuals and corporations and will be supplemented by matching funds from the Small Business Administration. Donations will be tax deductible and contributors will receive full insulation from FCC multiple ownership rules. Two types of contributions will be solicited, direct (cash) and guarantee. Cash contributions will be for immediate use as equity or low cost loans, and a guarantee would be payable only in the event of a default by a minority firm whose loan had been guaranteed by the trust.

Thurston, who is also chairman of NAB's board of directors, said, "To assure the economic viability of stations owned by minorities, the fund also plans to provide training programs, technical assistance, and other supportive activities." The fund will be under the direction of a nine-member board of

trustees to be appointed by NAB's executive committee.

New Satellite TV Service For Hawaii

Satellink, Inc., has installed a ten-meter earth station approximately 18 miles from downtown Honolulu, and three commercial TV network affiliates in Hawaii, KGMB-TV (CBS), KHON-TV (NBC), and KITV (ABC), have installed a microwave relay system from the earth station site to their Honolulu studios. All three stations will use Satellink for daily importation of network news plus numerous post-season football telecasts and special events.

Robert N. Wold, president of Satelink, said the new enterprise will enable Hawaii's TV broadcasters to collectively save at least \$700,000 in the coming year, compared to current costs of utilizing satellite facilities leased by the Hawaiian Telephone Co. from international carriers. "As a result of the substantial cost saving," Wold said, "the three stations will undoubtedly increase the amount of satellite TV programming." Currently, each station expects to handle 333 hours of programming annually.

Wold said that the new earth station is equipped to receive as many as four TV programs simultaneously. During the initial months of operation, Satelink will be aimed exclusively at Western Union's Westar II satellite, although the earth station can be re-oriented, when desired, to receive signals from other domestic communications satellites.

In contrast to the current telephone company capability, which is limited to one signal each from San Francisco and New York, service via Westar II can be uplinked at New York, Atlanta, Chicago, Buffalo, Dallas, Los Angeles, San Francisco, and Seattle.

News Briefs

In the first five-week period in its fourth quarter survey of four major markets, TRAC-7 reported radio listening levels higher than those generated by the weekly diary. The reported increase reflected late afternoon and evening day-parts and male and female audiences under 25 years of age. . . . The NRBA has filed comments with the FCC in support of the Commission's proposal to exempt licensees from Fairness Doctrine requirements and personal attack rules resulting from "uses" by legally qualified political candidates as outlined in Section 315 of the Communications Act. NRBA argued that due to licensees' lack of control over political broadcasts, they should have "no obli-

continued on page 20

• INNOVATIVE TITLING GENERATORS



T-1024 SERIES



T-5002



T-1000A

TOMORROW'S PRODUCTS ... TODAY

Our T-1024 SERIES provides features and performance heretofore not available in an inexpensive system.

While compact, it boasts an 8 page memory expandable to 16 pages, auto line centering, character insert/delete, and a highly legible display of 24 characters per line using a 10 x 14 character matrix. **PRICED FROM \$1095.**

Our T-1000A is designed for simplicity of operation with outstanding features.

Fingertip controls provide access to a 16 page memory with simultaneous program and preview display channels, variable length roll, crawl, adjustable title window, and eight choices for character font enhancement. **PRICED \$3995.**

NEW!! Our T-2001 offers programming flexibility at an affordable price.

Select on a character line basis, three character heights, two character widths, black or white characters, and three choices of edging. The font library provides 128 characters including upper/lower case, and 32 graphic symbols.

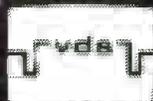
Special editing and control features provide operator programming flexibility and ease of operation. **PRICED FROM \$5995.**

NEW!! Our T-5002 encompasses all of the features of our other titling systems and more.

Imagine the features of the T-2001, along with a super high resolution dual font library, colored characters or background, and an independent edit channel which can double as a second program channel.

Optional expanded memory, two channel mix, and custom characters or logos makes the T-5002 an unusual titler. **PRICED FROM \$8995.**

SEE US AT NAB



Video Data Systems

... IN TOUCH WITH THE FUTURE

VIDEO DATA SYSTEMS, corporate office, New York, N.Y. (516-231-4400);
VIDEO DATA SYSTEMS, National Sales, Salt Lake City, UT. (801-363-0408);
International Sales, ADCOM ELECTRONICS, LTD., Ontario, Canada
(416-251-3355); CATEC AG LUZERN, Luzern, Switzerland (041-22-66-19).

News Briefs

gations due to material broadcast during such a section 315 'use'."

The **Broadcasters' Rally Against Overregulation**, organized by the NRBA and scheduled to take place in Washington on February 28, has received full support from the NAB. Presidents of state broadcasting associations plan to be on hand for the rally and are working to bring sizeable delegations with them. . . . President Carter has proposed a new shield law de-

signed to protect reporters, scholars, and their sources from searches by federal, state, and local law enforcement officers. If adopted, the law will, in effect, reverse last May's Supreme Court ruling on newsroom searches. The law will include exceptions in cases where a search is necessary to prevent serious injury to an individual, or when a person with protected information is believed to have committed a crime and the materials would serve as evidence.

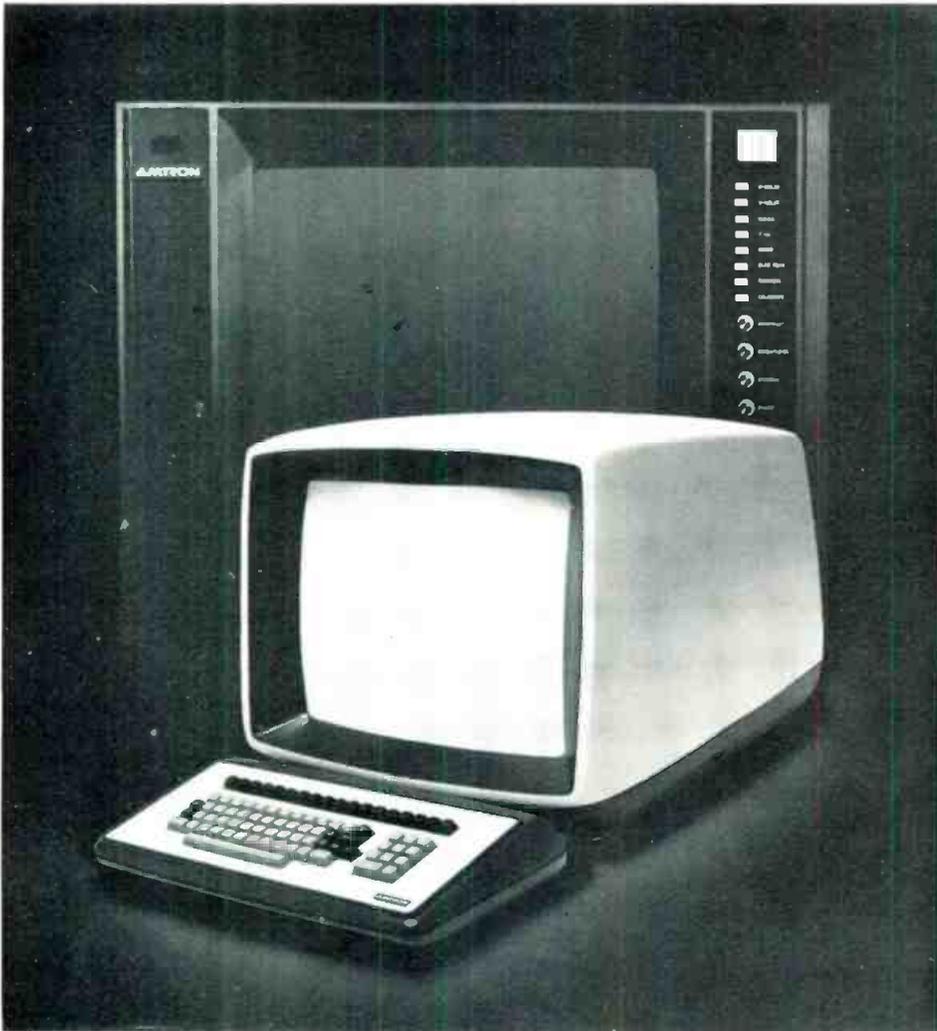
NAB president Vincent Wasilewski criticized the FTC's intrusion into

children's TV advertising and possible mandatory wording in ads for over-the-counter drugs and antacid products. Addressing the Advertising Club of Metropolitan Washington, D.C., Wasilewski said, "After many years of doubt and confusion, the constitutionally protected status of truthful commercial speech is beginning to be confirmed by the Supreme Court. . . . Ultimately, the right of advertisers to communicate freely with the public — in truthful and accurate terms that it will understand — will be upheld, even if we must see it through to the Supreme Court." Wasilewski emphasized that people's rights are affected by unreasonable restrictions involving our free enterprise system, our advertising structure, or our media.

NAB has also objected to the FCC's inquiry into the airing of PSAs, which is a result of the Public Media Center's petition to the FCC to require broadcasters to air more local public service announcements. NAB noted that broadcasters had to spend hours tabulating data to answer the FCC's questions in the proceeding that ensued, and now the Commission will have to spend hours analyzing the answers. NAB suggested that the FCC should view future proceedings, inquiries, and rule makings with consideration to whether the value of the benefits obtained by the proceeding will exceed the value of the time and money spent in gathering the information. . . . NAB has submitted a study to the FCC supporting the assumption that as the number of viewers declines, so does a television station's revenue. This conclusion refutes the NCTA's contention that there is no direct audience/revenue relationship.

A one-day **Digital Microwave Transmission Systems Seminar** will be held at Princeton University on February 27. Contact Bernard DeMarinis, 201-747-9303. . . . The fifth annual **Los Angeles Videoshow**, sponsored by *Educational & Industrial Television* magazine, will be held May 1 to 3. Contact Ellen Parker, 203-743-2120. . . . **Gerald R. Ford** will deliver the keynote address at **Visions '79, the National Cable Television Association's 28th Annual Convention and Exhibition**, to be held in Las Vegas, May 20 to 23, 1979. The convention will spotlight the rapidly growing cable/satellite network. For further information, contact NCTA, 918 16 Street N.W., Washington, D.C. 20006.

Thomas E. Bolger, chairman of NAB's Television Board of Directors and president of WMTV, Madison, Wisc., has appointed a committee to coordinate plans for the upcoming NAB public affairs meeting to be held in Washington at a date to be announced in the future. **BM/E**



Doppelganger.

Last year, we introduced the 7800-Series, high-resolution color video master monitors.

You loved them. So did the guys in computerized data display. . . if only we would boost resolution to 1000 pixels; circuitry to 7mHz.

Sure thing, we said.

So this year at NAB, we'll introduce the 7800-Series, master color video and data graphic display monitors.

You'll be glad you waited.

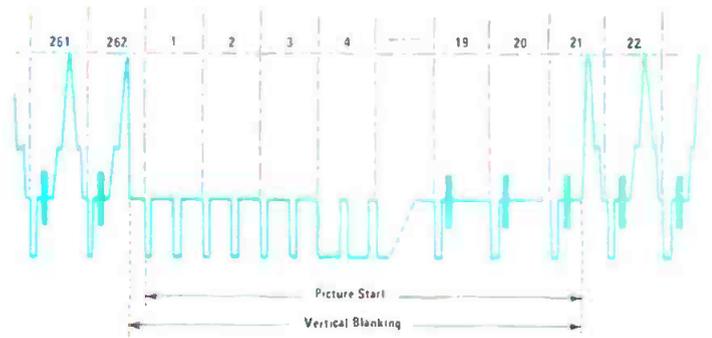
AMTRON

Amtron Corporation, Aptos, CA 95003
(408) 688-4445 TWX 910 598 8420

Circle 115 on Reader Service Card

**Marconi Television Interval Timer
Model 2920 measures the
following parameters**

**MARCONI has the
proven answer to
'H' & 'V' Blanking
Measurements**

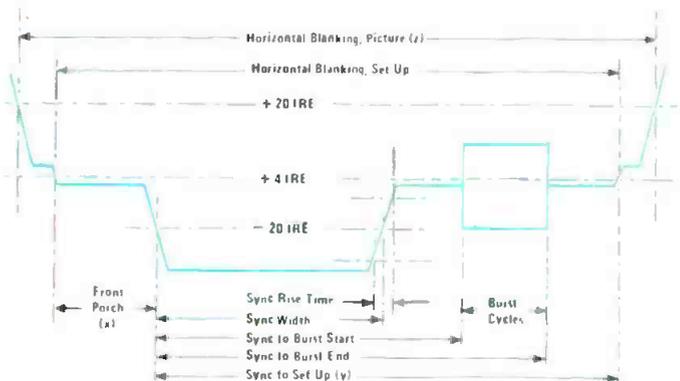


VERTICAL BLANKING MEASUREMENTS

- Total Vertical Blanking Interval
- Picture Start
- Equalizing Pulse Width
- Serration Width



- Fast accurate measurements at the touch of a button
- Results based on samples taken throughout the active field
- Blanking at set-up (+4 IRE) and picture (+20 IRE) measured independently to 10 nsec. resolution
- Vertical Blanking resolved to 1/10 line
- Printout from BCD output on command
- All functions may be remotely controlled for simple system integration
- Manufactured in U.S.A., domestic price \$4500



HORIZONTAL BLANKING MEASUREMENTS

- Set Up Blanking (+4 IRE)
- Picture Blanking (+20 IRE), (z)
- Front Porch, (x)
- Sync Width
- Sync to Burst Start
- Sync to Burst End
- Sync to Set-Up, (y)
- Burst Length in cycles
- Sync Rise Time

REFERENCE MEASUREMENTS

- Burst Amplitude in IRE
- Sync Amplitude in IRE

**See How Easily Timing Measurements
Can Now Be Made
At NAB Visit MARCONI Booth 322
Instrument Section**

mi MARCONI INSTRUMENTS
100 STONEHURST COURT, NORTHVALE, NEW JERSEY 07647
TELEPHONE: 201/767-7250 • TWX: 710-991-9752

Circle 116 on Reader Service Card

THE ONLY PROVEN EFP 1" VTR BOSCH FERNSEH... BCN-20

These EFP pros have proved again that the rugged BCN-20 is ready to travel anywhere and at any time... **that's Availability.**

and that the BCN-20 always performs under the most severe operating conditions and environments... **that's Reliability.**

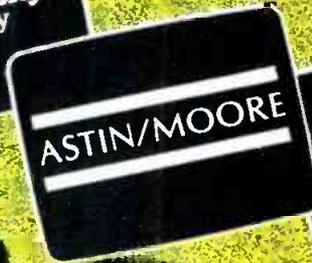
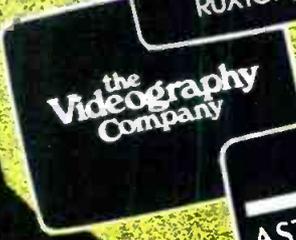
and that the BCN-20 consistently produces broadcast quality tapes... **that's Stability.**

And in the field, the BCN-20 performs assemble and insert edits and provides color playback verification without a TBC, yet in the studio the BCN-20, with a TBC, can go On-Air... **that's Flexibility.**

This real world experience proves that the Bosch Fernseh BCN-20 is compatible with your EFP requirements. We invented the system that guarantees compatibility between portable and studio 1" VTR's. It's the BCN-20.

These EFP pros have been operating more than 60 BCN-20's for over 90,000 hours. BCN-20's & BCN-50's the portable BCN-20 field produced tapes can be played back on studio BCN's.

You don't have to wait for 1" VTR compatibility!
BCN-20 the B-format



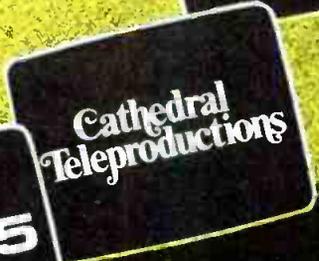
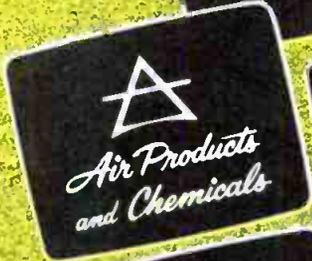


More than 125 BCN's are operating in the U.S. today, and over 650 worldwide.

We are adding new VTR's to the compatible BCN family. The BCN-5 is the only ENG portable 1" cassette VTR available today, and 25 pounds light.

The BCN-100 is our new random access multiple 1" cassette VTR system for station On-Air operations. You can continue to rely on Bosch Fernseh for the best and latest developments in video tape machines.

For a hands-on demo of the BCN-20 or more information, write to: Bosch Fernseh, 279 Midland Avenue, Saddle Brook, New Jersey 07662 or call: New Jersey 201/797-7400 Houston 713/688-9171 Los Angeles 213/649-4330



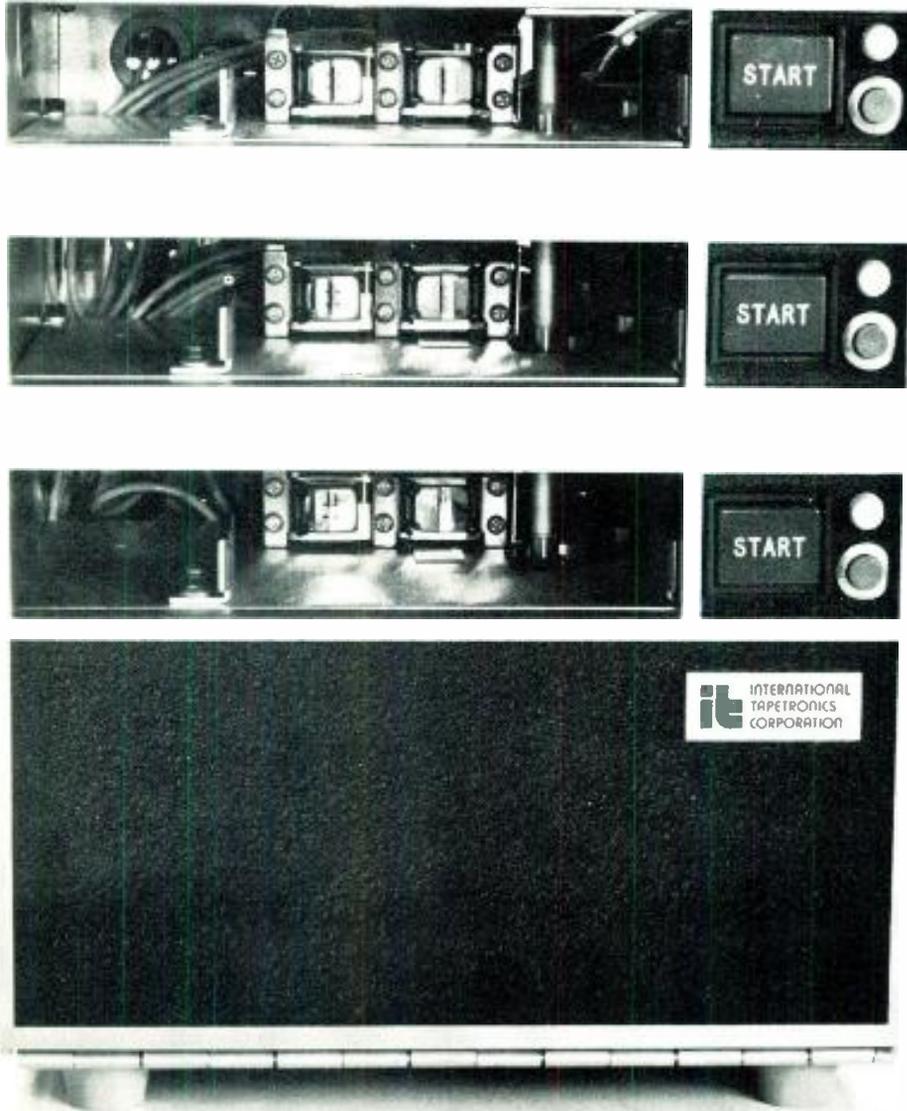
BOSCH FERNSEH

Our 50th Anniversary

Look into our next decade at NAB

Circle 117 on Reader Service Card

Evolutionary!



The 3D Reproducer. An instant success.

And it got better with time.

Through engineering improvements like these:

- New program recording and reproducing amplifiers provide less distortion, more headroom.
- + 18 dBm audio output (optional).
- Improved 450 RPM capstan motor with less heat, less wow and flutter, higher reliability.
- Head laminations are constructed of mu-metal impregnated with aluminum oxide particles—a substantially more durable material, resulting in head life many times that of common lamination heads.
- Improved head mounting blocks provide better stability.
- Improved air-damped solenoid with Teflon[®] coated plunger for quieter operation.
- Self-aligning top capstan bearing.
- WRA Series Recording Amplifier (optional).
- New IC Voltage Regulators with thermal and short circuit protection provide improved regulation.
- Two year warranty on parts and factory labor.

**CALL TOLL-FREE
800-447-0414**

From Illinois, Alaska or Hawaii call collect: (309) 828-1381. Ask about our no-risk 30-day trial order. Attractive lease-purchase plans available. Generous trade-in allowances.



INTERNATIONAL TAPETRONICS CORPORATION

Bloomington, Ill. 61701

Marketed exclusively in Canada by McCurdy Radio Industries, Ltd., Toronto

Circle 118 on Reader Service Card

RADIO

PROGRAMMING & PRODUCTION FOR PROFIT

There Are A Number Of Ways To Make News Pay Off — Here Are Some Of Them

A RADIO NEWS PROGRAM can succeed by selling air time, by building the station's audience, by serving the community, or perhaps in other ways. Most successful stations have put news to work in two or more of these ways.

BM/E talked with managers and news directors at a number of radio stations to find out what combination of news functions each is using and how the management chose that particular treatment of the news. This month we report on three of those stations; others will follow in future issues. Making a proper use of news has high priority for any radio management because skillfully produced news is now one of the most essential and most valuable products of a radio broadcaster.

Small town gets prize-winning news

WLOK, Lincolntown, N.C., is a 1000-watt daytimer in a city of 5000, with its primary market the county of about 40,000. It is the only radio station in the market. Charlotte is about 35 miles southeast, and the radio and television stations of that city cover the area well.

But the big-city stations, as in hundreds of similar situations in the U.S., do not cover local news thoroughly. The management of WLOK decided in

1967 that a local news program was needed and that it would help the station's business. As the only radio outlet in the county, WLOK felt both the responsibility and the opportunity.

After a series of news directors, none of whom made a permanent go of it, WLOK in 1976 hired Larry Seagle, who has made the program a success and a model for other small-town radio stations. In 1978 the station, an AP subscriber, won an AP award in its class for "best handling of local news."

The station's format is contemporary music. News comes on starting at 6:00 a.m. and runs for five to seven minutes every half-hour until 8:30 a.m. (drive time). From then until midday, the AP hourly newscast is used. At noon and 12:30 p.m. there are 10-minute newscasts, then AP until 4:00 p.m. At 4:00 and 5:00 p.m. there are 15-minute local roundups. That ends the news day, with the station going off the air shortly thereafter. Manager Jack Brown reports that of the total news production, some 50 percent is local, 25 percent is state, and 25 percent is AP international and national.

Seagle has established a strong "actuality" character for the local news: whenever possible he goes directly to the newsmaker with a portable tape recorder and brings the tape back for airing. He is constantly on the go to cover town and county. When there are two or more fast breaking events at one time, other members of the staff back him up in the field.

As any news gatherer in a small town must, he maintains close relations with the town government, the police department, the churches, the schools, etc. He has persuaded large numbers of local citizens to think of him instantly whenever they are involved in, or know about, a news event. This is positive for the station's identification in the community.

Does that identification extend to the listening audience in general? Has the

continued on page 26



Cameraman's Headset...

Keeps the crew in touch

A professional TV Cameraman's Headset series specifically designed to interface with existing Western Electric circuits. Single side unit receives intercom only. Dual side, binaural unit receives intercom and monitors program. Carbon boom mike with optional push-to-talk switch. Designed for comfort and rugged dependability in every day use. Keeps the crew in touch—in or out of the studio. For complete information please write:

PRODUCTS OF SOUND RESEARCH

TELEX
COMMUNICATIONS, INC.

9600 ALORICH AVENUE SOUTH
MINNEAPOLIS, MINN. 55420 U.S.A.
Europe: 22, rue de la Legion—d'Honneur,
93200 St. Denis, France
Canada: Telex Electronics, Ltd., Scarborough, Ontario

Circle 119 on Reader Service Card

All-News Is A Going Business

The series on news handling that begins in this month's column will consider stations that use news effectively as part of a mix that also includes music and other elements. The all-news station has some rules all its own; in later issues *BM/E* will study it. The number of such stations seems to have recently stabilized at a little over 100, most of them in large cities. Thus, all-news is a restricted class. When conditions are right, however, a station can do very well indeed with all-news, and the format is still attracting recruits (KRLD in Dallas, for example). *BM/E* will analyze all-news for lessons valuable to all stations.

**IF YOUR OPERATION
REQUIRES
AUTOMATION
WITH ABILITY
THEN WE'VE GOT
ESP FOR YOU.**



Introducing the new ESP-1 programmer system from SMC, the innovators in broadcast audio control.

The ESP offers a modern microprocessor controller with a deep 4,000 event memory, including sub-routines and fully programmable clock. The only simple thing about ESP is the ease of service and the lack of knobs, buttons and complex video terminals.

And what's even better, the ESP just happens to be the lowest priced programmer of its ability on the market.

Investigate before you buy. Call or write SMC for complete information and a proposal on how ESP can work for you and your station.



SONO-MAG CORPORATION
1005 W. Washington Street
Bloomington, Illinois 61701
309-829-6373

Circle 120 on Reader Service Card

Radio Programming

local news helped make them loyal to the station? The answers seem to be "yes," which is most important to WLON's selling job. Without regular rating from Arbitron, local advertisers go by the general feeling in the community about the station and the experiences of other advertisers.

Wayne Howard, program director, described a market survey made for the station by students at nearby Gaston College (where he also teaches a course in radio). Given the names of WLON's news director and those of anchormen and weathermen of the Charlotte TV and radio stations, respondents in the survey identified WLON's Seagle more often than any of the others. The station's news programs are certainly being listened to and are clearly building the numbers and good will of the audience. That is success for a news program.

Smart news competes for the big-city listener

WHDH, Boston, is a long-established 50 kW "clear" operating with great success in a highly competitive big-city market. The music format is "contemporary," with a tight playlist that extends to "soft" disco. The equipment for putting the music on the air is all of top quality; WHDH recently installed new consoles, all of them stereo in anticipation of AM stereo. The improvements in signal quality brought about with new audio equipment over the last couple of years have stirred widespread approval among the listening public.

A large-scale news program, with heavy emphasis on live local news, backs up the music in the maintenance of audience appeal. There is a mobile van with complete studio equipment for location shows away from the studio. Leased aircraft send in traffic reports during morning and evening drive times. Reporters on foot have hand-carried transceivers to connect them directly to the studio or to get through with the van acting as relay. All these units, connected via 450 MHz radio, allow live reports to be put on the air directly with studio quality or to be recorded in the studio for editing and later airing.

News director Dave Cooke outlined for *BM/E* the general schedule of news handling during the day. At 5:30 a.m. there is a 35-minute news show, including both local and world news, carefully edited in the WHDH newsroom. This opening show has substantially improved the station's ratings for the morning drive time, Cooke says — before WHDH put it on the air, the station had a slump in audience at that period.

Through the rest of the drive time there are two newscasts an hour, five to 10 minutes each (depending on the breaks in the news). Up to midday, there is a three and a half-minute newscast on the hour, and at noon a six-minute summary. Their studies, says Cooke, have convinced them that the midday period, between morning and afternoon drive time and especially around noon, is not a time of strong listener interest in news. The pace is picked up again during afternoon drive time, and then at night goes back to on-the-hour segments of three and a half to five minutes each.

In addition to careful scheduling, Cooke and his team put large effort into making the news comprehensive, varied, and fast-paced. Their own local "live" material, with actualities of various kinds, is edited into segments that also include data and actualities from AP and UPI for national and international coverage.

Cooke is presently putting into operation a new editing room as the central facility for producing the newscasts. It is built around a large central table at which all editors and reporters working on newscasts sit. In a deck above their heads, but within easy reach, are tape machines, cart machines, scanners tuned to significant local frequencies, and supplies. Adjoining this "city desk" are tape editing booths with open-reel and cassette equipment. At the table, telephones can be punched into connection with various dedicated lines to sources of important news around the city.

To use news in such a competitive way in a major city would be impossible without WHDH's heavy investment in equipment and highly skilled news personnel. The investment, in the view of the station's management, has been fully justified by the station's durable grasp on the top of the Boston audience ratings.

Community service needs an all-out local news program

At WELI in New Haven, Conn., general manager Frank Moore has gone all out to make his station as valuable as possible to the community. This 5 kW day-and-night AM operation concentrates on "upbeat" MOR music and has found an excellent response in the southern Connecticut/Long Island area it serves. But listeners in this heavily populated area have literally scores of other choices on the radio dial. WELI has built a loyal following in large part by identifying the station with local issues that matter strongly to the station's potential listeners.

One recent example: when the Department of Commerce announced that an NOAA weather transmitter in the area would be closed down as an

economy measure, WELI collected 22,000 signatures on a petition pointing out the tremendous value for the community of this fast local weather prediction service. WELI's management, along with other community leaders, took the petition to the assistant secretary of commerce, and the last word was that the radio weather service would be saved. WELI depends on the NOAA station for much of its own local weather news.

Another example that suggests the variety of coverage: the station broadcast live a series of public hearings at the police department at which citizens expressed unhappiness about possibly illegal police wiretaps. The hearings brought some dramatic confrontations and attracted a very large audience to WELI.

Moore summarizes it by saying his station must be "a mirror of the needs and thinking of south central Connecticut." One principal way the station keeps the road open for this is with a nightly telephone call-in program, running from 6:00 p.m. to 1:00 a.m., with listeners expressing via phone their opinions, problems, and suggestions, and station personnel replying. Many important issues turn up during these direct exchanges with the public.

WELI's handling of news is a vital element of its "community" policy. Every newscast is an "adjunct to that policy," Moore says. Bill O'Sullivan, news director, told *BM/E* about the daily scheduling of news. The station has two mobile vans with UHF radio to get live reports into the studio. The mobile equipment is used for a wide variety of remote originations: an example was coverage of a recent explosion in an apartment house in the city, which included 20 live reports from the scene with interviews from residents, firemen, police, and city officials. Regular sources of news, like the police department and City Hall, are continuously monitored. Reporters on the beat can use the 450 MHz radio or telephone lines to get reports in.

At the station there are always at least two news staffers on duty to write and edit newscasts. For state news outside of the city area, WELI uses the Connecticut State Network, an association of stations throughout the state which exchange news material.

The management's campaign to make WELI the source for "everything anyone needs to know in the area" started in 1971, when the present owners bought the station. A major move was the raising of news coverage from a few hours to 25 hours a week. The campaign has succeeded in establishing the community position of the station, and also in lifting its business status. It is a case in which service and profit come in the same package. **BM/E**



THINKING VIDEO? THINK CAMERA MART.

Because at Camera Mart, we feature an entire line of video equipment including Ikegami, Hitachi, Panasonic, Sony, Microtime and many others. The Ikegami ENG package shown here is just one of many we offer. It's got everything you need to cover the story, indoors or out.

The camera: Ikegami's HL-77, the completely self-contained, high sensitivity Plumbicon®* color shoulder camera that's light weight and easy to handle. Its low-profile, with eye-level CRT monitor (on both take and playback, by the way), gives it the convenience and maneuverability you'll appreciate during those hectic, on-the-spot coverage sessions.

The recorder: Sony's easy-to-operate VO-3800

gives you up to 20 minutes of NTSC color on a single U-Matic® cassette which can be edited on the 2860.

This custom package and whatever you need in video, are all available for sale, rent or through convenient lease-purchase options which can be arranged to suit nearly any budget. And we're flexible, too. If there's a special package or custom purchase option you'd like to work out, let us know.

So when your thoughts turn to video, turn your attention to Camera Mart. Whether you're equipping a studio for the future, or producing a program for tomorrow, we've got what you need. The way you need it.

*Plumbicon is a registered trademark of N.V. Philips

See us at NAB Booth No. 555

Camera Mart

40 years of excellence.

THE CAMERA MART, INC.

456 West 55th Street New York 10019

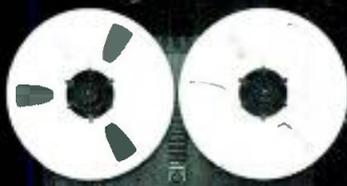
(212) 757-6977/Telex 1 2078

Sales • Service • Rental



Circle 121 on Reader Service Card

OTARI BROADCAST RECORDERS



MX-5050-B

A complete line of professional tape machines (from one to eight tracks) built to meet the current and future needs of the broadcaster (including AM stereo) for long term reliability, high performance, full production capability, and backed by a new expanded program of parts and technical support.

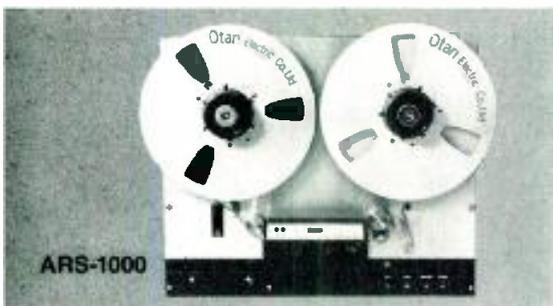
MX-5050-B Compact Broadcast Recorder.

Newest version of this field-proven two-channel machine, widely used in broadcasting worldwide. Three speeds, 24 dBm headroom, dc capstan servo, and modular construction.



Mark II

Mark II Broadcast Recorder. Separate transport and electronics for mounting convenience, plug-in card electronics, complete alignment accessibility. Two-channel 1/4-inch or four-channel 1/2-inch models.



ARS-1000

ARS-1000 Automated Radio Station

Reproducer. Two-speed two-channel stereo reproducer specifically for automation systems. Ruggedly constructed for long term reliability and continuous operation.

Call Ruth Pruett at 415/593-1648 for your nearest Otari broadcast dealer.

PREFERRED BY PROFESSIONALS

OTARI®

WORLDWIDE

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

Circle 122 on Reader Service Card

BM/E's Program Marketplace

Syndicators For Radio

Automated Music Unlimited

P.O. Box 3692
Port Arthur, Texas 77640
Tel: (713) 985-2543.

WHEN YOU ARE running a radio station that is at or near the top of the ratings in a market of 500,000 people, you can syndicate your programming to other stations on a comparatively easy, step-by-step basis, taking on a few stations at a time.

That is the situation of James H. Joynt, owner of KYKR in Port Arthur, Texas, who has recently created a new syndication operation he calls Automated Music Unlimited. KYKR is succeeding handsomely in a highly competitive radio market (18 stations) with its mixture of old and new country music, put together with a skill that has won the approval of a large segment of the audience. Joynt decided somewhat over a year ago that his programming could be duplicated and distributed to stations in small markets at rates that small-market managers would find feasible and attractive.

Consequently, he and his staff have assembled recorded programming on reel-to-reel tape, arranged in sequences for effective and attractive variety and "air flow." Each 10½-inch reel holds 30 cuts of music. A subscriber gets music in three categories, all in stereo. There is an initial delivery of 30 reels of "gold," country hits more than two years old, and 12 reels of "recurrents," music less than two years old, off the hit lists but still popular. Each week thereafter will follow two new reels of current country hits. The subscriber sends back his two reels of currents when he gets the new ones. The current hits include voice parts supplied by Automated, but the gold and the recurrents are unannounced.

The music is designed for easy use on automation systems that include three to four reel-to-reel machines. But the user can do it "live" if he wants to. Joynt says that he will not dictate to a station management a minute-by-minute plan of action, but prefers to cooperate with the management in finding the best ways to do things. Moreover, if the management is in-

terested, he will simply sell the music at \$50 a reel and let the buyer use it in any way that appeals to him.

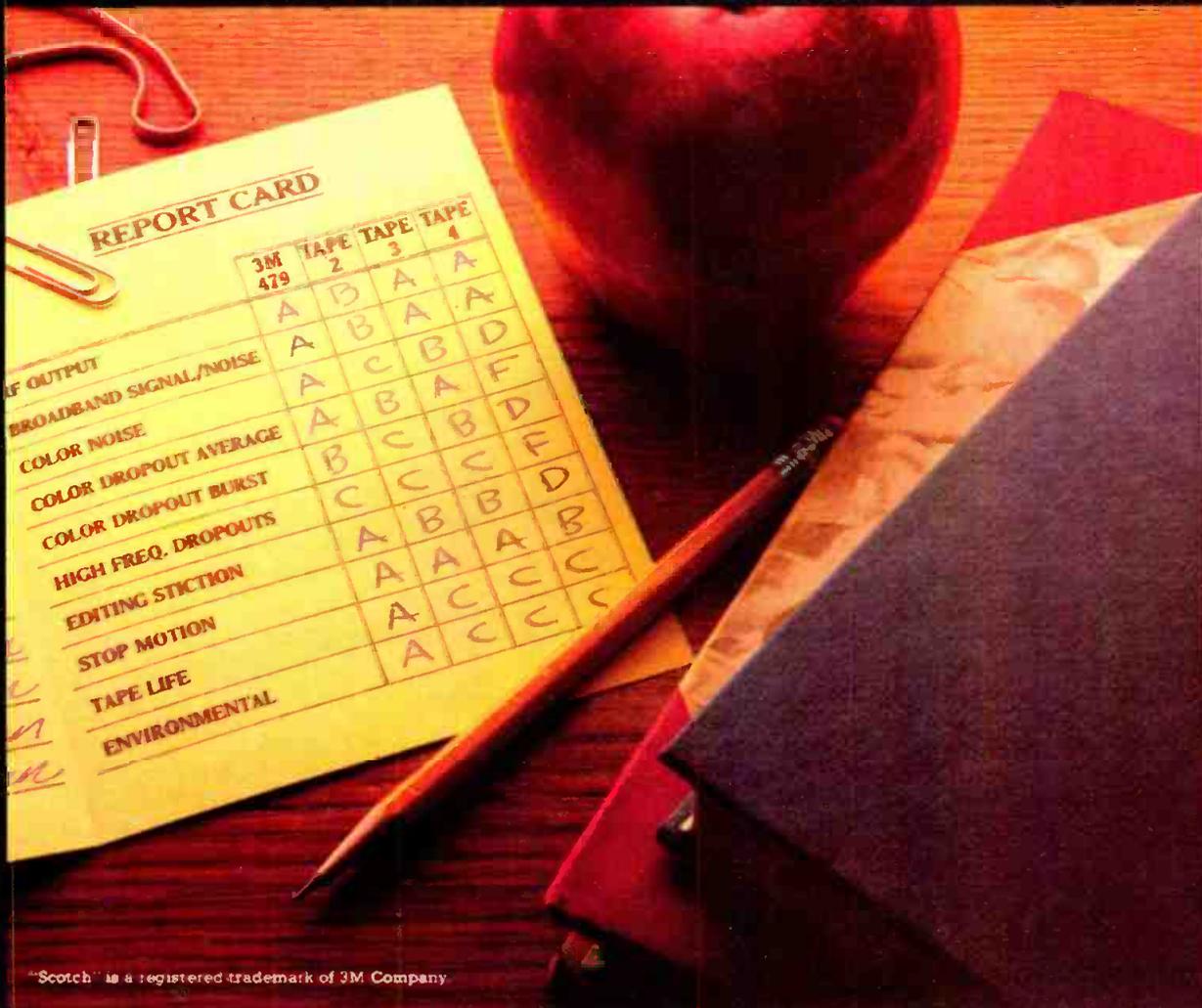
The regular syndication service will cost about \$300 a month. Joynt sees this as attractive for small-market managements who want "successful" music but cannot afford the fees two or three times as large charged by many other syndicators. His service can be comparatively inexpensive because the major planning and assembly are done for KYKR's on-air programming. The station has both AM and FM transmitters, the AM being a 1 kW daytimer and the FM a 100 kW 24-hour operation. They have been simulcasting during the day, but Joynt will initiate a change in the AM program in coming months, with the FM continuing to use the developed country music.

Thus, Automated Music will continue to have the benefit of KYKR's program development, and can take on syndication subscribers gradually with little additional effort. The FM station is live during the day and automated from 7:00 p.m. to 6:00 a.m. (using an SMC DP-1 automation system); the programming is ready for broadcast either way.

Joynt's career in radio goes back more than ten years. He started on the engineering side, moving over to programming and then to management. Also central in the operation is Bart Evans, music director of KYKR, who collaborates with Joynt in the assembly of the programs and is the "voice" on the reels of current country hits. Evans has had a long career in radio as an announcer and programmer. Joynt holds that the skillful DJ-talk supplied by Evans is another element that the small-market station could not afford to buy on its own.

Joynt says he will not mount a major promotion campaign intended to bring in ten or 20 subscribers before the end of the year. He prefers to talk things over in a relaxed way with any small-market manager who gets in touch. If, say, five decide to join up, he can take care of them well; if most of them succeed with the format, he will later enlarge his production capacities to get ready for the additional stations that success attracts.

BM/E



Scotch is a registered trademark of 3M Company

IN A TEST OF ONE-INCH VIDEO TAPES, WE ACED OUT THE COMPETITION.

When we tested the top four brands under strict lab conditions, the overwhelming performance leader was Scotch 479 Master Broadcast Video Tape. In fact, we came out on top in all ten performance categories.

If that isn't reason enough to make us your choice, maybe this is. We're the only one-inch supplier that winds your tape onto a special cushioned flange reel to protect against shipping and handling damage. And we pack and ship our tape in a flame-retardant case to give you even more protection.

We're the people who pioneered the development of video tape 25 years ago. And according to the pros who know video tape best, we're still the best video tape. Give or take an inch.



SCOTCH 479

3M

"This struck BM/E as one of the most useful audio handling units introduced at the show."*

The editors of November 78's issue of BM/E* were talking about our new ARA-1612 Audio Router/Amplifier introduced at the 1978 NRBA convention. What they saw may be destined to become the universal replacement for today's patch-bays and all their attendant draw backs.

Whether you are preparing for AM Stereo or just revamping your present mono or stereo operations, the ARA ushers in a new era of convenience and flexibility. Local and remote routing of all your audio sources; balanced bridging inputs for zero loading effects on sources; individual input gain adjusts for consistent level distribution; remote and local LED source status displays; expandable inputs and outputs capability; mix and match mono/stereo capability; and fully protected, instantaneous switchover, dual power supplies.

Stop by NAB booth #409 for your personal demonstration of this and our other great new audio tools. From the new ESP-38 turntable preamp to the incomparable P5M remote console.

If you won't be coming to NAB be sure to circle the bingo card, call collect or contact one of your nearest reps for further information. You will be money and performance ahead.

See us at N.A.B. Booth #409

NEW

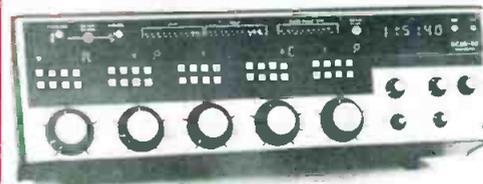


TURNTABLE PREAMPS. Leaders in their field. MP-8 & SP-8 — Bal. out; 0.05% dist.; 68dB gain; +8dBm out (+21dBm max); S/N —77dB down ref. to 12mv in @ 1kHz & +8dBm out. ±1dB RIAA, remote scratch & brilliance activation. Mono, stereo, table top, and rack mount versions. \$98 to \$162.

ESP-38 — Bal. out; 0.03% distortion; S/N, —85dB down referred to 12mv in @ 1kHz and +8dBm out; ±0.5dB RIAA; remote & local scratch, brilliance, rumble filter and mono activation; +8dBm out (+21dBm max.), +60dB gain. Left & right Hi/La equalization trimmers and recessed level controls. Built-in turntable remote start/stop relay. Stereo only. Price — \$325.



AUDIO DISTRIBUTION AMPLIFIERS. Available in 12 different rack and table top versions. All inputs and outputs may be used balanced or unbalanced and in any combination on the same amplifier. All outputs are individually amplifier isolated and will work into any load over 125 ohms without change in distortion or response. Response 10Hz to 30kHz, ±0.5 dB. Distortion 0.1% or less. Hum and Noise 98dB down referenced to +20dBm out. Channel separation —75dB. DA's start as low as \$145 for our 1x30 mass feed model, thru our 1x6 line and mic level units, to our modular 20x80 rack mount design. No need to pay more or settle for less. Price — \$145 to \$2,276.



DC38 SERIES AUDIO CONSOLES. Outstanding versatility and advanced technology. Unparalleled features such as 4 inputs per mixer, high Z balanced bridging inputs accept mic level thru high level, patch-panel input gain select, DC control of all audio, back lit alpha numeric readout above each mixer, solid state LED VU meters dual channel (plus mono mixdown channel or stereo), solid state switching and muting for noiseless operation, selectable muting, plug in electronics, and optional built in Clock/Timer. Available mono or stereo and 5, 8, or 10 mix versions. 4 year warranty with 2 week trial period. Price — \$2,447 to \$4,980.

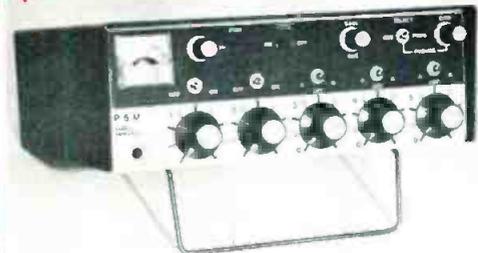


DC-12 SERIES AUDIO CONSOLES. A remote control console with low profile control head and rack mount electronics that may be located up to 90 feet away. Features 2 inputs per mixer, silent illuminated touch switches, dual channel (plus mono mix down channel on stereo), solid state LED VU meters, DC control of all audio, patch panel input gain select, selectable solid state muting and switching, slide faders with dual cue entry and plug in electronics. Since the DC-12's are totally modular you may order any number of mixers and add on later. Twelve channels may be accommodated and an additional 8 may be added via the DC-12 extender. 4 year warranty. Price — \$4,200 to \$5,200.



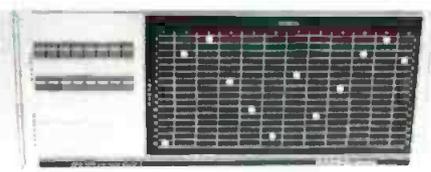
SC-5, DC-5, & DC-8 SERIES AUDIO CONSOLES. This series of consoles, whether single or dual channel; table models or rack mount; 5 or 8 mixers, mono or stereo, feature illuminated touch-pad audio select switching, solid state LED VU meters, Simul-Q monitoring capability, full-range gain selects on each input, selectable solid state cue and monitor muting on all channels, and plug-in electronics. DC control of all audio with built-in relays for on-air lights and aux. muting. Options include 4 and 8 channel extenders, Simul-Q latching and remote control of AC equipment. These popular consoles have recently been up-dated to incorporate many new features. Price — \$995 to \$2,375.

NEW



PORTABLE CONSOLE. P5M — A full 5 mix audio console in miniature. Bal. in & out, 8 inputs, 3 of which are mic/line selectable & individual compressors on mic channels ±1 & ±2 Tone gen., cue and monitor feed with gain controls & phones select with gain control. Last channels equipped with Q switch & the first channels provide muting. A folding stand is part of the unit and may be removed for rack mounting. +8dBm out nominally (+18dBm max) ±2dB, 20Hz to 20kHz; S/N —75dB high level and —62dB mic level. Max gain of 90dB and a distortion of 0.3%. Compression/limiting range of 35dB and a slope of 50:1. 9 3/4" W x 9 1/2" H x 3 1/2" H. Price — \$545.

NEW



RADIO ROUTER/AMPLIFIER ARA-1612. The most versatile switcher on the market. Plug in cards for up to 16 inputs & 12 outputs. Each input has an amplifier and level adjust for attention and up to 17dB of gain. Output cards feature dual bal. 600 Ohm outputs, momentary LED coded controls (may be slaved from other stations), LED output status lights show thru front panel, and on-board mono/stereo select switch. A smoked plexiglass front panel allows operator to tell the status of any output. Also on the front panel are 2 rows of silent momentary contact switches. One row for output selection & the other row for input select. Contact RAMKO for further info. and specs. Price — \$1,099 to \$2,296.



LINE AMPLIFIERS. The ideal solution for your line level problems can be found in one of the 4 different models offered. LA-2 (table top or rack) and LA-5S/10M: mono or stereo, balanced or unbalanced high impedance inputs, +21dBm maximum input level, +21dBm maximum output into 600 ohm balanced line, frequency response +0 —1dB 10 Hz to 50kHz, distortion 0.008% at +8dBm out. The LA-2 is a 2 channel amplifier. The LA-5S/10M is a modular rack mount unit with up to 5 stereo or 10 mono channels. The LE-3 is a 3 channel mono line amplifier with equalization for high and low frequencies and is also modular. Gain of all units, variable to +20dB. Price — \$135 to \$453.



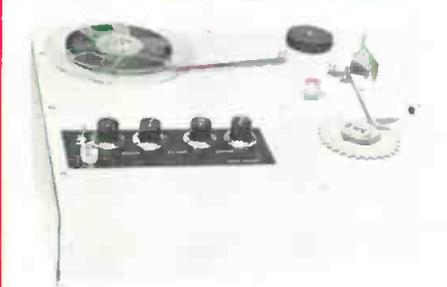
DUAL MIC COMPRESSOR/AMPLIFIERS. Portable dual mono & stereo mic limiters that amplify, mix, limit and control gain. The DML-dual mono is used where 2 separate mics must be independently amplified and compressed and mixed into a common 600 ohm output. Primary and backup batteries (or an optional AC supply). Includes tone generator & talkback ability. The DML-1S is an AC powered, stereo version. Input: —60dB nominal, —18dB max. Gain: 90dB max. Limiting Output Level: DML-2M, +10dBm. DML-1S, +18dBm or +8dBm. Balanced Inputs and Outputs. Dist.: 0.3%. Attack Time: 2 microseconds. Noise: 60dB below limiting output. Size 2 1/2" H x 5 1/4" W x 8 1/2" D. Price — \$239 to \$281.



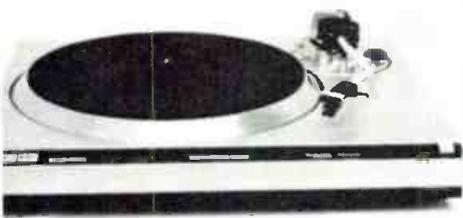
MIC/LINE AMPLIFIERS. Dual function for microphone or line. The MLA series are ideal for remote broadcasts, churches, mixer expansion, and emergency situations. Front panel controls for microphone or line selection and level. Mic input —60dB for +4dBm out. Line input balanced bridging high gain variable +26dB. —18dBm in provides +3dBm out with an additional 13dBm of headroom. Distortion is 0.1% or less. Response: Mic input: +2dB 20Hz to 20kHz. High level channel: +1dB 5Hz to 30kHz. Inputs may be used balanced or unbalanced. XLR Mic connectors. Single or dual channel, table top or rack mount. Price — \$28 to \$185.



STUDIO MONITOR AMPLIFIERS. Exceptional reproduction with high performance and versatility. 7 different models to choose from. MA-12 (mono) MA-20 (stereo): 12 watts mono/20 watts stereo. Response: ±1dB, 10Hz to 50kHz. Distortion 0.05% max. @ 1kHz and rated output. Input: 5k unbalanced. Table top or rack mount. SMA series: mono or stereo, table top or rack mount. 25W RMS per channel into 8 ohms. Inputs: high Z balanced bridging. Response: ±1dB 15Hz to 90kHz at rated output. Distortion: 0.6% at rated output. Built in muting circuit with input and output level controls and bass contour adjust. Price — \$121 to \$325.



AUTOMATIC CARTRIDGE & CASSETTE LOADER. Precision wind your own carts and cassettes and save up to 40% on reloading costs. The ACL-25/E is simple to use, just dial in the time desired and push the run switch. The ACL stops automatically, precisely to —0, +1 second of playback time. The exclusive playback speed selector ends mental gymnastics figuring tape length versus playback speed. Simply set the selector to 1/8, 3/4, or 7 1/2 i.p.s. and the ACL does the rest. An optional cassette adaptor enables you to wind both carts and cassettes on the same machine. An optional pancake adaptor is also available. The ACL-25/E has a nominal winding speed of 30 i.p.s. Price \$375.



TECHNICS PROFESSIONAL SERIES BY PANASONIC. Ramko Research is proud to be one of the largest distributors of this extraordinary equipment. The SP-10MKII and the SL-1500-2 Turntables have set new standards by which turntables will be judged for many years. These direct drive units with Quartz-phase locked speed control maintain speed within 0.02%. Wow and flutter is 0.025% WRMS and Rumble —73dB. Also available are reel to reel tape recorders, portable and fixed cassette players, power amps, parametric equalizers, speakers, and a series of studio monitor speakers that will astound you with their phase-linear reproduction.

FOR FURTHER INFORMATION CONTACT YOUR AUTHORIZED RAMKO REPRESENTATIVE OR CALL RAMKO RESEARCH COLLECT.

- Arkansas, Louisiana, Oklahoma, & Texas
DARRYL PARKER — (214) 233-5535
- Florida
JOHN GOVREAU — (813) 227-5051
- Georgia, Alabama, & Tennessee
BOB STEWART — (404) 577-4689
- Maryland, Washington D.C., Delaware, New Jersey, & Eastern Pennsylvania
STEVE KINCAID — (301) 864-0997
- Michigan & Indiana
BOB CHAMPAGNE — (313) 649-4428
- New York & The New England States
RON DAGENAIS — (617) 537-4706
- Minnesota, Wisconsin, Iowa, North & South Dakota
KEITH EMMONS — (612) 881-1118
- North & South Carolina & Virginia
BOB CAUTHEN — (704) 847-5687
- Ohio, Western Pennsylvania, & West Virginia
DOUG COOK — (614) 471-4114
- Montana, Idaho, Wyoming, & Utah
TOM HILL — (208) 342-6902
- Canada
RON PALEY — (203) 786-6715

RAMKO RESEARCH
11355 "A" Folsom Blvd.
Rancho Cordova, Calif. 95670
(916) 635-3600

"YOUR KEY TO QUALITY"

the 800 series

The 800 Series Video, Pulse, and Audio Amplifiers comply with the most rigid specifications and are built to American Data's stringent manufacturing and quality standards.

Each amplifier is energy efficient with its own internal dc supply eliminating the need for redundant power sources.

The 800 Series features individual front panel adjustments and test points for power and signal verification. All amplifiers may be intermixed in any combination in a single frame. The 800 Series is compatible with NTSC, PAL, and PAL-M standards.

Flexible, reliable, and cost efficient. Easy to install. Two screws and you're in business.



we're easy.



American Data

A North American Philips Company
Research Park • P.O. Box 5228
Huntsville, Alabama 35805
Telephone (205) 837-5180
TWX 810 726-2125

ADC NORTHEAST
Box 452
New Hartford, CT 06057
(203) 379-7840

ADC MID-ATLANTIC
5504 Waterway
Rockville, MD 20853
(301) 460-1454

ADC WEST
3760 Cahuenga Blvd.
North Hollywood, CA 91604
(213) 760-3221

ADC SOUTHEAST
2219 Oakawana Rd., N.E.
Atlanta, GA 30345
(404) 633-2100

ADC MIDWEST
P.O. Box 27324
Indianapolis, IN 46227
(317) 784-3000

Visit us at the NAB in Dallas, Texas. March 25-28 Booth 312

Circle 124 on Reader Service Card

www.americanradiohistory.com

TELEVISION

PROGRAMMING & PRODUCTION FOR PROFIT

Capital Cities Productions: Groups Are Producing The Quality Programming Agencies Say Is So Hard To Find

IN THE CALM BETWEEN the battles for ratings points there is room for what has come to be called "quality programming." Quality programming, in the common wisdom, means programming that a broadcaster can be justly proud of before any audience — critics, stockholders, advertisers, or the public. But where is this quality programming? Where is it coming from, and where is the venture capital to produce it?

In recent months, this column has examined many different types of programs and the techniques used to produce them. Finally, a picture is beginning to emerge that stations and advertising agencies ought to take notice of. If you are looking for quality programming for the national audience, look to the group station owners. Group W, Post Newsweek, RKO, Capital Cities, Outlet, and others are becoming major sources of programs that inform, entertain, and deliver large audiences of aware and interested people. These audiences are usually not huge, but they



Nancy Dickerson, a broadcast journalist with impeccable credentials, has been the correspondent for a number of Capital Cities' documentaries

may be influential; they may be that important part of the American viewing public that helps shape the majority opinion.

It should be no surprise to anyone that group owners are the source of such programs, since unlike other producers, they have as a major constituency local stations, licensed to serve local communities whose perception of the station can make or break a case for renewal.

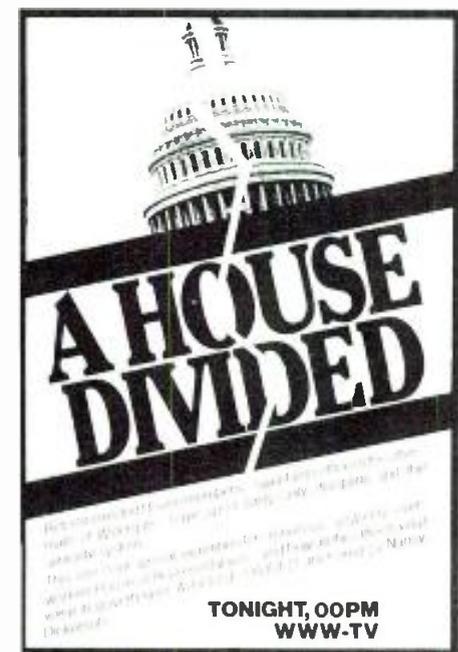
It is somewhat unseemly that the conflict between advertisers and the NAB has broken into the press in a way that appears to cast broadcasters as incapable of providing so-called quality programming, programming that can make it without violence, sex, or debasing humor, when, in fact, broadcasters do produce quality programming but find that advertisers and agencies turn their backs because the crowds of viewers are not large enough.

According to Charles Keller, vice president of Capital Cities Communications, Inc., "That's precisely the point we are trying to tell advertisers, and fortunately, there are enough advertisers who understand that to be encouraging and keep us going at it [the production of quality programming]." Keller, whose Capital Cities organization has produced a number of major one-hour documentaries in the past couple of

years and is now embarked on the production and distribution of a series of half-hour dramatic family specials, points out that there are some advertisers "who really do care about these kinds of programs, do want to see them on the air, and do want to support them even if they have to take a small penalty in terms of their costs per thousand."

In a sense, the Capital Cities projects are an experiment in seeing if a professionally executed program or series of programs can find the support from advertisers that is needed to answer the advertisers' own criticism. Agencies have often remarked that they had to have the "network" structure in order to get the clearance, market by market, that they would need to justify the buy to their clients. Capital Cities' last three documentaries cleared nearly 90 percent of U.S. television households. Their first effort at putting together a national network of affiliate and independent television stations was "We Will Freeze In The Dark," which cleared 160 television markets. Their next documentary effort, "The \$45 Billion Connection," cleared more than 170 markets, and the most recent documentary, "A House Divided," cleared 153 markets, including eight of the first 10. According to Keller, Cap Cities got the idea of putting together

continued on page 35



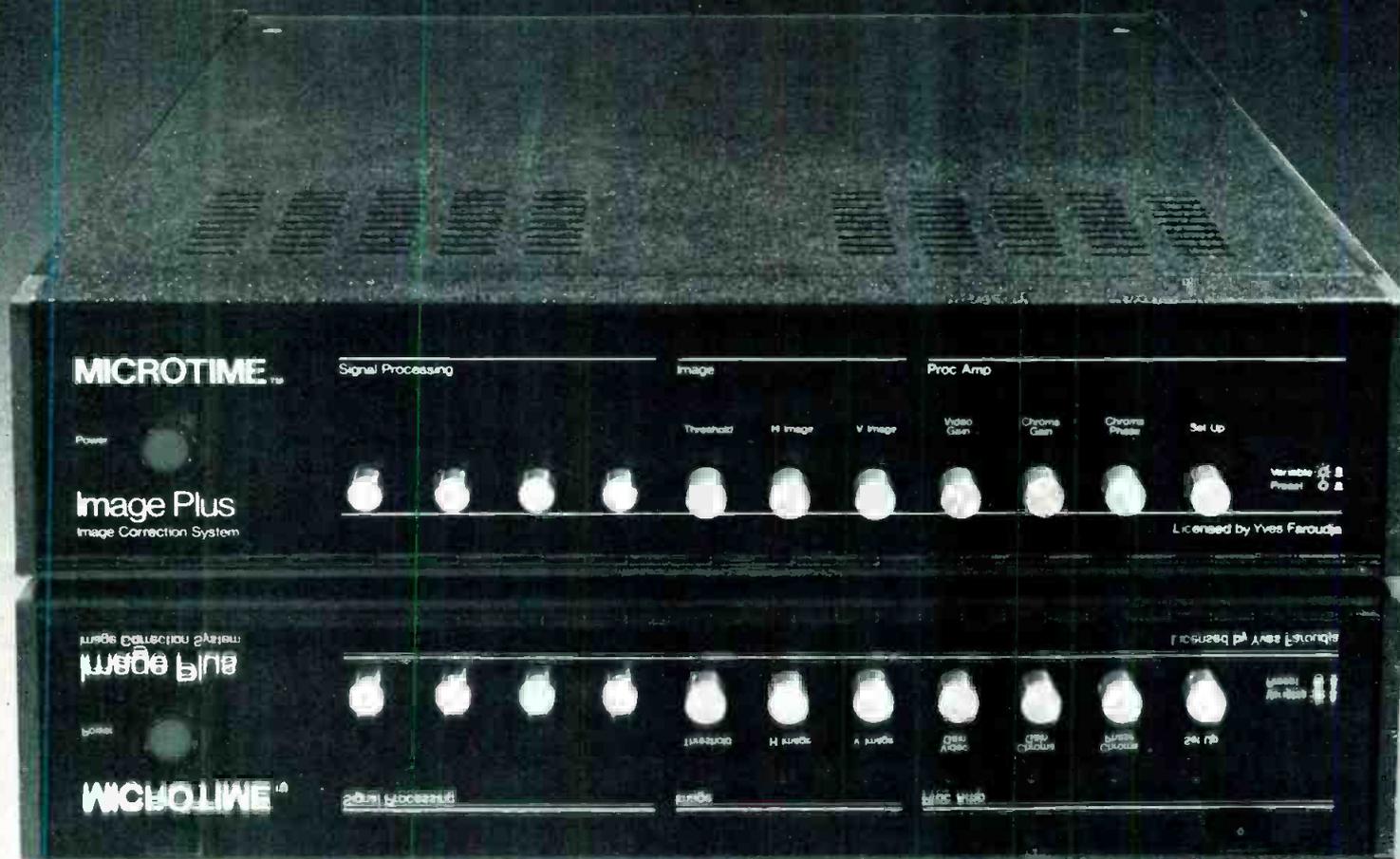
A complete promotion package, both on-air and print, is provided to stations that clear Capital Cities productions

When Good Isn't Good Enough

The Image Plus™ Correction System will improve any video signal. Improve multiple generation tapes, noisy, problem tapes. Reduce noise in tapes recorded in low light, or deteriorated tapes. Experience dramatic improvement of picture quality through 6 dB video noise reduction, horizontal detail synthesis, vertical aperture correction, automatic group delay correction, comb filtering to remove cross color errors, chroma crispening, and chroma hue error reduction.

Image Plus can be used at any point and as many times as desired in the tele-production process, with or without external subcarrier.

So make poor tapes good, and good tapes even better. Write or call today for more information on the Image Plus Correction System from MICROTIME.



Microtime, Inc.
1280 Blue Hills Avenue
Bloomfield, Conn. 06002
(203) 242-0761 TWX 710-425-1165

MICROTIME

Circle 125 on Reader Service Card

TV Programming

networks back in 1976 when they discovered that 140 stations were interested in carrying, live, the Eucharistic Congress which they were broadcasting in Philadelphia. The Congress, a quadrennial event of the Roman Catholic Church, was held in Philadelphia in conjunction with the bicentennial celebration, the first time in 50 years that it had been held in the U.S.

The first two documentaries received respectable national ratings of 8.6 and 3.9, respectively. Every step was taken by Capital Cities to assure maximum clearance. The shows were broadcast from Philadelphia at 8:00, 9:00, and 10:00 p.m. over a network of telco and satellite channels set up in cooperation with the Robert Wold Co. This strategy was chosen, said William Mulvey, marketing vice president of Capital Cities Communications, to give the shows at least nine opportunities in any three-station market to get a clearance. Assuming network affiliation, a station would have a choice of any one of three one-hour blocks to preempt network programming. For independents, of course, preemption was no problem.

The documentaries are provided with six minutes of commercial time. In the first two, General Foods, Bristol-Meyers, and E.F. Hutton bought spots and the remaining three minutes were given over to the local stations. The most recent Capital Cities documentary, "A House Divided," did not do nearly as well as the first two. The show, which aired on December 28, had only one 30-second national spot sold, to J.C. Penney. Overnights from New York, Chicago, Los Angeles, and San Francisco indicated a drop from the performance of the earlier documentaries, though Mulvey cautioned that this did not necessarily mean that the national ratings would be appreciably lower.

The poorer performance of "A House Divided," said Mulvey, was more a matter of Capital Cities getting into the market too late. By the time advertisers started being contacted for the show's late '78 air date, budgets had already been committed. Mulvey swears that this won't be the case next time. "We're going to be in the market a lot sooner next year," he vows.

Some of the important things to be considered about the Capital Cities series of documentaries, known as *Capital Cities Special Reports*, are that they are all of the highest quality, produced with network budgets. The first of the series, "We Will Freeze In The Dark," was produced by Av Westin, now vice president of ABC News. The correspondent for the report, Nancy Dickerson, has continued as correspondent in

the succeeding two Special Reports. The last two documentaries were produced by Gateway Productions, with Dick Hubert as executive producer. As Keller points out, the choices of Gateway and Westin are typical of Capital Cities' dedication to the idea that the reports be journalistically and technically of the highest possible quality.

According to executive producer Dick Hubert, "We shot some 60,000 feet of film for 'A House Divided,' which at 400 feet a minute gives you some idea of the editing ratio." For "The \$45 Billion Connection," Gate-

way sent its crews to Japan, Brazil, and locations throughout the U.S. to tell the story of the impending energy crisis. The family specials being produced by Paulist Productions are shot on film and completed on tape, but throughout the process, the single concern is quality.

The problem with documentaries is that they are based on current events. This means that their suitability for replay is modest, at best, as history tends to render continuously changing points of view on the topics covered. There is, however, a small after-market for

continued on page 36

Beaucart Stereo Machines.



Ready for AM stereo?
It's here, and so are we
with our super quality Beau-
cart® Stereo Record/Repro-
ducers. Perfect for FM or AM
stereo, each reproducer incor-
porates an unique head hold-
down assembly which keeps heads in perfect alignment almost
indefinitely, plus a series of patented cart locating and handling
features for the utmost in stereo reproduction. And only Beaucart
machines feature our patented Beau pancake motor and matched
Beau audio heads.

If you need the ultimate in AM or FM broadcast stereo machines
for A, B, and C-size carts, you owe it to yourself to look at Beaucart.
Price specs, service, performance: No wonder they've become so
popular! For the full story, write today for Bulletin 103 or call us at
(203) 288-7731. We're the Broadcast
Products Division, UMC Electronics Co.,
460 Sackett Point Road, North Haven,
Connecticut 06473.

UMC®

Outside Connecticut, toll free,
(800) 243-6178.

TV Programming

documentaries in schools, libraries, colleges, and corporate information programs. Hopefully, this after-market will make for a break-even score on the cost of production and distribution. Nevertheless, Capital Cities is committed to the production of at least two such documentaries in the coming year. In addition, there will be a two-hour special on the civil rights era from 1954 (the *Brown v. Board of Education* Sup-

reme Court decision) to 1964 (the year of the Civil Rights Act).

Capital Cities is not dedicated, however, to simply breaking even. This year witnessed the beginning of its *Family Special* series of half-hour dramatic programs aimed at the teenage audience and their parents. This series deals with contemporary problems confronting teenagers and features well known stars, top writers and directors, and first-rate production staffs.

These programs are produced by Capital Cities in conjunction with Paulist Productions of Los Angeles,

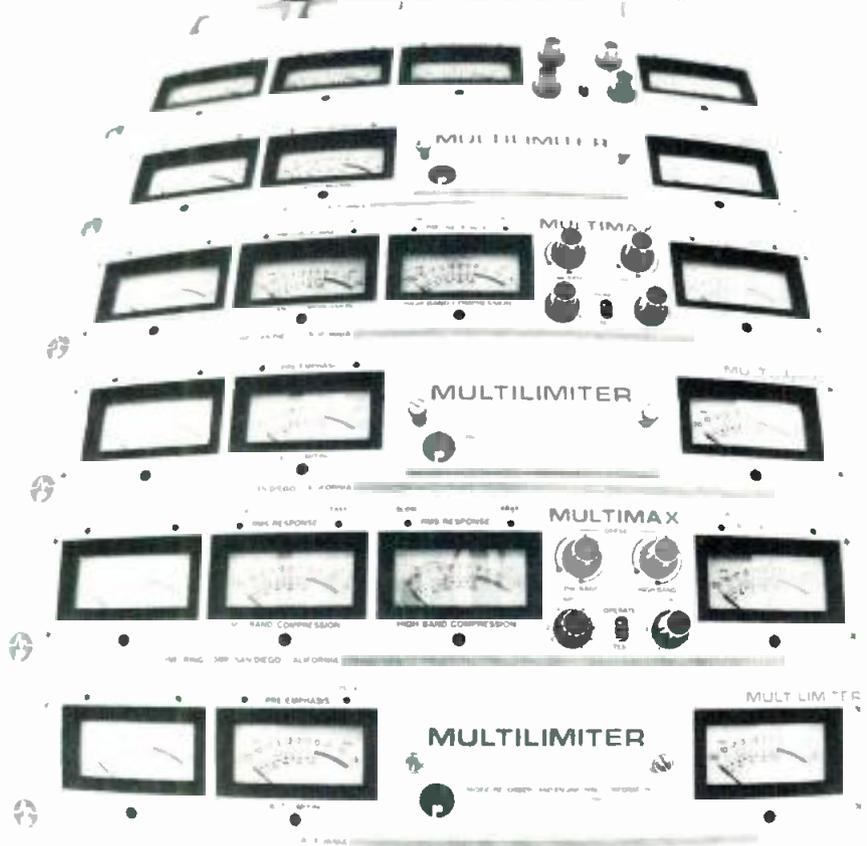
which enjoys a special relationship with the artistic community in Hollywood, according to Keller. The series is currently in syndication and the first of four shows, "It Can't Happen To Me," aired in December. The series got off to an auspicious start in the ratings with an overnight in New York of 11.0, a virtual tie for first place in its 7:30 p.m. time slot.

The package of four programs ("It Can't Happen to Me," which deals with teenage alcoholism; "When, Jenny? When?" dealing with teenage sexuality; "This One For Dad," taking on the problem of the death of a parent, and "Loser Take All," which deals with character development and conflict among boys of different backgrounds) is offered to stations on a barter basis. The station gets four programs and may replay any two of the four with certain separation requirements. Stations are required to give the programs slots at prime access time or better. The series has thus far cleared television markets covering more than 25 percent of U.S. television homes.

Capital Cities is not about to sell a program and disappear. Each program is bolstered by a complete promotional package that includes 30- and 10-second promotional spots with open ends for station ID. *TV Guide* and newspaper repros are provided in different page sizes, as well as press releases, cast lists, and program digests. Black and white production stills with cut lines, color photos, slides, and numerous other materials are provided, and most recently, Capital Cities bought TV Log, the system of boldfaced listings in newspaper television program listings. Capital Cities has also made a practice of providing stations with rough cuts of its documentaries during various stages of production so that the station can get a sense of where the program is headed and also provide press screenings.

It is clear from the efforts of Capital Cities and other group station broadcasters that the quality programming agencies and "concerned" advertisers so often carp about is available and is being produced by its logical creators, broadcasters themselves. Ratings will continue to be overwhelmingly important to the members of the broadcast industry, but broadcasters at the station and group levels must convince advertisers that their complaints about program quality can be and are being answered. Perhaps, as Dick Hubert of Gateway pointed out, commercial broadcasters might learn something from the public broadcasting system, which is consistently successful at going to image-conscious advertisers, *not their agencies*, and convincing them that they don't have to hold a license to be a good citizen. **BM/E**

MULTILIMITER MULTIMAX



THE BUILDING BLOCKS OF GREAT BROADCAST SOUND

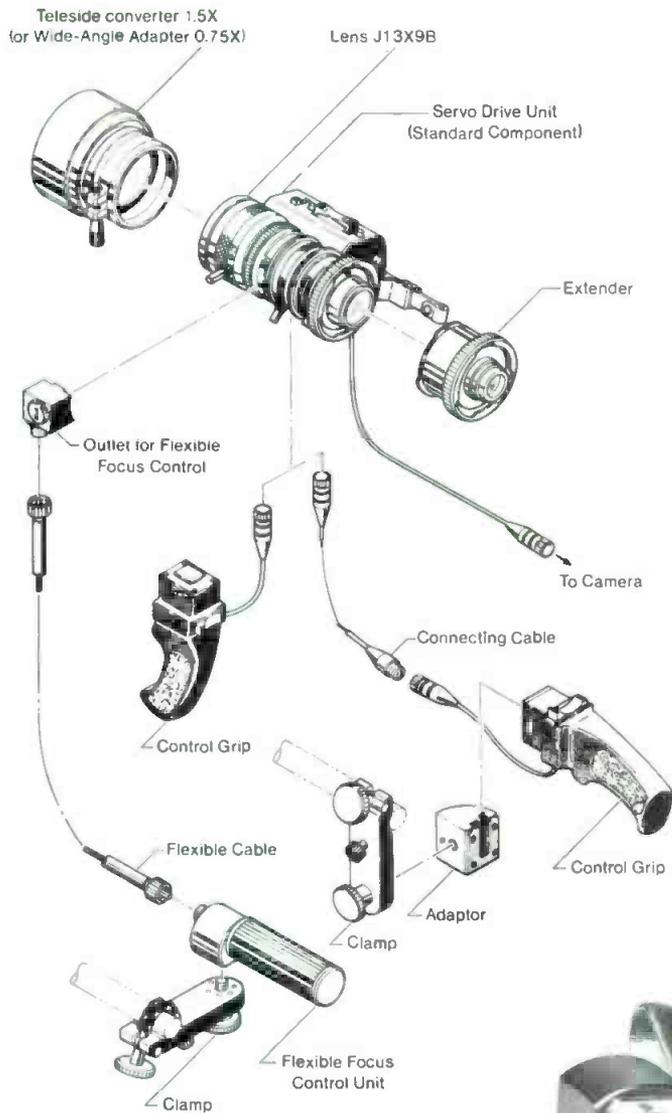


PACIFIC RECORDERS AND ENGINEERING CORPORATION
11100 ROSELLE ST., SAN DIEGO, CALIFORNIA 92121
TELEPHONE (714) 453-3255 TELEX 695008

exclusive export agent: Sierra Audio Burbank, Calif.

Circle 127 on Reader Service Card

IF YOU THINK OUR J13X9B IS VERSATILE, WAIT 'TIL YOU SEE THE SYSTEM.



It starts, of course, with our remarkable, lightweight 13x lens that's ideal for ENG and other field production use, yet versatile enough for the studio. Featuring a more sensitive $f/1.6$ aperture. Broad zoom range from 9mm to 118mm. And enough ruggedness for any application.

But that's just the beginning. By adding our accessory system, your ENG or small studio camera takes on new dimensions in versatility: Extend the focal length up to 1.5x *with no light loss*, using our teleside converter. Add a 2x rear extender, or combine with the converter for 3x extension.

For wider shots, snap on our 0.75x wide-angle attachment, which gives you a 6.75mm focal length *with no light loss*. Providing a wide-angle, wide-aperture lens with full auto-iris capabilities.

More? More. Remote focusing and zoom, manual or motorized. With easy-to-use rocker-switch controls. Or twist-handle grips via flexible cable couplings. For greater handling ease, either way you want it.

All in all, there's a lot more to our J13X9B zoom than meets the eye. In versatility, as well as performance. For more information, contact us directly, or specify the Canon J13X9B when ordering your new ENG camera.

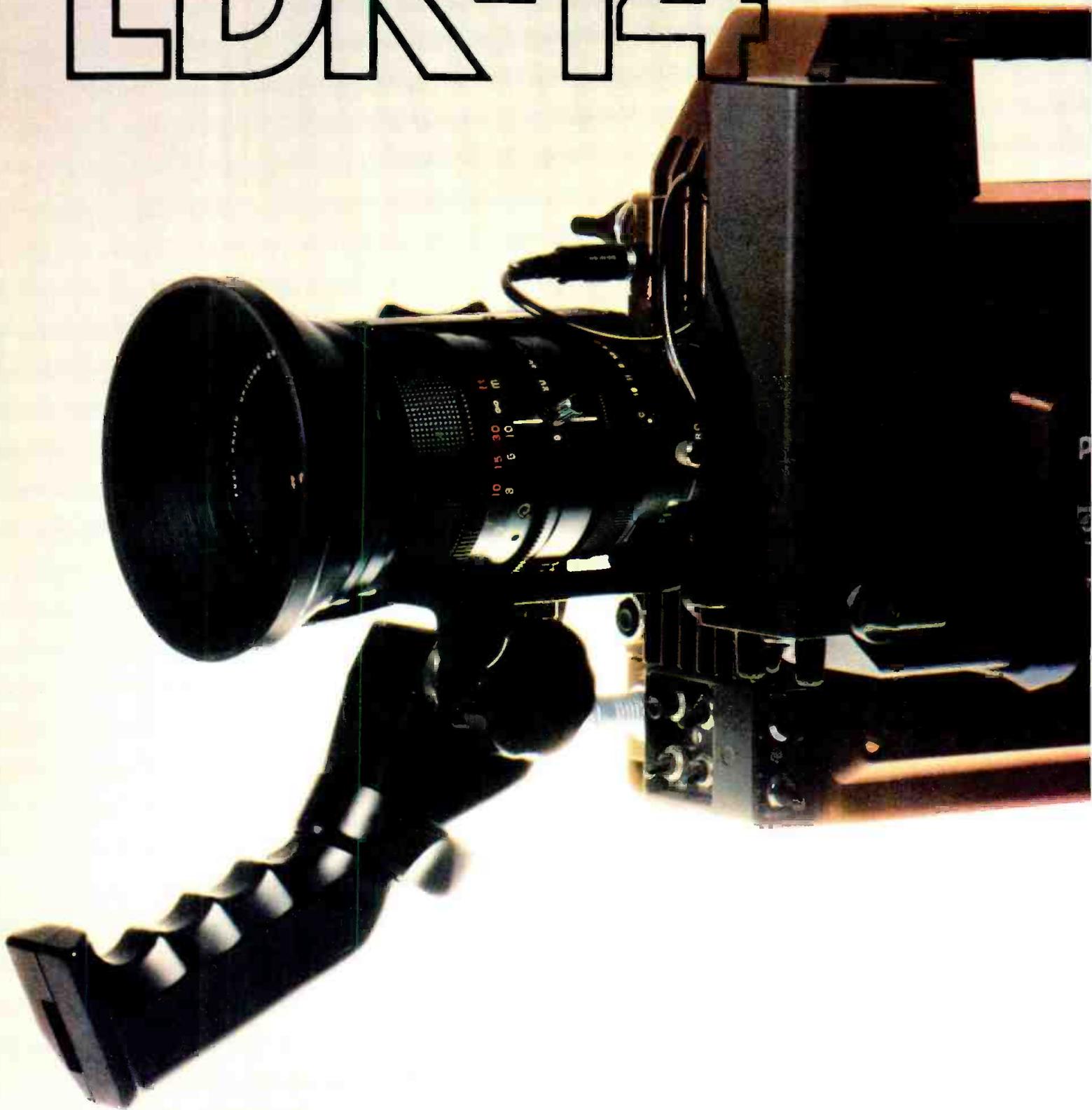


Canon®

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 Paulino Avenue East, Costa Mesa, Ca. 92626 (714) 979-6000
Canon Optics & Business Machines, Canada, Ltd., 3245 American Drive, Mississauga, Ontario L4V 1B8, Canada
Canon Amsterdam N.V., Industrial Products Division De Boelelaan 8, Amsterdam, Netherlands

Circle 128 on Reader Service Card

New Standard for Portables... LDK-14



In the great tradition of Philips portables:

1968...PCP-70 The industry's first portable. The one that started it all.

1969...PCP-90 Step two. World famous Minicam.

1975...LDK-15 First generation of triax field production cameras.

1976...LDK-11 A smaller, lighter, lower cost field and studio camera.

1977...Video 80 An innovation in lightweight camera and production system...LDK-15L Latest version of the LDK-15.

Evolving from this long history of portable equipment leadership, Philips' engineers have created a new concept in portable and field equipment. *The LDK-14 broadcast systems camera.*



A futurized camera offering three advanced configurations for field and studio use...all achieved *without equipment repackaging:*

1. *ENG*—studio quality portable: self-contained, one piece; film camera handling; weighing less than 15.5 lbs. (7 Kg) lens included; less than 12 lbs. (5.5 Kg) without lens.

2. *EFP*—studio quality portable, with remote control; timing and phase adjustable gen lock; instant convertibility to studio camera use by simple change of viewfinders.

3. *Studio*—compact, maneuverable; full broadcast quality; 5" viewfinder.



The LDK-14 combines innovative design and unique capabilities in a state-of-the-art 2/3 inch camera that is *much lighter* and *uses significantly less power* than the competitive ENG-only camera. Plus the LDK-14 gives you additional advantages in size, picture quality, stability, maintainability and cost.

Among its many other unique features for portable and studio use are:

- Only 27 watts power consumption (almost 1/3 less than the ENG-only competitive portable) gives longer continuous operation with choice of battery belt or small battery pack affixed to camera. A standby switch further conserves battery power between takes.



- Viewfinder displays include: contour enhanced camera picture or external video signal; status monitors for video level, color balance, bars on, battery discharge, VTR functioning, intercom call and camera tally.
- Automatics include: color balance; white and black level; centering; noise reduction when operating with extra gain; auto iris with set and hold facility.
- Externally switchable black stretch and contrast expansion.
- Dynamic Beam Control (DBC), regulates beam current to suppress comet tailing and blooming.
- Circuitry designed to maximize advanced capabilities of the latest rear-loading Plumbicons.

- Optional remote control facilities.
- Easy access for set-up and maintenance. Rear casing flips up for access to five main plug-in circuit boards.
- The rugged magnesium housing and titanium quick-release lens mounting holds all optical and electrical components in absolute registration. (Lens mount is strong enough for the heaviest extended range zoom lenses.)
- Rain, splash and RFI proofed.
- Other features include electronic raster rotation for better registration; linear matrix for optimal and Philips compatible colorimetry; and 360-degree hue-selectable chroma key.
- Other competitive cameras may have some of these LDK-14 features—no one has them all.

Camera-Recorder Systems

With this unmatched combination of performance and portability, the LDK-14 is *also the ideal camera for field recording of ENG and EFP.*



And just as Philips has always offered the widest selection of portable and studio cameras to meet your specific needs, the same policy now applies to your choice of 1" VTR's and TBC's. Offering 'C' format and 'B' format VTR's in both portable and studio configuration, Philips can provide the greatest objectivity and cost-effectiveness in packaging systems to match your requirements.

Philips, the company that started it all, now introduces the latest portable breakthrough, the LDK-14 broadcast systems camera. It will be the industry standard for years to come. And for a camera-recorder package to match your requirements, your choice of 1" VTR formats. Only from Philips.

For all the facts on this innovative new camera or camera-recorder system (please specify) write: Philips Broadcast Equipment Corp., 91 McKee Drive, Mahwah, N.J. 07430 (Canada: Philips Broadcast Equipment, 601 Milner Ave., Scarborough, Ontario M1B 1M8)

Innovative Leader in World Television

PHILIPS

TM-N.V. Philips

Circle 129 on Reader Service Card



YAMAHA'S NEWEST TOURING PROFESSIONAL.

Yamaha's new PM-2000 Mixer. Ideal for professional sound reinforcement, it's the kind of full production console pros have always had in mind, but never in hand.

The PM-2000. The touch is solid, smooth, consistent. It feels like the professional console that it is.

The knob, switch and slider placement anticipate where your hands will naturally fall.

With 5-position, 4-band equalization and six independent sends on all 32 inputs, plus a full function, 14x8 matrix, the

PM-2000 has everything you would expect from the consummate professional console.

And if the PM-2000 looks and feels like a custom console, and seems to have read your mind, it is no accident. Because Yamaha spent two years on intensive research

and prototypes based on input from professionals. One touch and you'll realize: the PM-2000 feels how you think.

Available early 1979, on a limited basis, through select Yamaha dealerships

 **YAMAHA**
P.O. Box 6600, Buena Park, CA 90622
Write for complete information on the PM-2000.



Circle 130 on Reader Service Card



Digital Technology In Broadcasting Begins To Look Like A System

Part 1: Digital video effects lead to profound changes p. 43

Part 2: Graphics systems become super versatile p. 53

Part 3: Digital at NBC approaches system status p. 64

THERE ARE NUMEROUS occasions each evening when the American television viewer is looking at a picture that exists almost entirely in the mind of a computer; in fact, it may exist in the minds of several computers. The "slide" that is keyed behind the newscaster may be the output of an electronic still storage device containing millions of bits of information that define color, border, and shapes, while the letters that provide the supered title may be only microsecond pulses of digital information and the size and position of the entire "key" may be determined not by the size and shape of the chroma key area, or even the position of the switchers' wipe controls, but instead by a continuous computation of the size and shape of the chroma key area available.

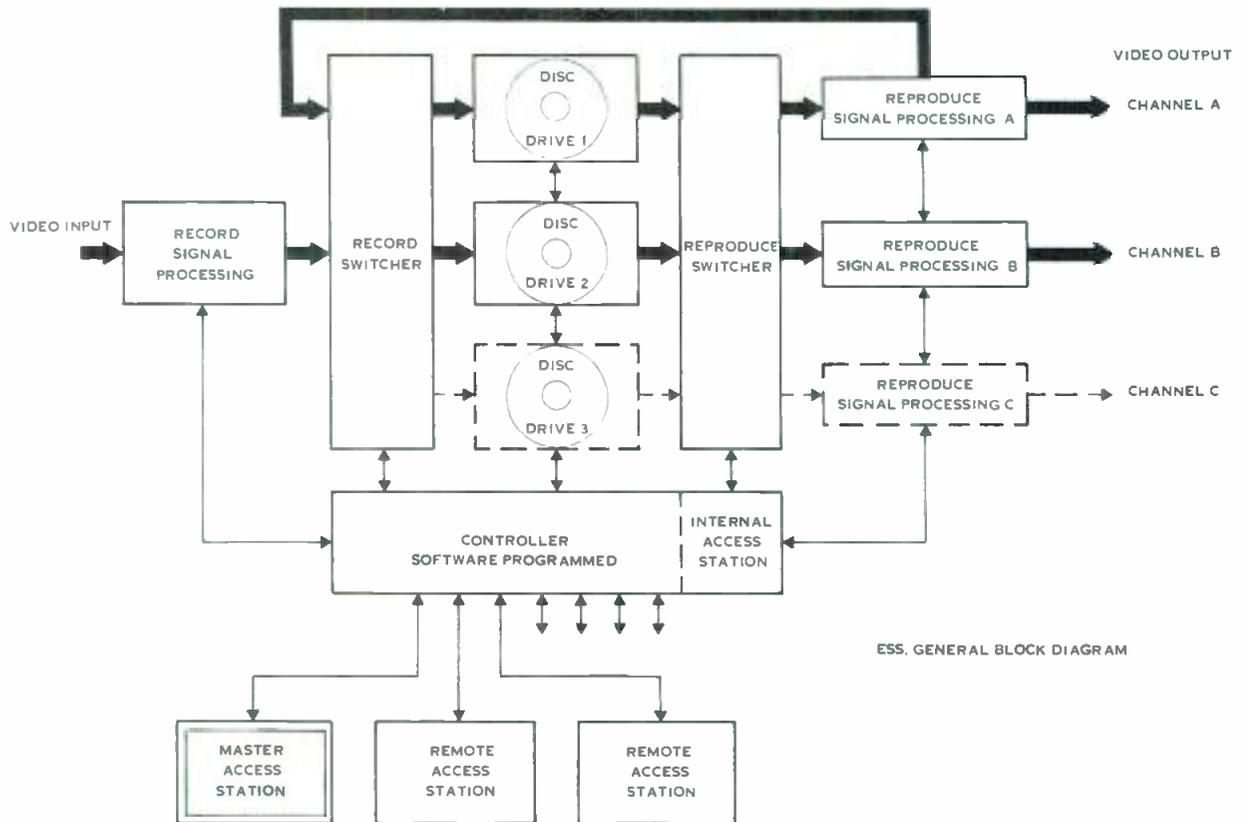
In numerous issues preceding this special report, *BM/E* has covered the subject of digital technology from primarily an "introductory" approach, with technical articles on

new equipment, primers on digital theory and microprocessors, and discussions of likely areas for further development of digital technology. During this period, enough digitally based equipment has entered the routine of broadcast operations to warrant a look at how it is being applied and what broadcasters' experiences have been with the new technology. Much of what broadcasters have discovered about digital was expected — much of the equipment has performed in the way it was designed to perform — but the demands of broadcasters have also turned up a few problems and developed many applications that the digital designers only vaguely conceived.

The "black box" stage that has been the story of digital development thus far is still very much with us. As the papers that were delivered on the subject of digital technology at the recent 120th SMPTE Technical Confer-

continued on page 42

Digital Technology in Broadcasting



General block diagram of the ESS-2 Digital Video Production System. Although it began as a still store, the system now provides variable speed recording and playback and is used in both production and post-production modes

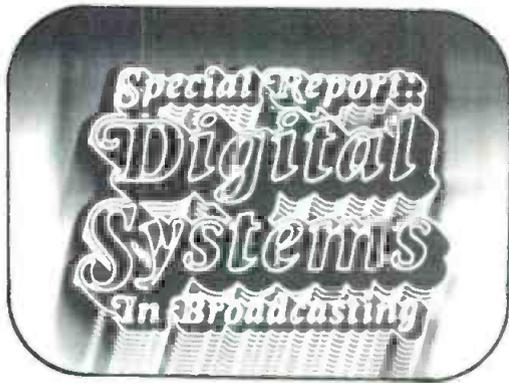
ence indicated, the breakthroughs necessary for the proclamation of dawn of the digital era still wait in the shadows for digital standards, more efficient memories, and more specialized solid state designs. But we are getting closer. The panel discussion at the conference on the "Near Term Future of Digital Technology" yielded the uniform opinion that the digital videotape recorder would be the true hallmark of this new era, and that the development of a practical DVTR was still some years off. Prophetically, A.A. Goldberg of CBS Laboratories said that the market would first see some special purpose digital recorders. Just weeks later, while researching this article, *BM/E* editors found at least one instance of a digital "still store," Ampex's ESS-2, being used as a digital production recorder. True, the ESS-2 is not a DVTR, but the fundamental benefits of storing images in digital form and being able to recall them at variable speeds from real time to freeze frame has led Matrix Video's director of engineering, Bob Lieberman, to utilize the ESS-2 in ways that provide a glimpse of things to come.

Matrix Video, a commercial television production house located in New York City, took delivery on its ESS-2 in early September of 1978. The system, which grew out of the CBS/Ampex joint venture on the development of a massive electronic still storage system, ESS-1, caught Lieberman's eye not as a still store but as a variable-speed video recorder. This computerized disc recorder/player has the capacity to store on a single disc pack either 814 stills or 27 seconds of real-time video. Matrix uses the ESS-2 Digital Video Production System as both a production and post-production tool. In a production mode, the ESS-2 is used to permit matched dis-

solves, a frequent technique in commercials. Imagine wanting to change the makeup, hairdo, clothing or some other aspect of a model's appearance as she pirouettes on screen. Matrix is able to do this during production by recording the final frame or frames of the camera's output onto the ESS-2. After the change is accomplished, the model repeats her movement while the ESS-2 playback is fed to the switcher as another source. When the action from ESS-2 matches the action from the new scene, the dissolve is effected. In essentially the same manner, Matrix uses ESS-2 to provide matched cuts and dissolves in post-production when using a single VTR as a source machine. (This is sometimes required when Matrix employs its BCN-20 VTR, since it has just the once BCN machine and many A/B cuts need to be made between different segments of the same tape.) Essentially, the last few seconds of scene A are recorded onto the ESS-2, and then the head of scene B is located. As ESS-2 plays back the segment of scene A, the edit is made to scene B at the appropriate moment.

According to Lieberman, the reason this technique is now practical — though it had been possible previously — is that there is absolutely no loss of picture quality while the video is in the digital domain. Therefore, cuts and dissolves accomplished through this technique suffer no apparent generational loss. This zero degradation characteristic of digital storage makes the digital video recorder a very versatile tool. "There is absolutely no special effect," says Lieberman, "that couldn't, in theory, be produced by using the ESS-2. One can store a frame, play it back and add to it, store again, play it back, modify it again, store it again, etc. etc."

Part 1: Digital Video Effects Provide Profound Changes



Bellis exemplifies the experiences of not only dozens of post-production houses involved with both programming and television commercials, but of on-air broadcasters, too; the introduction of digital systems such as the Vital Squeezoom, Grass Valley Group DVE, and MCI/Quantel DPE 5000 has finally opened videotape up to the outer

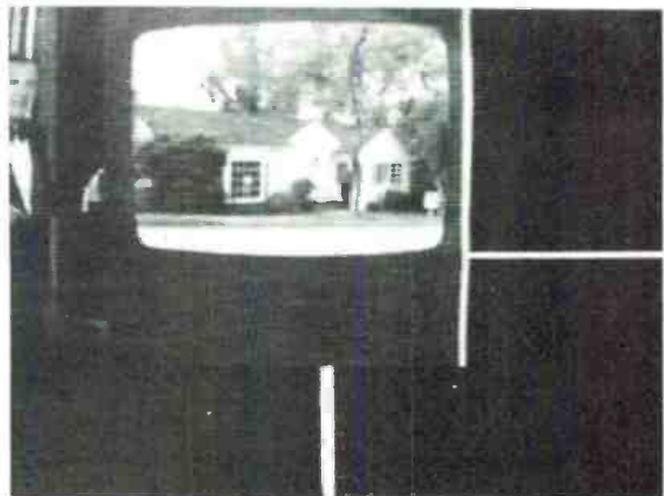
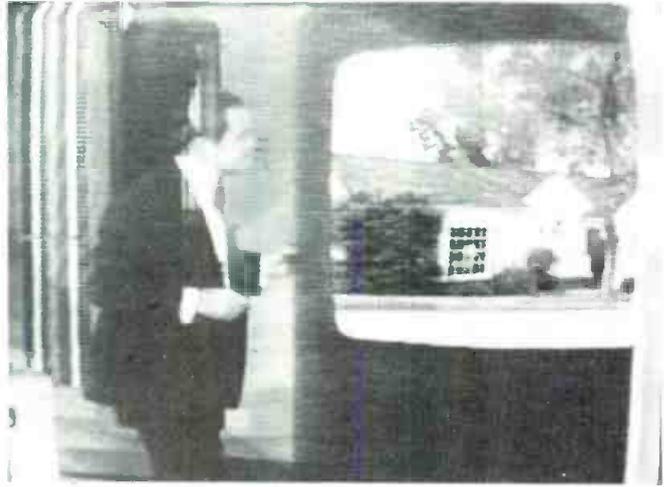
continued on page 44

THE UNIQUE CHARACTER of video information in digital form has provided broadcasters with the power to manipulate the video image in ways never before possible. In the few short years since *BM/E* began covering digital devices in television, we have moved from the single purpose device, such as the time base corrector, through a range of products such as field and frame synchronizers, some with special options like freeze frame and compression, to very powerful digital effects devices that allow the television image to be manipulated in a completely protean fashion. Many of these effects devices have now found their way into routine broadcast applications.

Spotting images created on one of today's ultra-sophisticated digital special effects systems is simple; they inevitably contain effects that just were not possible when video was in the analog domain. For example: the screen starts out red. A full-frame image of runners in motion appears as a postage stamp-sized shape in the upper left corner. Slowly, it begins folding over itself, at the same time continually expanding in size and moving toward the center of the screen. A final flip locks it into full-frame position, the titles which have been folding over with the image finally legible. For example: A yellow star-shaped insert appears in the center of the screen. The yellow dissolves into a performer's face which talks for a second or two, then freezes. The star shape carries the face to the corner of the screen, deposits it, then returns to the center to be dissolved into another performer's face. When the screen is filled with six of these frozen star images, the star patterns dissolve into circles and the performers come to life again. For example: the chroma-keyed block behind the newscaster dissolves into a live full-frame image of a fire bordered in red, complete with one-line caption. It then wipes diagonally into a second, live image, again with caption. As the announcer begins the story, a smooth off-center zoom expands the chroma key to full-screen and wipes back to the announcer at the end.

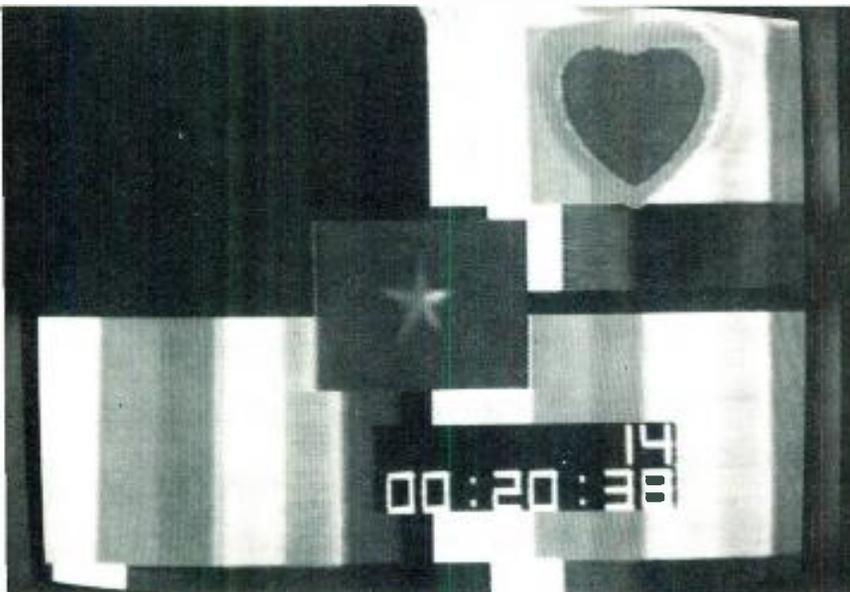
Vital Squeezoom

"Before digital video devices," says Newt Bellis, president of Mobile Video Systems, a West Coast teleproduction company, "we were basically unable to move an image after it was a composite signal on videotape and locked into the sync track. Now, with digital devices, we can move the image almost anywhere we want in almost any configuration. You can do things that, before digital video devices, were impossible."



Unretouched monitor photographs of an Alan King special post-produced at Compact Video Systems on Grass Valley Group's Digital Video Effects system, interfaced with E-MEM. King first pulls out a panel with a chroma key insert that is automatically tracked by DVE. Still tracking, the DVE compresses the full frame into a corner of a quad split, then pops on three additional images

Digital Technology In Broadcasting



Sample effect created by Ken Zeran Productions on Mobile Video System's Vital Squeezoom system. Mobile, which has had the system for some six months, has been a proving ground for Squeezoom

limits of creative imagination previously reserved only for those willing to commit enormous budgets and extravagant time periods to produce the effects on film.

Bellis' operational experience with digital video systems can be generalized for a large segment of the broadcast industry. Mobile installed Vital's Squeezoom (a prototype model) as part of its new post-production facility which opened in August, 1978. It has therefore been a proving ground for the Vital system, which should be in a full production and delivery schedule by January, 1979. Squeezoom is interfaced with Mobile's Vital production switcher, which is equipped with PSAS, Vital's Production Switching Automation System. Thus, any effect created on the four-channel Squeezoom appears like any other switcher input, and the digital setup can be memorized along with other effects and transitions for instant recall.

Squeezoom offers a package of special effects features encountered on almost all of the digital video effects systems. One of the most important of these is the digital devices' ability to take a full frame of video and compress or expand it. Once the image has been compressed, it can be moved anywhere on the screen (or off the screen from where it can be slid into view). With the repositioning of compressed frames, it is thus possible to build up extremely complicated split-screens or graphics patterns by positioning images either in symmetrical arrangements (as in quad split or combination of multiple quad splits), or by varying the size of the panels, in arrangements giving more emphasis to certain of the images.

Similar effects possibilities open up when the frame is expanded. This is the equivalent of a zoom-in, except that it can be accomplished in post-production where, until now, one had to aim a camera at a display monitor and use the camera's zoom lens. With picture expansion, it is possible to either zoom into the image to show highlights of the action or to magnify only a portion of the frame using one of the system's pre-cut masks (circles, squares, stars, etc.) to give a "magnifying glass" effect which can, by positioning the mask, actually be moved about over the

surface of the image.

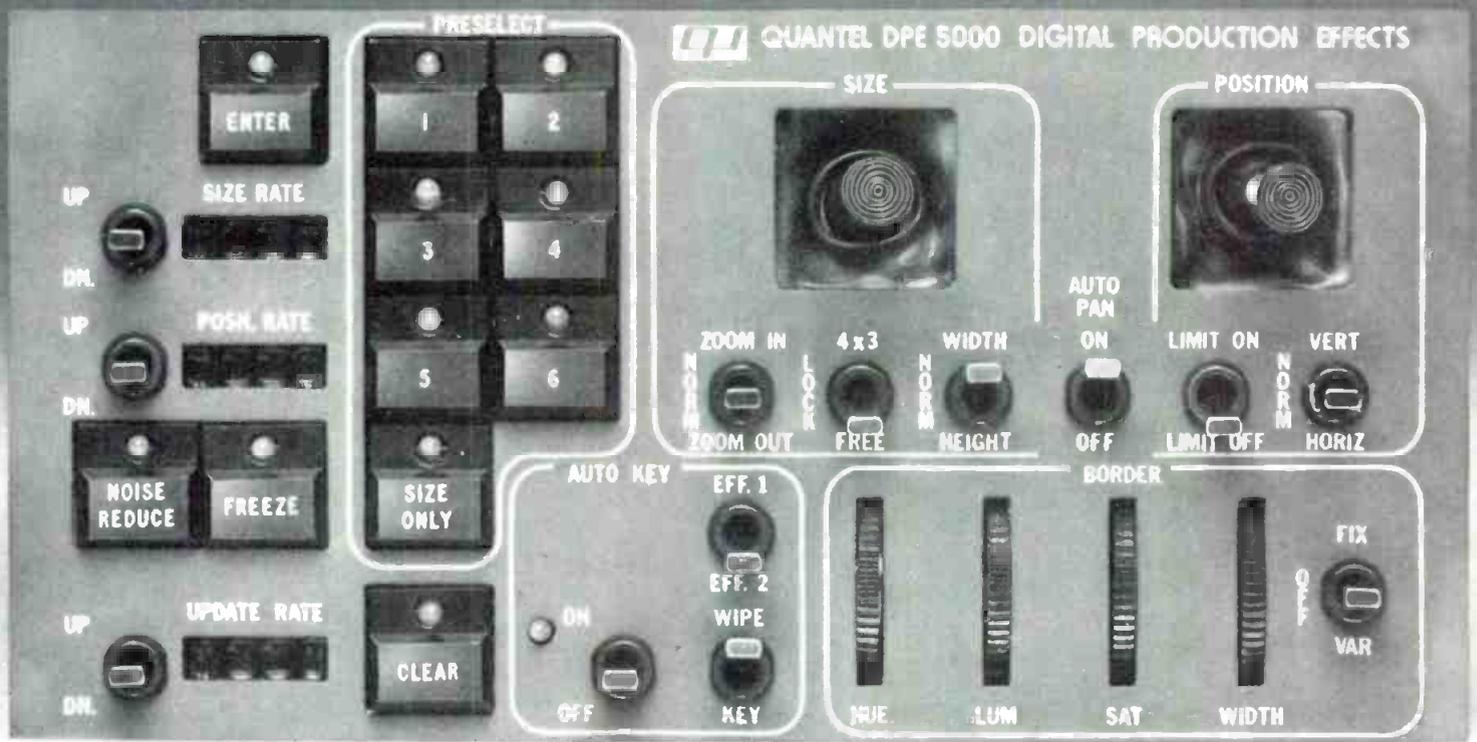
Compression and expansion also make possible the characteristic "squeeze" effect in which, instead of one image wiping across another, the incoming image will actually squeeze the full frame of the outgoing image tighter and tighter until it disappears. The same concept is used to achieve flips, in which case the outgoing image is first compressed from both sides towards the center, then the incoming image expanded from the center out. Most digital devices operate on either horizontal or vertical planes, or both, so that squeeze effects can operate in all directions, including diagonally.

In addition to the compression and expansion capabilities and a variety of pre-cut wipe and insert patterns (moveable throughout the frame), the other great benefit associated with digital effects systems is their ability to track a chroma key. If, for instance, a key insert image of a circle has been generated in the upper right hand corner of the screen and a picture of a performer chroma-keyed into it, the circle can be expanded and repositioned to fill the whole screen while the chroma key expands simultaneously. It is also possible to actually create effects within the circle while it is expanding. This chroma key tracking function is most often seen in news presentations where the on-air personality sits alongside a screen which displays slides or moving images. Traditionally, this setup has been handled either with photographic projection onto a rear-projection screen, sometimes located many feet behind the announcer to compensate for lighting conditions, or by chroma-keying the news clip into a blue matted area behind the announcer. In the latter case, of course, only the small area of the total news clip image which fell within the chroma key area would be visible until the camera zoomed into the blue area. With the combination of video compression and key tracking associated with digital effects systems, however, it is now possible to display the entire image of the news clip in the chroma key area, and then expand the chroma key area to fill the screen as the local reporter delivers the piece. Further, it is possible to actually position the on-air personalities directly in front of the chroma key without fear of their dropping out if a box wipe is used.

These digital effects systems contain digital frame stores. With this option it is possible to freeze any frame during an effect, or, in fact, to use the frame store as a blanking width corrector. The systems are also designed to work with color border generators, either integral to the effects system or part of the production switcher.

Perhaps the most significant advance of Squeezoom is its capacity to work with up to four different video channels at once. According to Bellis (who quotes Mobile's rates on the Squeezoom as \$150 an hour basic, with an additional \$50 an hour for each of the three additional channels), the majority of effects require two channels — for chroma key inserts, wipes, repositions, etc. However, with the four-channel option, multiple split-screen images can be quickly assembled, as can the exciting "hall of mirrors" effect in which an image is repeated in ever-increasing or decreasing size across the screen. Vital also points out the fact that up to four cameras can be fed into Squeezoom at once and recorded as a full-frame quad split. The four synchronized images can then be played back through the Squeezoom and any one of them expanded to full-screen, thus providing an exciting new multi-camera production and post-production technique.

continued on page 46



Production control panel of the DPE 5000.

SOME PEOPLE GIVE YOU DIGITAL EFFECTS. WE GIVE YOU DIGITAL EFFECTS WITH OPTICAL QUALITY.

There's good reason why the Quantel DPE 5000 is the world's most widely used system for digital effects: optical quality.

The DPE 5000 produces effects that are smooth, realistic, virtually indistinguishable from optical effects. Good enough to be used live on the air. With confidence.

A full-fledged minicomputer and several microprocessors handle millions of digital manipulations that make Quantel effects more camera-like.

And our unique production control panel, shown above, gives the operator "extra hands" to smoothly control operation and bring into play the marvelous range of DPE 5000 effects. Automatic functions, programmed routines, and fail-safe limits simplify control

and eliminate constant planning and anticipation.

With the DPE 5000, you can actually expand the power of your switcher. (It can be easily interfaced to *any* switcher.) You can preselect effects — shapes, sizes, positions, even transition rates from one effect to the next.

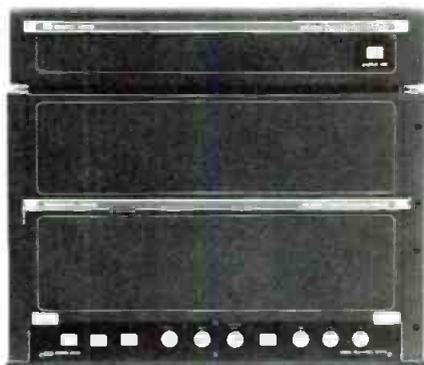
Using optional NO-BLANK noise reduction/blanking correction feature, you can salvage tapes that don't meet FCC blanking requirements.

The net effect of Quantel digital effects is a better, more exciting picture on the air — and a better, more rewarding bottom line.

For more details, call your nearest MCI/Quantel representative. Or get in touch with us directly:

Micro Consultants, Inc.,
P.O. Box 10057, Palo Alto,
California 94303, 415/321-0832.

MCI/QUANTEL



The digital video people

Circle 131 on Reader Service Card

Digital Technology In Broadcasting

No generational loss allows complex images

For some, however, the multi-channel capability is only one of many considerations in choosing a digital effects system. Jack Shultis, executive VP of operations at New York-based EUE/Screen Gems Video Services, uses a single channel DPE 5000 to "build" effects. In a recent test commercial for a national advertiser, they created a series of dazzling effects including repositions, supers, and mattes which culminated in a nine-way split screen with several of the panels containing compressed frames from the earlier effects, including the supers. Since the DPE 5000 has only one channel, the spot obviously involved the creation of many, many generations of edits; yet Shultis defies anyone to tell the difference between the finished cut and the first generation telecine transfer (the spot was shot on film).

The DPE 5000's (and other digital devices') ability to reduce noise and their extremely high S/N (typically 57-60 dB) make multiple generation editing and building of complex images a whole new tool open to the producer or director. The reason, familiar to any with experience with digital devices in either audio or video, is the difference between storing and reproducing the complex waveform signal of the analog system as opposed to the simple binary bit pattern of the digital domain. Noise and generational loss are completely overcome when a system is dealing with eight-bit binary words. Thus, image after image may be added without disturbing picture integrity.

The Quantel system, with a basic price of \$125,000 when supplied with its picture expansion and noise reduction options, may seem a high ticket price for a device that will simply add to the effects repertory of a broadcast or post-production operation. On the other hand, Editel in Los Angeles, a subsidiary of EUE/Screen Gems, claims to have already paid for its Quantel 5000 by simply using the system's digital frame store to correct tapes with blanking width problems. This has, indeed, proved to be the case for several stations and post-production houses who found themselves in possession of devices which would not only

guarantee that their own products would meet FCC specs, but could also provide an invaluable service for others.

Obviously, however, the real advantage of the system is its creation of the wide range of digital effects we discussed earlier — eight percent expansion (H or V), unlimited compression, repositioning, chroma key tracking, automatic masking, bordering (with the option of either allowing the border to float with the frame as it is compressed and expanded or of filling in the screen as the picture contracts), flips, etc. One of the most useful features of the effects package is its ability to remember up to seven preprogrammed effects and run them with the touch of a single button. In a typical effects setup, the TD might first use the "size" joystick to compress the frame into a small, bordered box which would be positioned off-screen with the "position" joystick (the DPE 5000 offers the option of either limiting the screen position to the standard 4 x 3 frame to guarantee against accidental "pushoffs" or allowing the position to float free on or off the screen). The size and position are then stored in the first memory bank as the initial setup. The TD would then use the size joystick to expand the image to, say, half-frame, at the same time repositioning it in the center of the field. With thumbwheels, he would indicate the rates at which the size and position were to change. All this information would then be stored in register two. He might then want to expand the image size to full frame (register four) and then make a three-second diagonal squeeze wipe (with the size and position joysticks set to control both horizontal and vertical movements simultaneously) which would then be stored in register five. After finishing the creation, it would be ready to be recorded, and all that would be required to air the sequence would be to push the register buttons at the appropriate cues. Recent PROM software developments by Quantel (available as free retrofits on existing DPE 5000s) now enable all seven presets to be programmed for size, position, and rate.

The setup at EUE is equivalent to that found in many commercial facilities using digital effects. There are four on-line editing rooms, each equipped with a cable interface to the Quantel system, which is located in a separate equipment room. EUE has only one control panel at

continued on page 48



Sample commercial created by WBRE-TV, Wilkes Barre, Penn. on GVG's DVE system. Multiple image effects represent one of the significant advantages of digital. WBRE will shortly open its own commercial production company, Digital Video Productions



Scene from WNET-TV, New York's MacNeill/Lehrer Report, showing reporters seated in their New York and Washington studios. Setup maximizes the MCI/Quantel DPE 5000's compression and auto chroma key tracking capabilities

THE SWITCHER



DRC 4000 SERIES

Now Ampex provides a new dimension of video control with increasingly popular Duca-Richardson production switchers. The most advanced, most capable, most flexible big boards in the world of video creativity.

Think of an effect, and get it. A simple, calculator-type keyboard gives you access to 100 patterns. Key ahead of mix/effects from two buses simultaneously. Create each composite from as many as five sources, using just a single mix/effects.

Ten different standard systems let you go for Duca-Richardson quality in a number of size/capability combinations.

Duca-Richardson production switchers. A perfect complement to Ampex color cameras and VTRs. Now the Ampex brand is on the big boards, too.

AMPEX MAKES IT EXCITING.

Ampex Corporation, 401 Broadway, Redwood City, California 94063, 415/367-2011

Circle 132 on Reader Service Card

Digital Technology In Broadcasting

present, which is moved from one editing room to another as needed. Extra control panels cost \$5000 each from Quantel, and Shultis finds it just as convenient to wheel the control panel about and connect it where needed.

Almost all effects possible with digital

Shultis's experience with television commercial clients who suddenly find themselves confronted with unlimited possibilities in videotape was echoed by almost everyone we spoke with about the digital effects systems. Ron Balousek of Producers Color Service in Michigan sums it up perhaps the best of all: "I'm an old optical film man myself, used to the incredible complexity of the multiple matte runs involved with creating film opticals. And I must say that there really isn't anything that we can do with film that we can't do with the Quantel DPE 5000 unit. We have done complicated seven-way split-screens, zooms into chroma keys, repositioned incredibly sophisticated graphic images — all with a minimum of expense and time."

Balousek's only question was the quality of the images, which was also pointed out by several others we spoke with. As John Godfrey, engineering supervisor of the Television Laboratory at WNET (New York's PBS station) put it, "We aren't quite at the state of the art yet as far as the quality of these units goes. Some have problems with horizontal signals, some with the vertical, some with the interfaces. Chroma noise is a continuing problem, even with the built-in chroma noise reducers found on some of these units. However, their digital designs mean that when, in a short time, the technology has come a little further along, it will be simply a matter of replacing a circuit board or two. The problems, at this point, are simply ones of program software, not inherent design."

Godfrey is quick to point out, however, that the expanded production capabilities of systems such as the DPE 5000 far outweigh any minor problems which may still remain with signal handling. WNET, which has had its 5000 for only a short time, has already found a major use for it during the nightly *MacNeill/Lehrer Report* — a live "soft" news analysis. With MacNeil in New York and Lehrer in Washington, WNET was looking for a way to get around having to shoot the newscasters off red-tinted monitors for insertion into the corresponding chroma key areas. The Quantel 5000, with its built-in frame store synchronizer and chroma key tracking, enables the process to be carried out digitally in either New York or Washington (which has an identical setup) as a round robin interconnection. Godfrey also anticipates that as directors become more familiar with the system's capability, more and more actual special effects uses will be found for the system.

WBRE opens Digital Video Productions

Experiences with the DVE system are as diverse as those with the other digital effects systems, and GVG points to sales to networks, stations, and post-production facilities alike. A station in Wilkes Barre, Penn., WBRE, has had its DVE package (interfaced with E-MEM on a 1600 switcher) since May, 1978. President David Baltimore says the station is doing a booming business in correcting tapes with blanking width problems for clients all over the East Coast, at the rate of \$500 an hour for

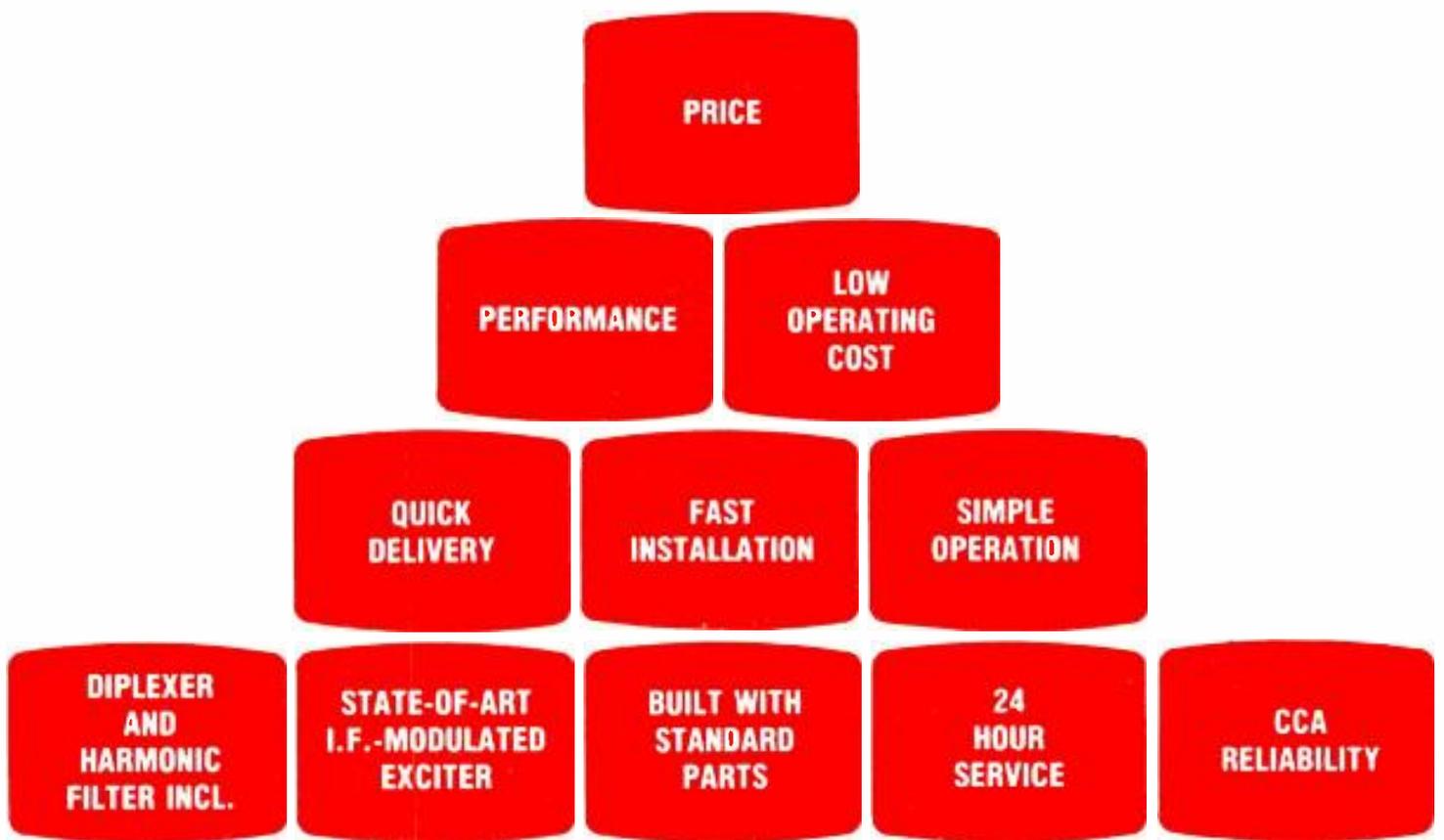
immediate service and \$300 an hour for five-day turnaround. The station also maximizes the expanded effects capability of DVE for its regular programming and television commercial production. One great advantage, according to Charles Baltimore, director of engineering and production, is seen in WBRE's daily *Crossfire* program, an interview show in which the interviewer and interviewee are alternately squeezed into a corner box. With conventional chroma key, the camera had to shoot a wide shot of the person being boxed so that the image could be positioned to fall within the key area. With the DVE compression, on the other hand, the person to be boxed can be shot in close-up or medium shot and the full frame image compressed into the box.

As we have seen, the range of digital effects available with systems on the market today differs little from manufacturer to manufacturer. GVG's Digital Video Effects (DVE) system, incorporating NEC's FS-15 digital frame synchronizer and DVP-15 digital video processor, is no exception. Frame compression and expansion, automatic chroma key tracking, repositioning, quad split, hall of mirrors, and other effects can all be simply generated. Where the systems differ is in how they utilize their microprocessors and memories to achieve the effects and in their approaches to interfacing the digital effects generators with other pieces of studio equipment. Thus, while the DPE 5000 can be interfaced with virtually any switcher since it contains its own control panel and automatic sequencer, and the Squeezoom, too, can be integrated with most production switchers (though it depends on Vital's PSAS for automatic sequencing), the DVE system contains no operating controls. Rather, it relies on the levers and controls of the GVG 1600 Series production switcher and the possibilities offered by E-MEM to carry out the effects.

Located directly alongside the other switcher controls are the few simple buttons needed to interface the DVE with the switcher; four pushbuttons control the selection of digital channels (up to four, including quad split); a few other buttons control the mode — picture expansion or contraction, split screens (for squeeze wipes or regular wipes), aspect ratio, etc. Once the mode is determined, control of the effects is accomplished through the switcher with picture size and position determined by signals from the 1600 and controlled by the movement of its levers. Similarly, if the 1600's chroma key signal is used, DVE will automatically track it. Multiple re-entry for the creation of extremely complex effects is thus simply a matter of calling the appropriate signal from the 1600's source busses.

So, too, it is possible to use the effects created by DVE in conjunction with E-MEM, GVG's microprocessor-assisted effects memory system, optional on its 1600 Series switchers. E-MEM, which will, with the touch of a button, remember up to 22 effects, including extremely complex transitions and rates of change (dialed up on a thumbwheel), presents the possibility of preprogramming most of the effects for an entire news show before on-air presentation. A new development from GVG, E-CARD, even permits the storage of frequently used effects setups on a magnetically-stripped "credit card." Once inserted, the card automatically transfers the effects stored on its magnetic stripes into the same registers, minimizing the number of setups needed for daily programs, especially news.

continued on page 50



Which do you want most in your new TV transmitter?

They're *all* yours when you select a CCA UHF or VHF TV transmitter.

Especially price.

There must be something in the way we build our TV transmitters and in what we say — we've sold more this year than ever before.

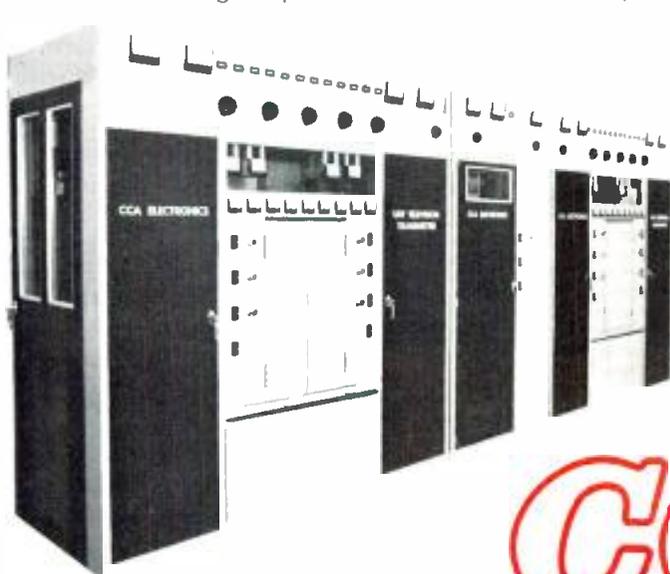
CCA builds both UHF and VHF TV transmitters with power levels rated through 220KW. Modular design allows field modification to higher power levels with no interruption in

service. And they can be ordered to meet all FCC and CCIR operating specifications.

Check CCA features — and check CCA's price. You'll probably find, like our satisfied customers, that CCA offers the most value in a reliable TV transmitter at a price others can't touch.

Call our toll-free number — 800-257-8171 — for complete details.

Or write CCA today.



CCA

CCA Electronics Corporation • Broadcast Plaza • Cherry Hill, N.J. 08034

Call toll-free: 800-257-8171 • In N.J. call collect: (609) 424-1500 • Telex: 845200

Circle 133 on Reader Service Card

The DPS-1 Mainframe Plus

Digital Video Systems' DPS-1 is not exactly a sophisticated digital video effects generator, but neither is it exactly a "black box" TBC or frame synchronizer. Instead, it represents a novel approach to satisfying a number of station needs using the technological ease by which digital systems can be expanded by simple read only memory modifications.

The basis of the system is a Mainframe which contains the three elements needed in any digital system: a power supply, an A-D encoder to transform the analog signal into digital bits, and a D-A decoder to transform the digital signal back into analog form for re-introduction into the television system. The \$9600 Mainframe also contains a digital "proc amp," sync generator, microprocessor control, and control panel. To turn the device into a low-cost TBC, one need only add a \$500 input buffer, a \$900 16-line memory, and a \$1500 I/P sync generator, all of which are basically plug-in modules. For a more typical TBC, a \$1700 32-line memory is substituted for the 16-line version, \$3,000 worth of velocity and dropout compensator circuits are added, and presto, it's a fully digital TBC. Substitute a \$6,200 256-line memory and it becomes a field store TBC/frame synchronizer. Add a \$2400 comb filter for handling still frames and expand the memory to 512 lines (\$9000) and you have a frame store TBC/synchronizer. And so on.

It is the potential of adding a digital comb filter and control circuits to the system in order to achieve some special digital effects that makes the DPS-1 worthy of mention here. The comb filter separates the luminance and chroma

components of the digitized signal before manipulation and storage. Operating at 4x subcarrier frequency, it adapts itself to changes in picture content so that the separation is almost perfect. This permits all the colorization and edging found in most digital effects systems. Horizontal effects such as pushthroughs, rotations, horizontal repositions, flipovers, page turns, horizontal squeezes, expansion, and mirror effects can be achieved with only a few lines' worth of storage in the memory. By adding a fully field memory, the same effects can be achieved on the vertical plane. Multiple microprocessors are used to control different parameters, enabling additional software to be programmed into simple read only memories.

Several stations we spoke to in connection with this article have had the DPS-1 on line for enough time to evaluate its performance, and all report fine results. WNEW in New York City has been using it for synchronizing incoming satellite feeds from England to station sync so that they can insert breaks and intros. Frank Willis at WFMY-TV in Greensboro, N.C., is also using it as a frame sync for locking in the station's two remote vans and also on election night for syncing live feeds and another station's program.

At present, the special effects capabilities of the DPS-1 are still under development, with the freeze-frame feature likely to be perfected within the next few months. According to John Lowry of DVS, as software and firmware improvements become available, they will be able to be simply and inexpensively added to the mainframe.

Further broadcast experience with the DVE system comes from KING in Seattle, Wash., where TD Bud Johnson and CE John Shawcroft have been experimenting with DVE and E-MEM on the station's news program. A typical KING setup provides a good example of just how useful this system can be. "We put a slide which we want to reduce and put into a boxed window on the news set into the DVE's Effects 1. In Effects 2, we chroma-key the live camera image from the news set and insert the slide from Effects 1 so that the talent won't drop out behind the box. On Effects 3, we lay in the announcer's name, which is generated by our Telemation Composer I. Meanwhile, film is rolling in the chroma key. Our next setup, which follows immediately, involves our weather forecaster delivering his report in front of a large, rear-illuminated chroma key screen involving a completely new set of switcher settings. We take the graphics from the Composer I which are in Effects 1 and put them over an outdoor slide. In Effects 2, we want to be able to mix to other sources, such as satellite pictures with wipes or dissolves. In Effects 3 we put all of the settings in Effects 1 and 2 into the chroma key of the forecaster's screen so that he is in front of it at all times and all the material in the background is controllable by dissolves. The complete changeover from the newscaster to the weatherman is accomplished by the push of a single E-MEM register button, leaving us free to cue up the A&B roll commercials and all the other things which have to be done. When the forecast is over, we can go back to the first register immediately for the next story."

Still another experience with the DVE/E-MEM package comes from Compact Video Systems, a California-based production and post-production facility which was responsible for the 25th Anniversary of Walt Disney Pro-

ductions and the 50th Anniversary of Mickey Mouse shows which were seen last year; both used extensive digital special effects. Another major post-production job involved the creation of a 16-way split screen for a Cher Special. Post-production manager Steve Mitchell describes with pride the process by which six generations of multiple quad splits were laid down, each panel containing a different angle or effect of the same original action.

Mitchell is also excited about the new flurry of interest by local television advertisers in the possibilities presented by the digital effects, pointing out the parallel to the situation five or six years ago when wipes and dissolves became all the rage in the production of local spots. "It's the latest way for them to put all the whistles and bells into their minute or 30 seconds of air time," says Mitchell, "and make their spots look flashy and fancy on relatively low budgets. This really applies to record companies whose promos have traditionally been in the vanguard of presenting exciting graphics and visuals."

From all these experiences with digital effects, it should be clear that a whole new era has opened up in television, adding both to the visual appeal of regular programming such as news, and also to the special needs of television commercial production. It is also evident that the process is only just beginning, as more and more applications are found for the effects systems. Providing an almost limitless possibility for creative imagination, production people are still very much in a learning cycle, discovering just how limitless the possibilities are, as engineers and designers continue to work toward the total perfection of the systems' designs.

Part 2: Digital Graphics Systems page 53

Now. A broadcast quality TBC for heterodyne VTRs



it controls blanking problems too!

It's the CVS 516, first digital TBC made and priced to give users of non-segmented, heterodyne VTRs all the proven advantages of modern digital video processing.

The CVS 516 is ideal for ENG, teleproduction, studio VTR backup and much more because it has features that, before, you'd find only in TBCs costing up to twice as much.

Correction of chroma/luminance delay problems, a chroma noise reduction of 3 dB, velocity compensation and color dropout compensation are all standard. So are a broadcast stable, gen-lock sync generator and a built-in, completely adjustable processing amplifier.

The 516 also includes circuitry to closely control FCC blanking problems. For example, it combines exclusive CVS Gyrocomp memory organization with a 2 line (or optional 16 line) memory, automatic VTR advanced sync and available H and V blanking adjustments. The result is complete control of output blanking.

Simple operation is another plus. Front panel con-

trols give you total mastery of your video signal. Each control also has a preset unity position to give you a consistent starting point for all your tapes.

If all that's not enough, add our optional, moderately priced Image Enhancer/Noise Reducer. This plug-in card substantially reduces luminance and chroma noise, and significantly improves subjective resolution.

The CVS 516 weighs only 35 pounds, stands just 3½ inches high and uses only 175 watts—major advantages with today's increased emphasis on ENG and field production.

So, to give your heterodyne productions the quality they deserve, get the one digital TBC made and priced to do the job—the CVS 516.

For full details and/or a demonstration, contact your Authorized CVS Distributor, or CVS, today. Also, be sure to ask for our popular booklet about the basics of digital time base correction, and a reprint of the article "TBCs, Blanking and the FCC."



**Consolidated
Video
Systems, inc.**

1255 E. Arques Avenue, Sunnyvale, California 94086 (408) 737-2100 Telex: 35-2028

Circle 134 on Reader Service Card



**“The TDF-1
makes
all our signals
studio quality.”**

“The TDF-1 Digital Noise Filter has made a major difference in how our news feed looks...

“As a member of ITNA, we receive co-op news feeds from all over the world, and sometimes they are 6th or 7th generation converted from PAL by the time we receive them. The TDF-1 absolutely dramatically cleans up even the worst feeds. It makes us look live . . .

“Commercials shot with ENG/EFP equipment look better. It cleans up shots under existing light to the point where the client is happy with them . . .

“Overall, our day-to-day operations look significantly better.”

— Hal Protter
Vice President and General Manager
KPLR-TV, St. Louis, Missouri

“The TDF-1 has given us a consistent air look and higher overall quality - better than network ...

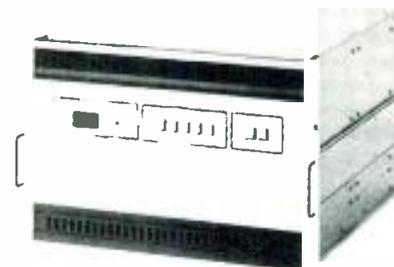
“It really makes life easier — it improves the signals that need improving and leaves the rest alone . . .

“We did a side-by-side test with a competitive unit, which we thought was pretty good, but when we brought the TDF-1 in — well, somebody had sure done their homework on it! It especially handles film grain better . . .

“It’s fabulous on cartoons! By the time you run the TDF-1 up to its top correction, you end up with a signal that has no grain . . .

“I haven’t seen anything it doesn’t handle well.”

— Jim Gonsey
Chief Engineer
KPLR-TV, St. Louis, Missouri



TeleMation
A Division of Bell & Howell
P.O. Box 15068, Salt Lake City, Utah 84115
(801) 972-8000, Telex 388-352

© 1978 Bell & Howell Company. All rights reserved. TeleMation and Bell & Howell are trademarks of Bell & Howell Company.

Circle 135 on Reader Service Card

Part 2: Digital Graphics Systems Become Super Versatile



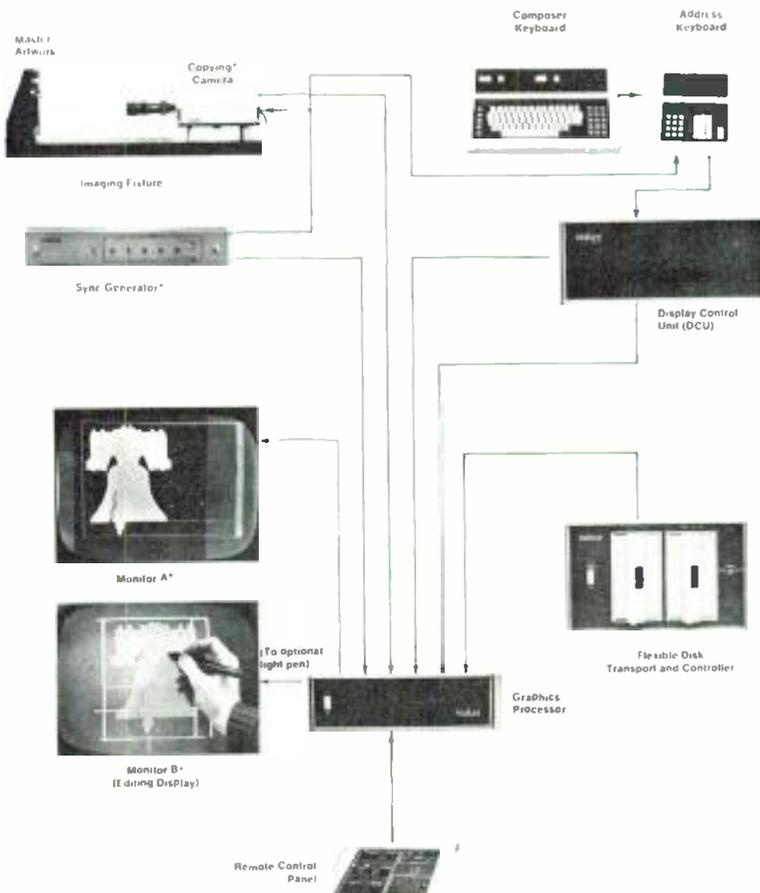
IF THE CURRENTLY AVAILABLE digital effects systems can be considered to be still in their infancy, digital graphics systems and character generators are already great-grandfathers. Very early on, manufacturers such as Thomson-CSF (Vidifont), Chyron, and Telemation (Compositor) realized that, with the relatively simple task of electronically generating and positioning graphic displays (pages), a computer technology-based approach would enable them to update programs rather than hardware. Today's ultra-sophisticated systems still rest on the same basic digital technology that was used four and five years ago when the systems were first introduced. What has evolved are some rather amazing ways of using it.

Harold Stevens, TD at WJBK, Detroit, calculates that the station uses over 50 pages of Thomson-CSF Vidifont information during the 21 minutes of news on its half-hour noon news show, and over 100 on its one-hour evening news. For the weather report, WJBK relies exclusively on Vidifont graphics, supering them over background slides. The 38 weather symbols, representing everything from

sunshine to tornados, lightning, and the phases of the moon, were created on the station's font composer. The 64-line high figures, some designed to be integrated with numbers representing temperature, humidity, wind direction and velocity, etc., are stored on the font disc under letters such as *s* = sun, *t* = partly cloudy, etc. Generally, a preset sequence is composed and transferred to the second disc for on-air playback using the address keyboard located in master control. In emergencies, however, a font operator will work with the director during the actual newscast.

WTCG creates electronic scoreboard

Another station making extensive use of the Vidifont's large storage capacity is WTCG in Atlanta, which has two Mark IVs with colorizer/keyer, preview page, and second disc drive options. One of the Vidifonts is permanently installed at the station; the other travels about with WTCG's mobile truck. The station produces an enormous amount of sports programming, including 100 Braves baseball games, 40 Hawks basketball games, 25 Flames hockey games, and several Falcon pre-season football games per year, in addition to supplying all three networks and half a dozen syndicators with other college sports programming. Its Vidifonts, either working back at the station when games are being broadcast by WTCG or in the field (usually in a separate font room at the sports arena) when the program is for another station, can be supplied with any of 30 different character fonts supplied by Thomson-CSF. The most creative use of the Vidifont system, however, is seen in the station's series of 128-line high sports logos, one for each team in the baseball, football, hockey, and basketball leagues which the station



Graphics page created by Thomson-CSF for use by WTCG, Atlanta. Graphics were created from artwork supplied by the sports leagues and are used as part of WTCG's electronic scoreboard

Block diagram of Thomson-CSF Vidifont Mark IV font compose system. Note optional light pen for correcting or creating graphic elements as small as 45 ms wide by 1 scan line high

Digital Technology In Broadcasting

covers. These logos, in addition to the station's own logo, were created at Thomson-CSF from artwork supplied to the station by the leagues. Thus, with relatively inexpensive software, the station is able to impart distinctive appeal to its electronic scoreboards.

Chief engineer Jack Ormond has also come up with a novel way of getting around the station's lack of a sync generator coupled with the Vidifont system. He takes the Vidifont output and feeds it through a device which rolls off the high end of the signal and then sends it as an external key input to his Grass Valley 1400 and 1500 switchers. After 260 nanoseconds, the colorized Vidifont graphics are inserted into the hole just cut out by the key source. In this way Ormond is able to handle multiple key situations which might otherwise be difficult to obtain without the rolloff and external key.

The Thomson-CSF Vidifont Mark IV, the latest in the line of Vidifont systems, now offers the possibility of using two 96-character fonts simultaneously, with a range of sizes (18 to 128 scan lines high) that can be mixed within a line, with all characters falling on the same baseline unless otherwise programmed. The key to the system's versatility is the floppy disc store, which provides random access to the two-font storage discs and the 192,000-character memory disc, capable of storing the equivalent of 6000 rows of information (averaging 32 characters per line). A second disc drive option doubles the page storage capacity, while an optional preview channel enables composition on one page while another is being used on-air.

Average access time to any stored message is .3 seconds, and switching between messages is accomplished during the vertical interval, enabling back-to-back dis-

plays. Nine roll and crawl speeds are provided. Edge position controls move characters horizontally or vertically in three positions for drop shadow effects, while the page positioner allows vertical adjustment of the page — ± 16 lines in two-line increments.

Once the font discs have been loaded, message composition is accomplished through a standard keyboard. An address keyboard controls loading of fonts, storage and recall of pages, and access to the optional colorizer/keyer and preview page of memory. Thus, the composer keyboard can be located in a separate area while the much simpler address keyboard can be located in the control room for on-air displays.

As is true with the other digital graphics systems, the Vidifont is far more than simply an electronic character generator. The advanced model of the Mark IV, the Mark IVA, contains a wealth of additional graphics software. Background colors, for instance, can be chosen for a full page, full row, or partial row and recorded during composition. Color windows of any size can be randomly positioned throughout the page. Outline characters are simply created by removing the character video and leaving the character outline, which can be varied in level from white to black. Drop-shadow characters are created by edging the characters in various levels of black or white. Options on the Mark IVA include a full color preview page, a sequencer permitting automatic page playback at pre-recorded rates, and an RS-232C interface.

An extremely useful addition to the Mark IV and IVA systems is the Thomson-CSF Font Compose system, which allows the creation of special, customized lettering fonts as well as graphics elements such as logos, fancy displays, etc., up to a maximum size of 11.5 μ s wide by 128 scan lines high. To enter the basic image into the system, artwork is placed on a copy stand and shot by the station's own monochrome camera. An alignment grid which appears on the display monitor allows the proper positioning of baseline, height, and width. Once the initial setup is completed, the digital processor is placed in an edit mode and the frame is captured. At this point, the character or artwork appears in a digitized form on another display monitor. Any portion of the captured artwork can now be corrected or modified by means of an X-Y cursor or an optional light pen. Since the system contains a variable 10x magnification range, extremely detailed touchups can be done on video elements as small as 45 ms wide by one scan line high. It is also possible, with the light pen and the processor in the edit mode, to actually create a logo or character from scratch.

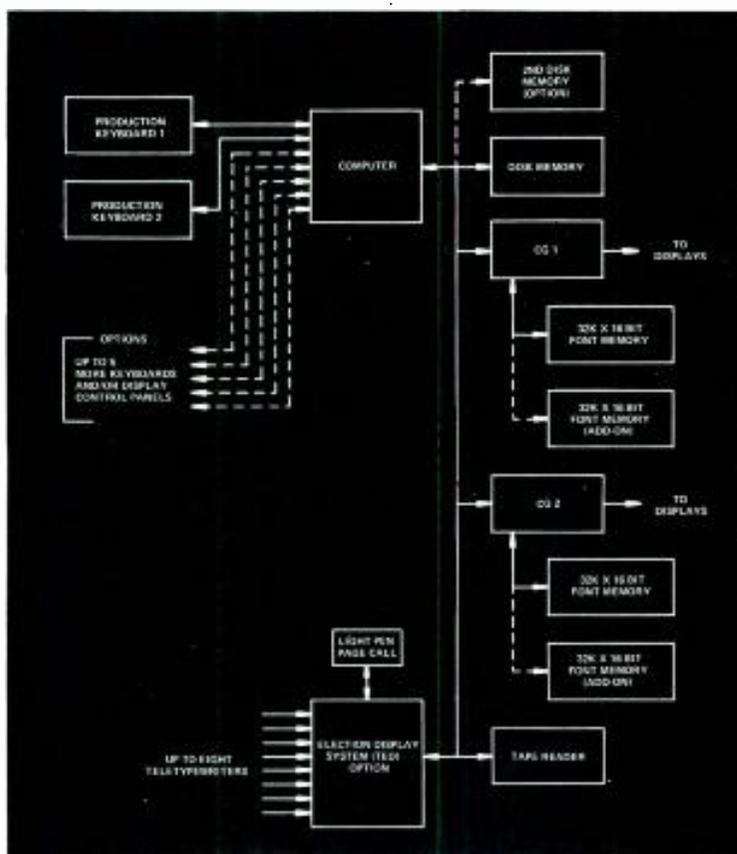
Once the editing is completed, the character is assigned an ASCII address by the remote control keyboard and memorized on the font disc for later recall.

Speed, repeatability, simplicity of operation, and flexibility — these are the hallmarks of all three digital graphics systems under discussion here. As Jack Shultis at EUE/Screen Gems puts it, "we have virtually done away with graphics cards now, and having to tie up a camera to shoot them. Gone are the days when we had to cancel an editing session because the television commercial director forgot to bring his logo; now we just keep them on file on the disc."

WNEW creates unique graphics

At WNEW, the MetroMedia flagship station in New York, VP of engineering Bill Kelly originally installed a

continued on page 56



Block diagram of TeleMation's Composer I graphics system in a dual configuration with optional TED (television event display) election reporting package

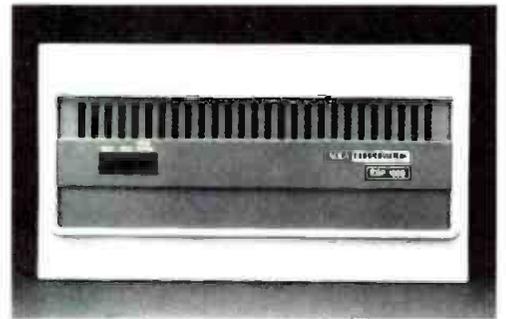
NOW EVERY STATION CAN AFFORD NETWORK QUALITY DIGITAL STILL STORAGE.

**INTRODUCING THE ADDA ESP-100B.
PROVEN DIGITAL TECHNOLOGY FOR UNDER \$45,000.**

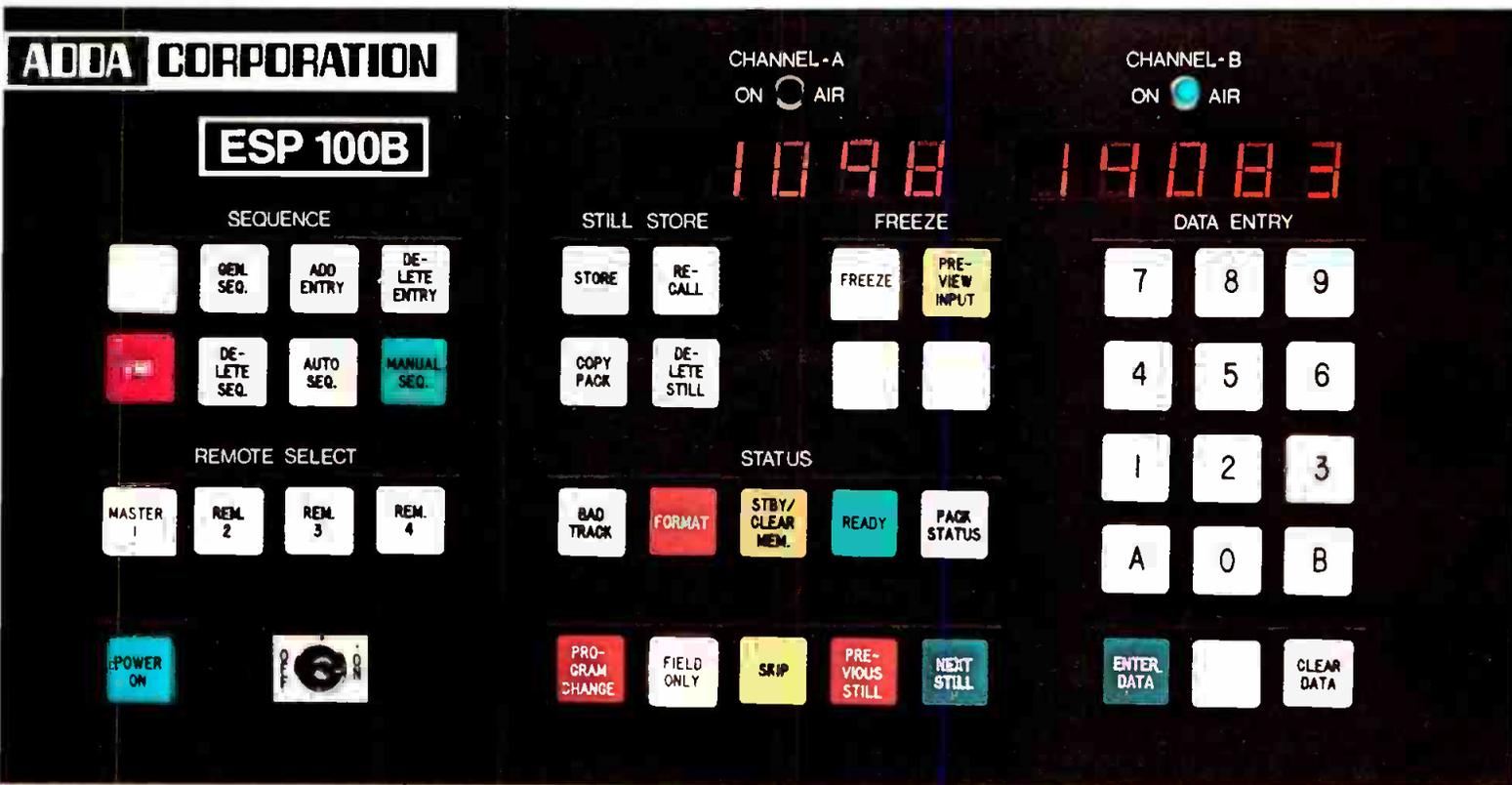
Here's ADDA's latest digital still storage breakthrough—priced so every station can afford superior digital picture quality without slide handling problems. The ESP-100B offers performance similar to our higher cost systems, but with a smaller, rack mounted, fixed disk storage capacity of 200 frames. You can create high resolution stills from live camera, VTR, 16mm film, network, or satellite feeds. You can program still sequences in advance and change your mind while on the air—knowing a new still can be called up at random in less than one-half second. Unlike slides, electronic stills are always easily located and instantly available. Always right side up.

Now's the time to join the digital still frame storage revolution without putting the crunch on your budget. You can reduce your still handling and camera support time dramatically while saving thousands in film and processing costs. You'll love the enhanced picture quality, too!

Take a look at the ESP-100B for yourself. Call, write or check our reader service number for more information and a demonstration. 1671 Dell Avenue—Campbell, California 95008 (408) 379-1500.



ADDA CORPORATION

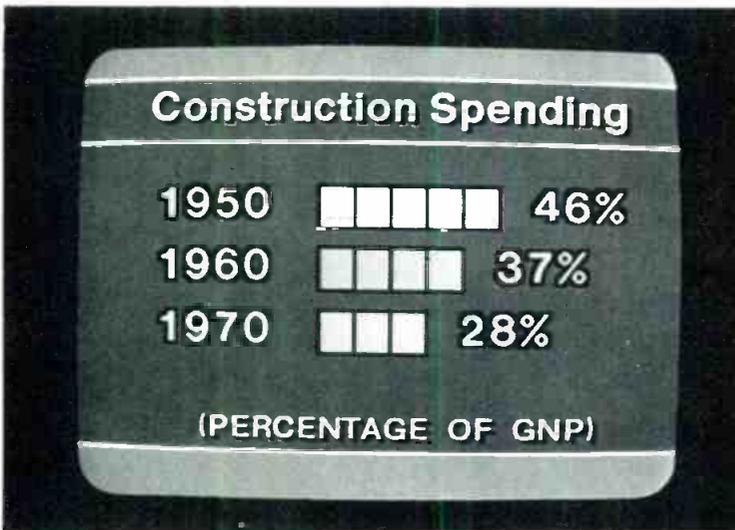


Circle 136 on Reader Service Card

Digital Technology In Broadcasting



Typical local commercial message produced by Compositor I. Note the drop-shadow effect, variable baseline in the word "accident" and individual colorization of extremely small areas



A chart produced on Compositor I. Graphics displays such as this find wide application for presenting information and for logging weather and other statistics

dual Telemation Compositor I system with keyboards in the news and graphic design department offices. The 999-page storage capacity was arbitrarily divided equally between the news and production departments for shows and commercials use. Some of WNEW's graphics would not, and in some cases could not, have been prepared if conventional graphic arts cards had been required. One example was a sports story run during 1978 Derby Week which analyzed the relative performances of Alydar and Affirmed. In each finishing sequence, the horses' names were precisely repositioned in the picture to provide positive identification.

Two new applications are now being planned, according to Kelly. One requires the addition of a third character generator, a second 999-page store, and a third keyboard located in master control. These new system components will be used as a station break slide and 10-second graphic spot storage and display system, eliminating one more need for using slides in a telecine chain.

The other application is to interface the Compositor I to two Bosch-Fernseh BCN digital stores recently added to the station's BCN-50 one-inch studio editing VTRs. This VTR accessory permits transformation of single frames of any live camera, remote, or VTR feed into a random-

accessible videotaped substitute for a pictorial slide. While the selected picture is frozen in the digital store, Compositor I graphics can then be added. When completed, the composite picture-graphic is stored in a decimally designated location on tape.

This TeleMation/Bosch-Fernseh system can completely eliminate a station's need to maintain a photographic slide processing and on-air display capability, with attendant cost savings. Further, image creating versatility and operating flexibility are expanded immeasurably by having image creation, storage, recall, updating, and on-air display simultaneously controllable from several locations in the station.

Skills needed to operate Telemation's Compositor I are comparable to those necessary to operate a font-selectable electric typewriter smoothly. The single character generator system is, in fact, much like such a typewriter. Its substantial added versatility comes from incorporation of techniques and functions common to graphic arts production, computer system data storage and processing, and broadcast operations.

In graphic arts production, the system features unlimited font capacity, with up to eight fonts on-line available at one time; character edging, bordering, shadowing and outlining in scores of combinations, with variables of luminance level, edge/outline width and height, and drop or slope shadowing; incremental vertical and horizontal positioning of individual characters; colorization of graphics and backgrounds individually and independently with 28 colors (7 hues at four brightness levels each); combination of internally generated and external backgrounds in the raster, in which characters can be crawled, rolled, blinked, popped in and out, and changed in color; and use of the system-controlling teletypewriter in combination with "Font Build" software which permits construction of custom fonts, logos, graphs, and other graphics from its keyboard.

Random access storage of 999 individual pages that may be called up as individual displays or automatically timed animation sequences is provided by the computer's data storage facility, along with automatic formatting of characters to be inserted in recalled, standard pages (weather maps, sports scores, etc.) including font, edging, color, background, and tab characteristics. Characters in a single or a sequence of pages can also crawl or roll.

In broadcast operations, remote control of the system is offered from any of up to seven keyboards or display-only control panels with assignable priority interrupt status, each connected to the system equipment rack through a four-conductor cable. An internal two-page memory permits instantaneous cuts from one page to another without "waterfalling" or blackouts, while variable "dwell time" (i.e., frame callup rate) permits automatic freeze frame or animation display of sequences.

Dual character generator systems permit simultaneous utilization of the two character generators in display or graphics creation operating modes from separate remote terminals, subject to selectable priority interrupt arrangements. A valuable operating mode available with dual systems is automatic full-color display of the "on-air" and "next" pages in a chained sequence, on adjacent monitors. While this "dual display mode" may take away system control and visibility from an operator at another terminal, the material on a page being composed at the

continued on page 58

Look to Cetec Broadcast Group for first-quality radio systems

Cetec System 7000:

The exceptional microprocessor-based program automation system speaks broadcast English. Up to seven days' programming; up to 10,000-event memory. Backed by 26 years of radio automation leadership and more than 1000 systems in the field!

Cetec FM Antennas:

Great JSCP circularly polarized antennas, proved in more than 1600 installations. One bay to twelve bays. Precision tuned and tested to your specifications.

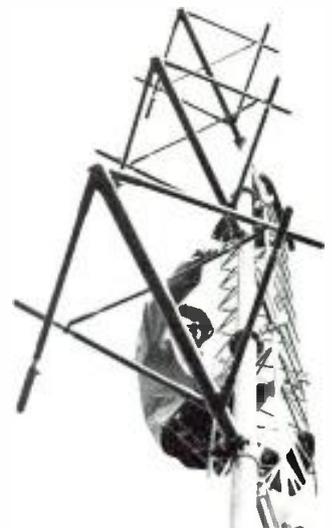
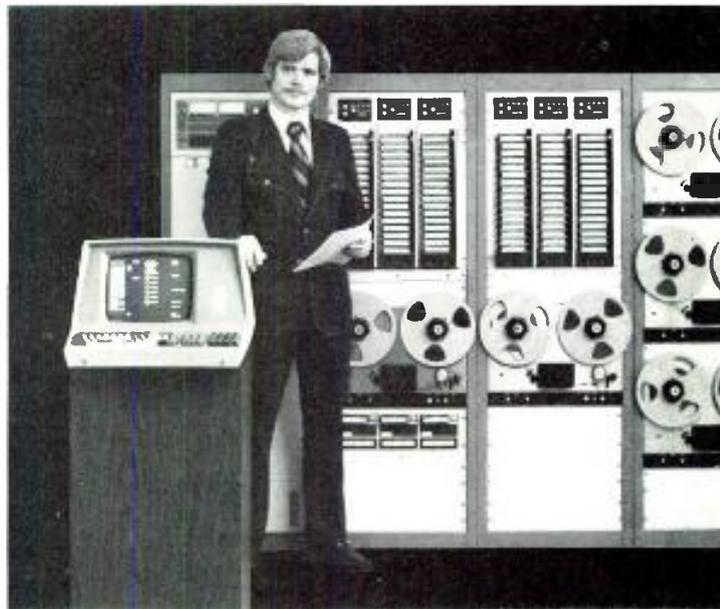
Cetec AM and FM Transmitters:

From 10 watts to 50,000 watts. Both solid-state and tube-type models. Strong, simple, rugged, dependable.

Cetec Studio Equipment:

Centurion II mono and stereo consoles, tape cartridge machines, professional turntables, complete studio systems, designer series studio furniture.

See Cetec quality in action at the NAB Show in Dallas!



Cetec Broadcast Group

Cetec Corporation
1110 Mark Avenue, Carpinteria, CA 93013
Telephone: (805) 684-7686

Circle 137 on Reader Service Card

Digital Technology In Broadcasting

time of interrupt is automatically transferred to a scratch pad memory and returned to that terminal display when the interrupt ends.

The TED election package allows the election night program director wide latitude in combining up-to-the-minute displays or votes counted in each of 200 races. These may be unrelated, but more commonly will include both subsidiary election district counts and grand totals for all similar districts. Displays may be arranged either by candidates' names or by their current vote totals, with counts displayed in raw votes or percentages. Races can be called up as full pages or lower half displays combined with live pictures. Software and a "housekeeping" CRT display provide instant callup of any page by operation of a light pen.

At WTEV, operations and engineering manager Lee Tanner claims that the three-keyboard dual TeleMation system "gave an immediate, dramatic new look to the station's on-air pictures, and a smoothness of continuity that hadn't existed before. The TeleMation unit is used to create visual bumpers to get in and out of station breaks, and to dramatize the key points in our in-house produced commercials. We also use it to make 'electronic slates' for our productions."

During last year's Americas Cup Races, for instance, the station created cartoon likenesses of the boats, using punctuation marks and line elements from the keyboard, and stored them as an animation sequence on the disc. When the United States finally won the competition again, they added an animation sequence that sank one of



Chyron II monitor photograph showing a five-day forecast keyed into a shot of New York City on WNBC's NewsCenter 4. The station relies heavily on Chyron IV graphics throughout its program

the boats.

"Compositor I has also helped us in our efforts to create effective special interests programming," adds Tanner. "We have a large Portuguese-speaking community which is the core of the area's commercial fishing industry. TeleMation created a Portuguese alphabet font for us shortly after the system was installed. Now when we produce our community service programs, we can add Portuguese language titles and captions and translations, either simultaneously as they are being taped or later when they play on air."

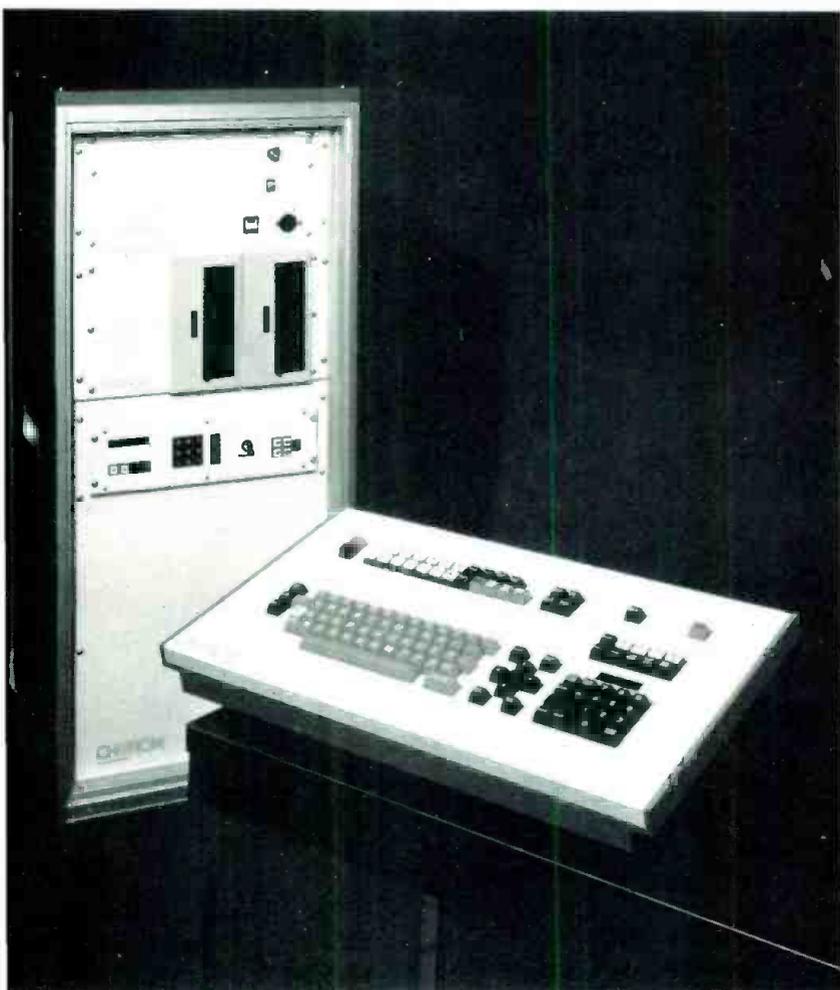
EUE Screen Gems inserts digital graphics into digital effects

When talking with stations and teleproduction facilities about digital systems, it is not at all uncommon to discover that digital graphics systems are more often than not tied into the digital effects systems. By using the output of a character generator such as Chyron as an input into the digital effects system, it is possible to create effects that not even the effects generator or character generator manufacturers dreamed of. Jack Schultis at EUE, for instance, a Chyron IV user, points out the fact that the Chyron can be used to create a wide range of insert shapes which can then be fed into his DPE 5000 as chroma key inserts. EUE, which frequently does complex graphics for industrial clients, now has the ability to not only compose elaborate graphic displays, tables, diagrams, etc., but to insert them noiselessly into another image. Schultis is also impressed with the Chyron's ability to resolve extremely fine letters such as copyright symbols, which may become lost in the low-resolution monochrome graphics camera.

The Chyron IV is the most advanced of a long line of Chyron digital graphics systems; with its optional features such as a font compose unit, colorizer/keyer, full-function second channel, right-to-left foreign language writing remote keyboards, RS-232 interface, expanded font memory, and multiple storage disc transports, it is capable of producing the enormous range of graphic displays that have come to be associated with today's high visual-impact presentations.

The font library contains dozens of styles and sizes for all types of applications. Character width, including spacing for each character, is fully proportional, with automatic character overlap. Fonts contain up to 92 characters, upper and lower case, and the 27-nanosecond increment resolution provides extremely sharp edges and good curve

continued on page 60



The Chyron IV digital graphic system showing the composer keyboard console and the character generator

IT STANDS ALONE



TV DEMODULATOR The World's New Standard

Rohde & Schwarz's TV DEMODULATOR, Type EKF 2 reflects the same high quality and performance of the Type AMF — long recognized as the world's standard. The EKF 2 is designed specifically for the U.S. market — and is priced lower.

- Continuously Adjustable — Channels 2 — 74
- Use Off-Air or at Transmitter
- Envelope and Synchronous Detection
- Sensitivity: 250 μ V — 150 mV
- Zero Ref. Pulse/AFC/AGC
- Ideally Suited for Fixed and Mobile Usage

\$6950

FROM STOCK!



ROHDE & SCHWARZ

14 Gloria Lane, Fairfield, N.J. 07006
(201) 575-0750 ■ Telex 133310

Circle 138 on Reader Service Card

See It at NAB-Booth 386

Digital Technology In Broadcasting

definition. Up to six fonts can be stored and used simultaneously, and can be mixed in any word, row or page. Any character or combination of characters can be flashed, and any word, text, or graphic can be sloped in 14 degree increments for instant italics.

Sixty-four colors are provided in an electronic color grid system, and, when used with the optional colorizer/keyer, individual characters or complete messages can be colored from full-screen height to four TV lines, independent of character height. Characters and graphics can be edged with either symmetrical block edging or non-symmetrical drop-shadow borders in two thicknesses. Transparent characters are formed by block edging.

A number of automatic functions make Chyron IV an extremely useful production tool. The Program Sequence Controller (PSC) enables the system to produce animation-like effects. The dwell time, sequences, and changed appearance of displays are recorded, so that subsequent high-speed playback can produce smooth transitions from "frame" to "frame." PSC can also capture all system functions, including flash, color, roll, and crawl, and add them to the animation effects. Five selectable roll speeds are available (including pause) and can handle up to 2000 lines of information. Five horizontal crawl speeds are also available.

Other Chyron IV features include cursor control of horizontal and vertical positions of characters or lines to form graphs, frames, underlines, and wide characters. Character overlap is controlled with horizontal shift controls that can position characters to within 224 nano-seconds of total overlap. An entire line or page can be

automatically centered with a single keystroke. Lower third displays are also automatically programmed. Still another useful feature is the ability of Chyron IV to insert or delete either characters or whole rows, making it possible to proofread and correct completed pages.

Chyron, too, offers a software program for election coverage, consisting of in-station hardware, local and remote data communications links, and software programming which ties into a national network of time-sharing computers to produce accurate, rapid election returns. The results, including analysis and display of any predetermined subsets and totaling for an unlimited number of races and candidates, are programmed through the Chyron graphics system for on-air presentation.

Though sophisticated digital graphics systems have been around several years more than their digital effects counterparts, the learning process is still going on. By expanding the software capabilities of these systems to enable them to interface with other digital data systems such as election reporting systems, weather services, stock market quotations, and so forth, a whole new area of attractive, rapid reporting can be added to a station's information presentations. Interfaced with digital effects systems, character generators have the capability of making words and graphics displays as exciting as other visuals. And, with expanded capabilities such as font composing and "animation" systems, they can be programmed to replace even the most complicated visual presentations. As is the case with any production tool with so many possibilities, the way must be left clear for those with creative talents to be allowed to experiment.

Part 3: Digital at NBC page 64

Introducing

The Galaxy

Our 12-C became the first broadcast standard turntable. We've bred this to become the second.

- Slip Cueing
- D.C. Motor
- Remote Start/Stop
- Direct Speed Read-out on LED
- Variable Speed Control
- Back Cue (*no motor drag*)
- Instant Start
- Solid State Circuit

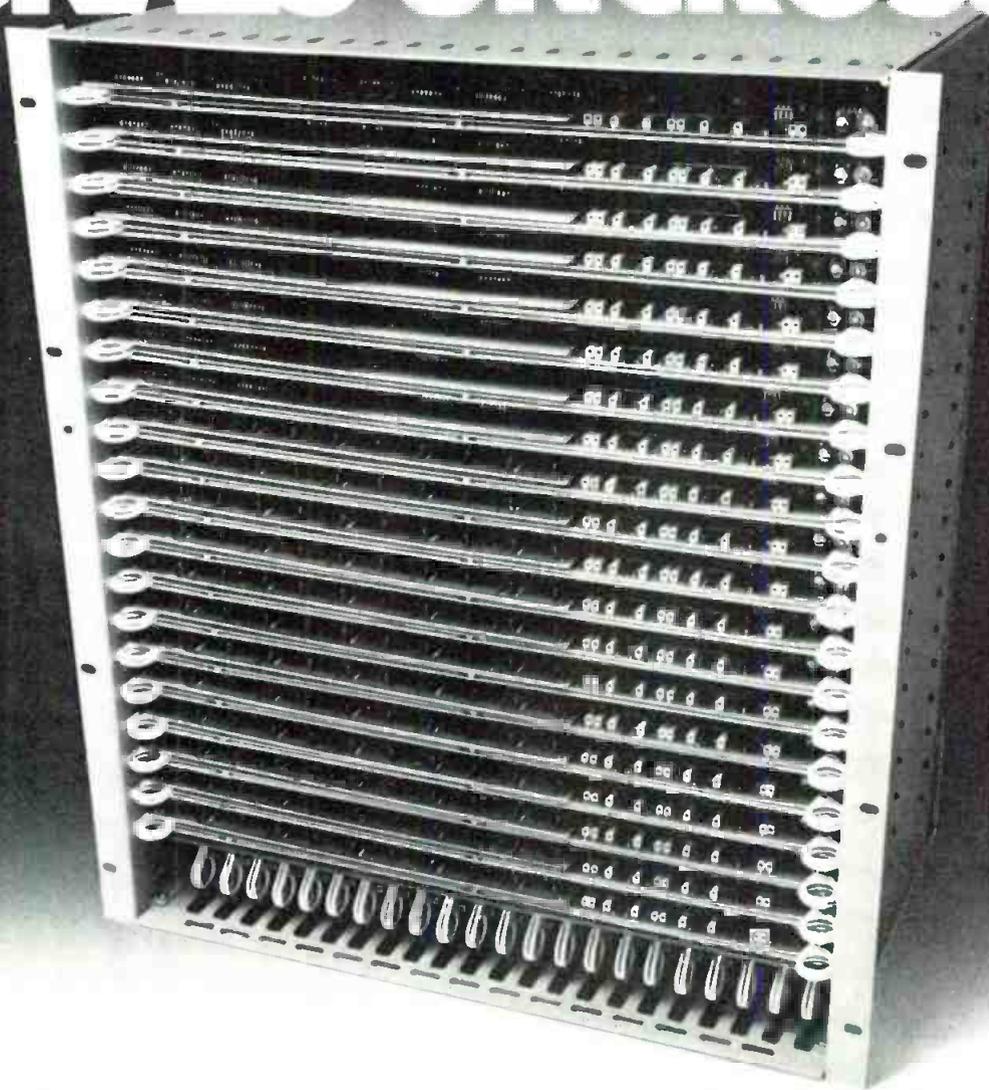


ORK Electronic Products, Inc

1568 North Sierra Vista
Fresno, California 93703

CALL TOLL FREE (800) 344-2181
Californians call collect (209) 251-4213

GET YOUR SIGNALS UNCROSSED.



No matter how complicated your studio operation is, we can unscramble your signals and send them on their way, with one of our nine off-the-shelf Switcher series.

For example, many broadcasters use our lower cost 15X or RX Series Switchers to switch input signals to their VTR machines. By providing instant access to signals at the touch of a button, difficult editing jobs are accomplished on the spot and, during the Vertical Interval.

And to minimize system downtime we've designed our Series 20X and 40X Switchers for optimum reliability and capability. Most units have a microprocessor in every channel to eliminate total system failure if the logic system malfunctions. And you can replace a channel

module without shutting down the entire system.

For audio use, our solid-state Series AX Switchers make the old fashioned patch panel a thing of the past.

All 3M Routing Switchers can be built to nearly any input/output capability, with vertical interval switching and can be operated by many types of controls.

Studio operation is getting more complex every day. You can't fight it, so why not switch? Switch to 3M Routing Systems.

Circle the reader service card number at the back of the book for more information or call 205-883-7370 for system design assistance. 3M Video Systems. Watch us in action.

3M

Circle 140 on Reader Service Card

www.americanradiohistory.com

THE FIRST 3-TUBE PORTABLE YOU DON'T HAVE TO BE RICH AS A NETWORK TO OWN.

Sharp's XC-320U is the first professional three-tube portable color camera for under \$5,000.* A price you'd expect to pay for a good one-tube vidicon camera. But price alone isn't all you'll want the XC-320U for.

Sharp gives you the quality of three-tube performance in a completely self-contained lightweight portable. With our exclusive three vidicon tube bonded block design that eliminates mechanical registration adjustments. Making the XC-320U ideal for any ENG or field production.

The XC-320U delivers a reliable picture of broadcast caliber. With greater color fidelity, S/N ratio and sensitivity (down to 15 ft-candles with +6dB gain). Horizontal resolution is 400 lines minimum.

Add any one of our optional "C" mount lenses, viewfinders and a VTR of your choice and you're ready for action. No matter where the action takes you.

For added mobility the XC-320U operates on three power sources: AC with a standard power adaptor, battery pack or car cigarette lighter.

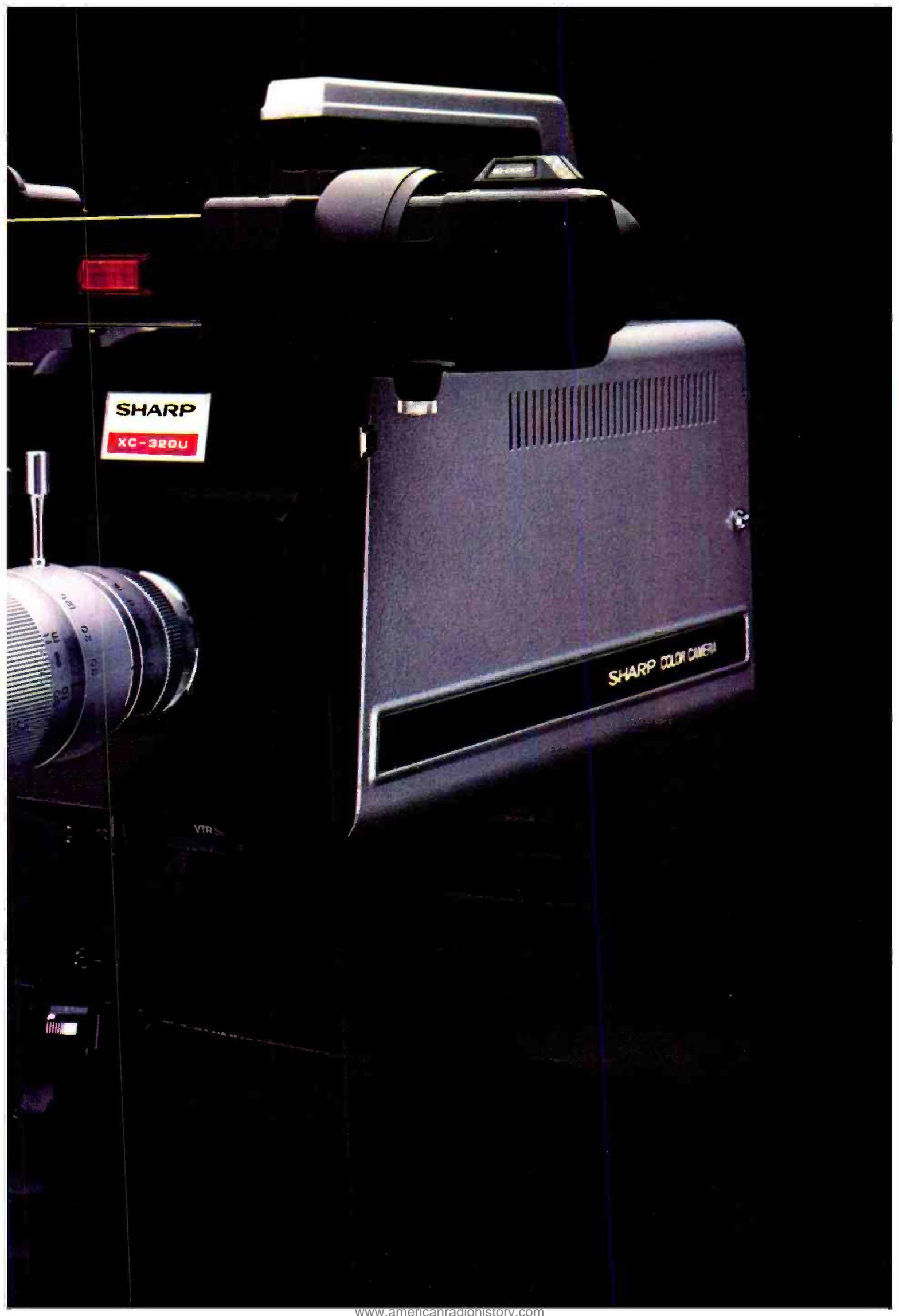
The XC-320U is easy to operate yet provides professional results. The electronic viewfinder has a built-in meter that helps you adjust the iris setting for optimum results.

Sharp's XC-320U. When you want three-tube professional quality like the networks. But don't want to pay for it.

For the Sharp dealer nearest you, call our Professional Products Department at (201) 265-5548 or write Sharp Electronics Corporation, 10 Keystone Place, Paramus, N.J. 07652



*Manufacturer's suggested list price for camera shown (without lens).



SHARP
XC-320U

SHARP COLOR CAMERA

Part 3: NBC Gets Closer To A Digital System



BOB BULTER, director of technical development for the NBC television network, is reluctant to describe the system in use at WNBC's Studio 6B as a true "digital system." Technically, the system in use for WNBC's *NewsCenter 4* program is mostly analog, but what it does could only be done given the large contribution made by digital devices.

The Studio 6B installation was designed to integrate an ADDA ESP-100 system, a Chyron graphics system, and an MCI/Quantel DVP-5000. The objective of the system was to overcome a number of shortcomings in the traditional method of using slide visuals and graphics material in a newscast. "Number one," said Butler, "the light level on the screen [in a traditional setup] had to be complimentary to the light level in the studio. Number two, the depth of focus on the lens used in the studio has always been a problem," especially when, for aesthetic reasons, you want to locate the screen at some relatively great distance behind the commentator's desk. Added to these "studio" problems, there was also the desire to shorten the time between the production of a graphic slide and its use on air. Moreover, the traditional "optical" means often produced great variations in the way an artist conceived his work on the drawing board and perceived his work on the screen after several film production stages.

Given the problems of the studio environment and the cumbersome graphics process formerly used, the limitations that standard chroma key presentations imposed on the direction of the program led to the inevitable conclusion that the entire graphics-to-screen process needed overhauling.

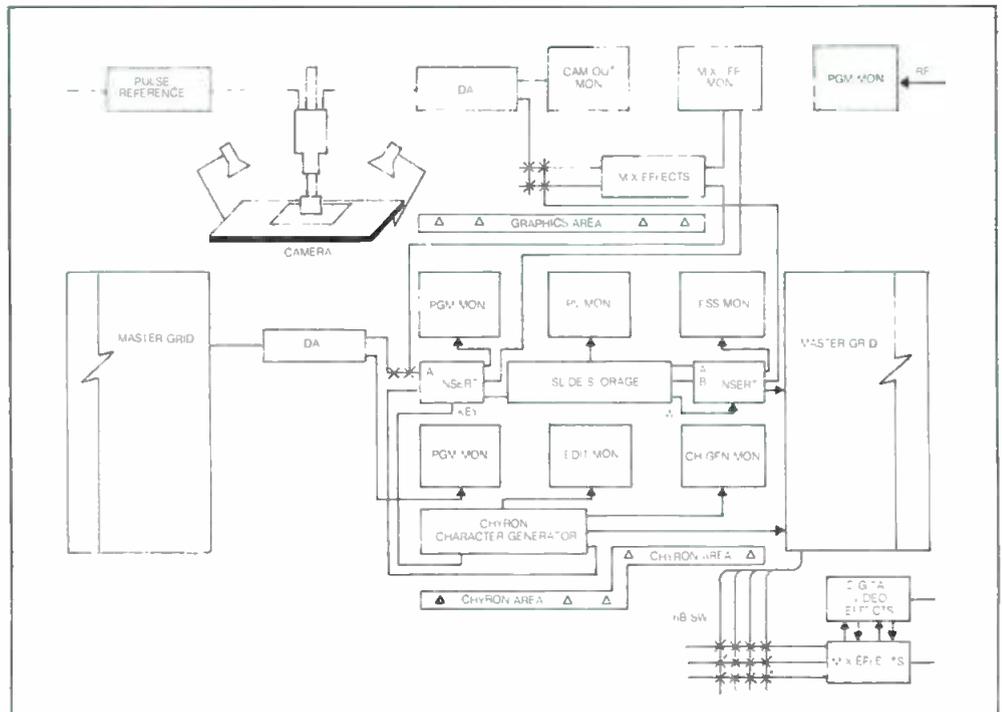
According to senior staff engineer Robert Mausler of NBC's technical development department, the *NewsCenter 4* program, which airs from 5:00 to 7:00 p.m. and again at 11:00 to 11:30 p.m., may use as many as 60 to 70 electronic slides daily. The process of getting these visuals to air begins in the graphics department. After an artist completes his drawing, executed in the traditional manner, he places it on an Oxberry stand located in a nearby room. Mounted on the vertical camera support is an RCA TK-76B which functions as the primary input port for such material. The room contains, in addition to the stand and camera, two black and white monitors, a color monitor, and a control panel for the ADDA ESP-100.

The black and white monitors provide the artist with graticules outlining the safe and essential areas of the picture screen. The color monitor provides him with an immediate gauge on the electronic color rendering. Once satisfied with the composition of the picture on the various monitor screens, the artist uses the ADDA control panel to "freeze" the picture into one of the ESP's two active memories.

Once the picture is frozen in the active memory, the artist can see how the ESP unit will reproduce his picture. There is another step to the process, however, that Butler feels is all-important. The still must now be transferred from the active memory to the ESP's disc memory and then recalled to be certain that the disc memory is clear and functioning properly. If all is well, the still is returned to its permanent storage location.

The address of the storage for any particular still can be assigned by the ADDA system, which will deposit the still in the next available track and then provide a five-digit address location readout to the operator, or the operator

Block diagram shows basic concept for using the ADDA ESP system. The artwork is entered into the ESP from the Oxberry stand and TK-76B camera. Chyron II lettering can be added and the "slide" stored or composited. The output is routed through the DVP 90 percent of the time to take advantage of the auto chroma key tracking



can assign the memory location himself.

The ESP system, according to Butler, has four basic memories: two active memories which can load in one-thirtieth of a second and two disc memories that are relatively slow, requiring about a half-second to load from the disc to the active memory. To some extent, this is a limiting factor if one wishes to view the system as a two-output device for doing back-to-back cuts between slides. Back-to-back cuts are not simultaneously possible on both outputs.

Though use of the ESP as a dual output device is possible, Butler feels that it would be infinitely superior to view the device as a single output unit and add output transitional effects as required. Delivery of the second output to a remote point for preview purposes only does not justify the additional distribution cost and monitoring required.

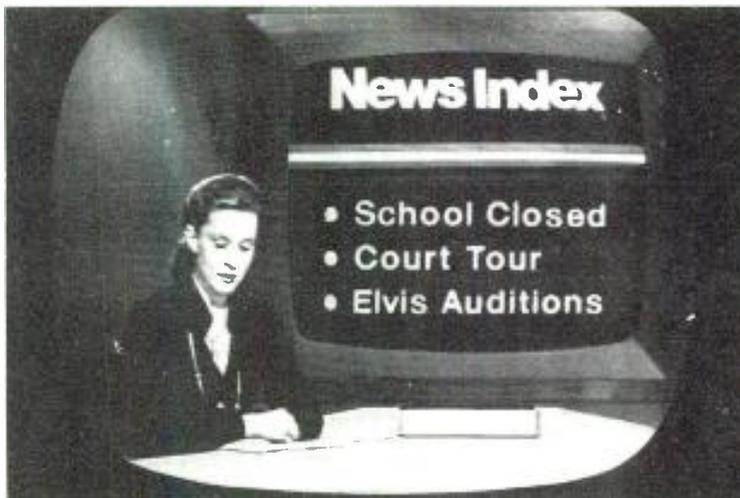
Where NBC decided to go for the pay-off with its ESP still store system was in using it in conjunction with the Automatic Chroma Key Tracking capability of the MCI/Quantel DVP-5000 system, which is interfaced to its RCA switcher. Ninety percent of the ESP on-air output is used through the DVP device, according to Butler. Essentially, this combination has enormously simplified the matter of using graphics chroma-keyed into the *NewsCenter 4* program. With the compression and auto chroma key tracking of the device, neither the camera operators nor the director have to accommodate the use of chroma keys in their selection of shots or camera moves. The DVP will automatically position the chroma-keyed image into the available chroma key area as "seen" by the primary camera source.

"This is the really tough thing to do," said Butler. "What had to be done here, and is essential, is that the compression and position of the picture that comes from the slide store is exactly compressed and positioned to equate to the chroma key area in the scene." The question that arises, and one of the problems with auto chroma key tracking that turned up, is: From where does the DVP get its instruction?

NBC's technical development team found that after the DVP/ADDA complex was installed, they had to go back into the studio and do some hard research into the entire chroma key issue. Because the DVP reads the chroma key area available in the scene and compresses and positions the picture accordingly, spectral highlights, or blue light spill from the intended key area, would give the DVP false instructions regarding the correct location of the key area. In short, set conditions that were acceptable to a normal type of chroma key setup were intolerable in this environment.

NBC had to go carefully into the studio and assure that the best separation possible between the chroma-key area and proximate objects was obtained. Further, the flattest diffusion material available had to be used on the lighting to keep the chance of spectral highlights occurring to a minimum. Also, because the *NewsCenter 4* format called for the frequent use of a wide shot that included black and white monitor screens in the foreground, the technical development team had to go into the DVP itself and install circuitry that would provide automatic masking to areas of the picture that would contain the monitor screens.

These necessary adjustments, Butler points out, are not faults of the DVP system, but rather a case of sloppy chroma key environments that in the past did not affect traditional chroma keys noticeably.



The above title card was created by a graphic artist with news items added by the Chyron II, and stored as a composite on the ESP. Display of the composite is routed through the DVP to take advantage of auto chroma key tracking



The inset of Willie Mays is not keyed in but rather compressed and positioned to equate to the chroma key area. When the scene goes to the tape, the inset picture is automatically expanded and centered by the DVP as a box wipe

The third element in the Studio 6B setup is the Chyron II Graphics and titling system. Normally, titles are not combined with the slide information until the last minute, since, as Mausler points out, title information is often the most up-to-date and the directors prefer to use them separately. Nevertheless, the ADDA ESP system is set up so that the Chyron titling can be combined with graphic artwork and stored in the ESP in composite format. This approach has been used occasionally, especially during times when large numbers of basic composite title cards are to be used, such as during the recent elections. It is in circumstances such as this that the viewer is watching a normal television picture that is generated, stored, and projected in a nearly totally digital system. Only the routed video signals and the final display of the picture are analog.

We are still a long way from the all digital system, but as the foregoing applications show, video in the digital domain has enormous flexibility and great potential for infinite variation without loss of quality. As broadcasters and teleproducers learn more about how the power of digital technology can be applied to the creative problem of developing television images, the pressure to maintain the video information in digital form will grow. Meanwhile, ever more powerful digital tools will be introduced and broadcasters will adopt them, opening up yet newer vistas to the television audience. **BM/E**



WHEN IT'S TIME TO SWITCH...

Then switch to the Video Controller

When Broadcast quality is required and cost versus performance is a must... take the time to evaluate the computer Image Video Controller... a product of Dytek Industries Inc. Models available starting as low as \$14,000 and up to \$80,000 depending on your individual needs.

QUALITY PRODUCTS ARE AVAILABLE FOR:

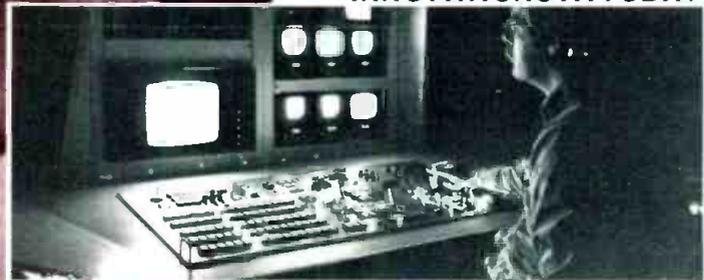
- Production
- Master Control
- Routing
- Computer Editing
- Automation
- Mobile Van Operations

STATE-OF-THE-ART-FEATURES:

(Available On Most Models)

- Multiple Level Keying Per M/E
- Over 100 Wipe Effects
- Rotary Wipes
- Computer Interface
- Image Compression
- Status Mode Readouts
- Automated Transition Control
- ... And Many More

**TOMORROW'S
INNOVATIONS... TODAY**



See us at the
NAB
Booth 2301

**COMPUTER IMAGE
VIDEO CONTROLLER**

A PRODUCT OF **DYTEK**
INDUSTRIES INC.

2492 West Second Ave.
Denver, Colorado 80223
(303) 935-3514

Circle 142 on Reader Service Card

On The Way: Digital Audio With Great Gifts For Broadcasters

The first noticeable impact of digital recording techniques that radio is likely to feel will come from an increasing trickle of high quality recordings making their way into the market. Experts, however, agree that this trickle will be followed by new technologies such as PCM laser discs, VTR adapters, and other spectacular improvements from the digital domain.



AFTER KICKING UP A TREMENDOUS advance fuss for several years, digital audio will finally start coming true for radio broadcasting this year. The recording industry is beginning to inject digital technology into the flow of commercial recordings in the form of digital mastering of the originals. After commercial recordings, digital audio will enter broadcasting in several other forms at various times in the future. The digital parade, as it is now taking shape, has a complex makeup. Its main sections, with their present status and possible timing, are set out in the accompanying table, providing a schematic background for this discussion, which starts with details on the commercial recording scene and goes on to digital potentials still only in the talking stage. The dozen-plus experts *BM/E* consulted agreed on all major points.

Master tapes with virtually no distortion

Warner Brothers Records in Hollywood, a major producer of commercial recordings, will put to work one of the first four 3M digital mastering systems delivered to the industry at about the time this magazine is distributed. Al McPherson, studio head, told *BM/E* that the digital system, on lease for the present, would be restricted at first to music that does not need elaborate editing because editing is difficult on digital tape without electronic aid. But he said there would be "some product" from the system this year. 3M's electronic editing system, described in November at the Audio Engineering Society convention in New York (see *BM/E*, January, 1979), is slated for delivery late this year and will remove this restriction.

The situation is somewhat similar at A&M Records in Hollywood, Sound 80, Inc., in Minneapolis, and the Record Plant in Los Angeles. All have or soon will have 3M digital tape systems; all are important producers of commercial recordings.

Another digital mastering enterprise currently underway, the first to turn out commercial recordings in this

country, is that of Soundstream, Inc., whose machine was the first available (see *BM/E*, February, 1977). Soundstream, as described in earlier issues, is leasing its system as part of a complete recording service that includes setting up the microphones and goes on through to overseeing the cutting of the master discs. Dr. Thomas Stockham of Soundstream told *BM/E* they had made 15 commercial recordings this way at the time of writing, with more on the way. The records have appeared under a number of labels, including Telarc, Orinda, and 2000 BC.

What are these records like? Samples of the Soundstream productions, plus two sample records produced by Sound 80 on the 3M system, all have a startling clarity well beyond that of most current commercial recordings. Some of this may have been the result of great care in other parts of production; but the total absence of tape noise, the total freedom from flutter, the sense of no-distortion, would seem to have been impossible without the digital technique. The listener is exhilarated by a feeling of ease that is combined with an accurate sharpness in the music.

Are these records important to the radio broadcaster? *BM/E* believes that for competitive reasons they will become more and more important over the coming years. When people play such records on good home hi-fi equipment — and many thousands will — their expectations about what they hear off the air will go up another few notches; home hi-fi has already pushed those expectations far above earlier levels.



Enthusiastic about the playback of a digital recording on the Soundstream machine is conductor Frederick Fennel (right). Also listening are Dr. Thomas Stockham (left), president of Soundstream, and recording engineer Jack Renner

Digital Audio

Moreover, even people who do all their listening on small table models or car radios are not totally exempt from an upgrading effect. Much recent experience indicates that a substantial improvement in signal quality gets attention and approval from a wide spectrum of the audience. The digitally mastered recordings will add to the pressure behind the upgrading of audio in broadcasting.

Digital mastering is certainly going to spread in the commercial recording industry as the machines become available. The fact that so many of the large electronics firms are staking out a piece of this territory tells us that the industry is expecting the technique to become general. There are plenty of advantages, on top of the quality boost: elimination of generation loss, extremely precise automatic editing, elimination of most forms of tape deterioration through time, and ready adaptability to digital sound control and processing. In addition, programs mastered in digital form will be ready to play a full part in the era of the PCM laser disc, if that comes — a momentous possibility considered below.

Next on deck: VTR adapters

Just coming into use as this is written is a second type of digital audio device, an adapter to put PCM audio onto videotape recorders. The analog audio signal is fed into the adapter, which encodes it into digital form and puts it on the horizontal lines of a "pseudo-video" signal, with horizontal and vertical sync just like those of a standard video signal. The pseudo-video signal can be recorded on any VTR, b&w or color. The adapter also acts in reverse as a playback unit, with digital-to-analog conversion recreating the original analog signal.

The first two adapters on the market are the Sony PCM-1600 and PCM-1, both with NTSC format. The maker recommends using the U-Matic with the PCM-1600 because the cassette form protects the tape, but any NTSC VTR will do. According to the announced specifications, the PCM-1600, using 44.056 sampling and a

16-bit linear code, operates at the top of the current digital art: dynamic range more than 90 dB, distortion less than 0.05%, unmeasurable flutter, etc.

Moreover, with the addition of an editing console the material can be edited just as video programs are; the machines can be synced to other video machines or audio machines; with two VTRs the user can make digital-to-digital dubbings with virtually no generation loss; the system can use any form of sync code and remote control just as video systems do. And the cost is far below the projected cost of open-reel digital tape systems (none is for sale yet). At \$40,000 for the PCM-1600 and \$3000 or less for the VTR, this promises to be the cheapest way to get top level digital recording for a while.

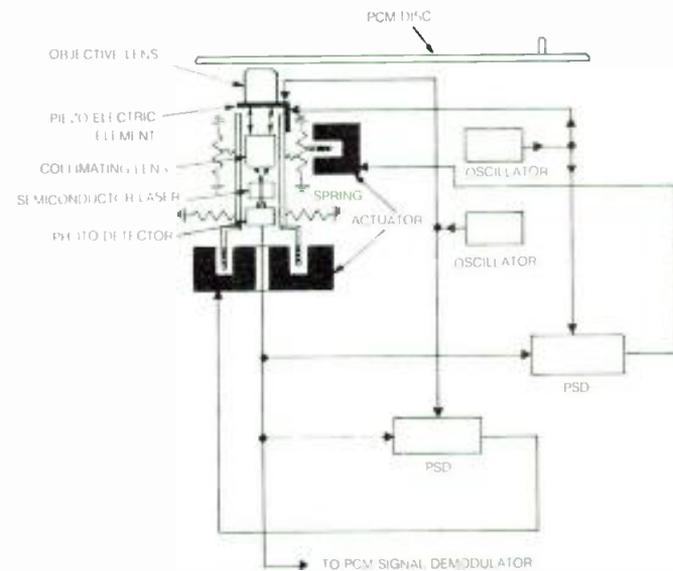
The most obvious limitation of the system is its having only two channels, which makes it unsuitable for most studio recording, since at least 8 to 24 channels are required. The 3M system has 32 tracks for the original recording. Thus, Sony suggests the following uses: for the mix-down to two tracks, producing a digital master; for synchronized high-fidelity soundtrack recording with motion picture and video programming; for mass memory applications; and for simultaneous handling of both audio and video signals in the same format. Sony points out that the pseudo-video signal can be transmitted over any system designed to handle video signals, including television broadcast transmitters!

The PCM-1, usable with Betamax and similar VTRs, is priced at \$4400, operating lower in the fidelity stratosphere than the PCM-1600, but still providing, according to the specifications, audio recording and playback quality worlds ahead of anything available to the consumer before. We can speculate that a class of amateur and semi-pro recording fanatics will emerge who will be able to produce their own recorded material at considerably higher fidelity than anything the recording industry has made in the past. Sony and the other firms developing the adapters are apparently counting on this.

For broadcasting, the PCM-1600 (and similar devices to appear later) will undoubtedly be the more interesting.

Digital Audio — Present And Future Systems

Digital Audio System	Function And Characteristics	Market Status
Open-Reel Tape Mastering		
Soundstream, Inc.	Multichannel digital recording and playback	Machine available for leased recording service
3M Company	Multichannel recording (32 tracks) plus two-channel mixdown recorder	Systems available on lease
Sony Corp.	Multichannel recording (up to 24 tracks)	Prototype shown; no market date
Mitsubishi Corp.	Multichannel recording	Prototype shown; orders taken
Matsushita Electric Corp.	Multichannel recording	Prototype shown; no market date
Adapter For VTRs		
Sony Corp. PCM-1600	Puts audio into digital form and into a "pseudo-video" signal for recording on VTRs; top digital quality (16-bit coding)	On market (approx. \$40,000)
Sony Corp. PCM-1	Same; slightly lower quality level (13-bit)	On market (approx. \$4500)
Matsushita Electric SH-P1	Same	Prototype shown; no market date set
Mitsubishi Corp.	Adapter and VHS recorder in one unit (13-bit)	Prototype shown; no market date set
PCM Audio Laser Disc		
Teac-Mitsubishi-Denka	Records PCM audio onto spinning 12-inch disc with laser beam for recording and playback	Prototype demonstrated; no market date
Sony Corp.	Same	Prototype demonstrated; no market date
JVC	Combined A/V disc system (13-bit) with laser recording, capacitance play.	Prototype demonstrated; no market date
Philips Corp.	Laser record and play, 4-inch disc	Prototype demonstrated; no market date



Simplified playback system for Teac-Mitsubishi-Denka laser disc player uses semi-conductor laser in housing that is "wobbled" on two axes to supply error signals for servos controlling focus and tracking

Radio managements wanting to record live concerts on location for later airing will be able to reach a superb fidelity level, far above that possible with analog machines, using two easily portable units, an adapter and VTR. One radio station is considering transferring its many open-reel stereo recordings to digital form on U-Matic cassettes to eliminate tape handling and variations in replay adjustment.

Using the system for re-recording, duplication, and processing of program material could be attractive when there is a lot of this to be done and the radio management wants to avoid loss of quality. Every quality-alert radio engineer will think of other ways to put such a system to work. As noted in the table, he will be getting more choices as time goes on; the industry is committed heavily to the adapter, as it is to the open-reel machine.

Laser discs: top quality, low cost

The digital tape mastering machine and the audio adapter for VTRs are reaching us now. Somewhere behind them will come the third kind of digital machine, the PCM audio laser disc. It will bring a massive uplift of technical quality because it has the top virtues of digital audio in a playback-only system that is inexpensive, compact, and handy to use.

As described in *BM/E* in February, 1978, the laser disc uses much of the technology developed for the optical video disc, putting digital audio at its fullest in a cheap, easily-duplicated recording format. The discs are stamped out very much as phonograph records are. The system overcomes the mechanical non-precision of its stamped discs with ingenious electronic servo systems that keep the laser beam centered in the one-micron wide track, keep the beam focused through ups and downs of the record surface, and provide time base correction.

The disadvantage of this system, compared with the other two, is that the laser disc does not provide ready recording to most users; recording must be done in large central plants (at least for the present; proponents of the system have predicted that in time the recording equipment will be inexpensive enough to be owned by many organizations). The process will mimic that for analog records. The digital mastering will be done on tape, the

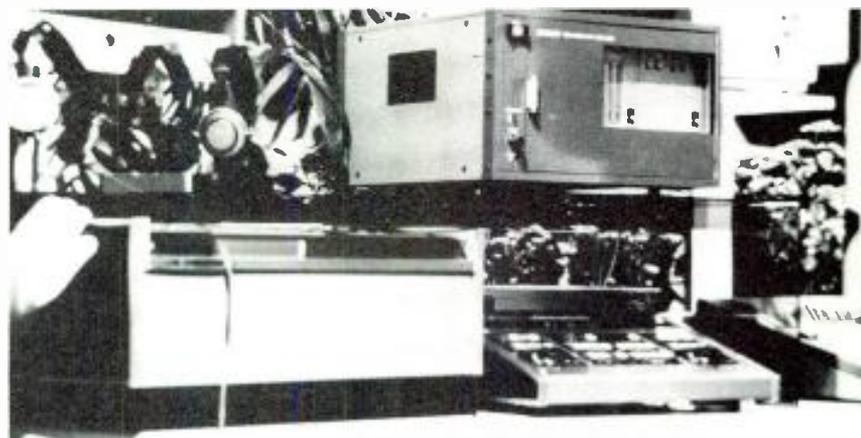
program transferred to a digital master disc, and duplicates of the disc distributed to users and played on inexpensive digital machines in their homes. Digital form and quality will be maintained through every part of the process from original taping to home playback.

If the electronics industry puts substantial force into making a consumer success of the laser disc, there is no doubt that it will permanently change public conceptions of acceptable fidelity in recorded sound. To radio broadcasting the laser disc will bring, first, inexpensive program material at the new quality level. It will alert the consumer to expect the new quality from radio.

Beyond that, the disc will create new conceptions of how program material might be stored and used in a radio station, particularly with some form of automation. The laser disc, both video and audio, is a storage system of almost incredible density. Potentially, one side of an audio laser disc can hold one, two, or more hours of music. The servo systems controlling the laser beam will allow almost instant random access, under automatic control, to any program item on the record surface. Thus, the technology is on hand for an automation system that stores the music on laser discs. One disc could hold, for example, all the Top 100 tunes of the month, or several classical symphonies. What a leap ahead in audio quality that could bring to radio!

How do our chances look for getting the audio laser disc? How soon? Some half-dozen firms have developed prototype systems (including the Teac-Mitsubishi system that caused such a sensation in demonstrations at the Audio Engineering Society last year). Moreover, these firms are only part of those around the world who are pushing laser audio disc systems — the table includes just the firms which have indicated some intention of marketing the machines in this country. In Japan, a number of additional firms are active, and recent audio shows there have emphasized laser disc systems heavily — the Japanese industry is evidencing strong intention to develop large-scale consumer marketing.

The great barrier is the need for standardization, and several firms say they are withholding further development until there is some progress in this area. No two of the systems announced so far are compatible. There are industry reports that a meeting of all the major Japanese firms will take place early this year to try for agreement on some basic compatibility. If the firms do agree, the way might be open for marketing by early the following year, but that may be overly optimistic.



Sony's PCM-1600 adapter for putting PCM audio onto VTRs is shown (right) above a U-Matic recorder (left) and BVE-500 editing console (under the adapter). The three units together can record, edit, and play digital programs

Digital Audio

Whatever the industry's speed (or lack of it), the overwhelming logic of the laser disc for digital audio cannot be diminished. It would be a tragedy if we were deprived of so powerful a servant for a long time — or, if compatibility, cannot be achieved, perhaps permanently.

Similarly powerful logic attaches to another form digital audio could take in a radio station. This one is pure blue sky at the moment — as far as *BM/E* can determine, no firm has announced any moves toward developing it. But several of the experts we interviewed in preparing this article called it a most logical and useful thing that digital technology could do for radio.

It is the storage of all program material in digital form in computer-type memories, with instant call-up at the punch of a button or under control of a sequence in the computer memory. The advantages do not need belaboring: digital audio quality, indefinitely preserved and always instantly available, with new material entered, or old taken out, with the greatest ease. Radio automation technology is already practically there: all the control systems have been developed. The main holdup is the cost of memory, and this is on a great downcurve.

A corollary advantage is that all signal processing could be done by computer techniques. With the program material stored in a computer in digital form, an equalizer or filter, for example, could be a computer program rather than a physical device with capacitance, inductance, etc. We already have reverb, delay, and special effects systems handling the signal in digital form. These could be

absorbed into the controlling computer, or interfaced with it in a simple manner.

The often envisioned prospect, in fact, is for every part of the signal handling in a radio station to be consolidated into one computer system. Noise and distortion arising from the handling would disappear. Signal processing, including level control, would be far more flexible and exact than it is with analog techniques. The technology is mainly ready. The main question now is cost. It seems probable that a technique with so many advantages will be pushed ahead until the cost is acceptable to radio.

How does it all fit together?

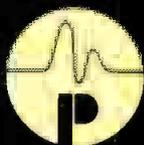
A final point: the various forms of digital audio technology covered here are not basic rivals. Each will play a prime part in the digital scene. Open-reel tape machines must be used for mastering of recordings. The audio adapters for VTRs will supply digital recording capability for a range of radio stations' needs, both inside and outside the studios. The laser disc will be the means for low-cost mass distribution of programming, and can supplement the computer bank as a storage system.

That computer system in a radio station can take programming in digital form from a laser disc or from a recording made on an adapter-VTR combination, or it can take analog signals, using an internal A-D converter. Programs can be shuttled back and forth among all these systems, processed, edited, and altered with no loss of quality. The fully developed digital technology will give the radio broadcaster superb control over every aspect of program handling, and this will be as important as high quality among the gifts of digitalization. **BM/E**

THE BMX IS NOW!



NOW in performance, NOW in technology and NOW in availability!
When you finally make the commitment to purchase a new broadcast console, you don't want to wait...order a BMX broadcast mixer NOW...it's the broadcast console that offers total delivery!



PACIFIC RECORDERS AND ENGINEERING CORPORATION
11100 ROSELLE ST., SAN DIEGO, CALIFORNIA 92121
TELEPHONE (714) 453-3255 TELEEX 695008

Circle 143 on Reader Service Card

Cinema Products has it all... The ideal equipment mix for film and electronic field production: CP-16R, MNC-71CP and Steadicam!"

Dennis Burns
PACIFIC FOCUS
Honolulu, Hawaii

day, video and film is the way to go. With the Oscar-winning Steadicam, of course.

For the small-to-medium sized production company shooting industrials, documentaries, TV commercials, as well as docu-dramas and specials for television, Cinema Products offers the ideal film and EFP equipment mix. Lightweight, rugged and reliable production equipment, recording broadcast-quality film and tape. All covered by the standard Cinema Products full one-year warranty and around-the-clock* service backup.

To meet their extremely varied and demanding production requirements, forward-looking and dynamic production companies — like Honolulu-based Pacific Focus — make use of Cinema Products' easy-term lease/purchase



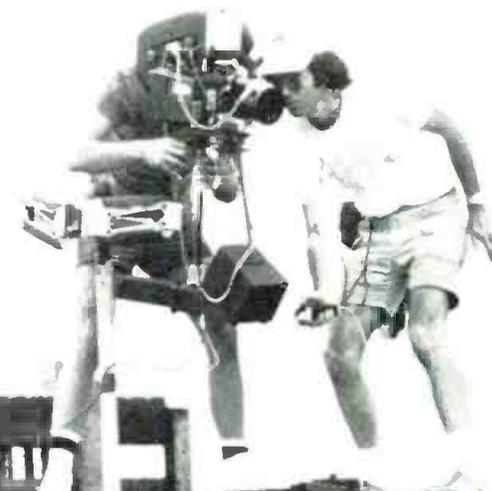
program to maintain a versatile mix of the highest quality 16mm film and electronic field production equipment available today.

In addition to its existing CP-16R camera equipment, Pacific Focus has

recently acquired two MNC-71CP video cameras with all the ancillary equipment needed to convert them to MNC-710CP studio/field production configuration.

"We shoot video or film, depending on what would best serve the needs of each particular project," says Dennis Burns, award-winning producer/cameraman and president of Pacific Focus. "In Hawaii, though, we produce on location almost entirely. So it's important that our broadcast-quality MNC-71CP cameras are rugged enough to take the kind of abuse that the CP-16R can take.

"Combined with the versatility and cost savings provided by Steadicam, which can be used interchangeably between our CP-16R and MNC-71CP cameras, there's no assignment we cannot handle!"



"The Steadicam camera stabilizing system lends itself to many innovative uses," says Dennis Burns. "For instance, by placing Steadicam on a special mount (built by Bud Weisbrod of Pacific Instrumentation — the CP dealer in Hawaii) and rigging it to a forklift, we were able to simulate boom/crane capabilities.

"And for shooting aerials, the same mount can be easily rigged to a helicopter or a fixed-wing aircraft."

For further information, please write to:

cinema E products
CORPORATION

Technology in The Service Of Creativity

2037 Granville Avenue, Los Angeles, California 90025
Telephone: (213) 478-0711 • (213) 477-1971 • Telex: 69-1339

*For video service (7 day/24 hr.), call: 800-421-7486.

Here's how useful a distortion analyzer can be

Monitor voltage, power, distortion or dB ratio.

No manual nulling controls required (the 1710A is always in auto-null, reaches a null in less than 5 seconds).

Intermodulation Distortion Analyzer optionally available.

Oscillator distortion is typically .001%.

Measure generator signal at load with the push of a button.

± 1 dB Vernier adds fine level control.

Selectable 18 dB per octave filters reject hum and high frequency noise.

Internal oscillator adjustable from +26 dBm to -89.9 dBm in 0.1 dB steps.

Fast pushbutton operation lets you set level, measure voltage or power, then measure distortion.

Turn off oscillator for quick S/N measurement.

Measure voltage or power from 10 Hz to 110 kHz.

Tuning indicators help measure distortion of an external source.

100 k Ω Balanced Input.

Simultaneously select oscillator and analyzer frequency with fast-to-use pushbuttons. 10 Hz to 110 kHz.

View input signal on a scope.

Balanced and floating 150 Ω or 600 Ω Generator output.

Automatic Set Level is optionally available.

View distortion products on a scope.

Measure distortion down to .002%, voltage or S/N ratios with 100 dB dynamic range.

Two of the above features are so outstandingly valuable that we especially invite your attention to them.

One is the fast, easy measuring you get with pushbutton-selected distortion-measuring circuits (signal source and measuring circuits are simultaneously selected with the same pushbuttons). Pushbuttons make it so simple to measure quickly and to repeat measurements.

Secondly, you can drive virtually any type of circuit from the signal source output — whether

balanced, unbalanced, off-ground or whatever. That's because the signal source output circuit is fully isolated and balanced.

There is no output transformer to introduce noise or distortion.

Besides these outstanding conveniences, you can have the Sound Tech 1710A with an option that enables you to measure intermodulation distortion.

Call Mike Hogue/Larry Maguire to get full information on an instrument recognized everywhere as the standard of the audio field.

BE SURE TO VISIT US AT NAB BOOTH 2405.

ST[®]

SOUND TECHNOLOGY

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

Circle 144 on Reader Service Card

Designing Systems Using Dedicated Microcomputers: Part 1

By Juan Rivera

The microprocessor holds great promise as an extraordinarily useful and versatile tool in the design of broadcast systems. In this, the first article of a three-part series, the groundwork is laid for the programming of a microcomputer.

Editors's Note: This is the first of a three-part series intended to give the reader an opportunity to "peek over the shoulder" as the author programs a microcomputer. Much basic information on microprocessors has been supplied in previous introductory articles appearing in the June '77, February '78, and July '78 issues of BM/E as a three-part "Introduction To Microprocessors." It is at the level of the dedicated microcomputer that most stations will find practical applications for this new technology. By going through the process of "initiating" a single board computer to do something useful, it is hoped that the reader will be able to focus on the entire process that makes the use of microprocessors such a promising extension to broadcast technology.

WHEN THE WORD "COMPUTER" is mentioned, most people think of large data processing systems, but that's only one type of computer. There are much smaller computers, some so small that they'll fit on a single circuit board. These are called "microcomputers," and while they're much too limited to perform in the stereotypical role of "number cruncher," they are ideally suited to operate as "smart" controllers, and as such, function more as very large and complex logic arrays¹. In such an application, the computer becomes an integral and sometimes unrecognizable part of the equipment it controls. Operating from a sequence of instructions stored in its memory, and acquiring data from the host equipment and occasionally from an operator, the controller can make complex decisions and issue appropriate commands to the host equipment. This technique produces a system with performance and versatility far greater than more conventional designs.

The digital computer

Since this approach is a departure from previous techniques, some background information is necessary. Briefly, every digital computer is composed of five essential elements: storage (memory), control, arithmetic logic unit (ALU), input, and output (Figure 1).

The storage section stores data in the form of binary numbers which may be interpreted as either information or instructions². There are two types of storage:

Program storage is accomplished utilizing "ROM"

Juan Rivera is owner/president of Spectrum Dynamics, Walnut Creek, Calif. Rivera has an extensive background in broadcast engineering for both radio and television and is engaged in the design of microprocessor-based systems for broadcast applications.

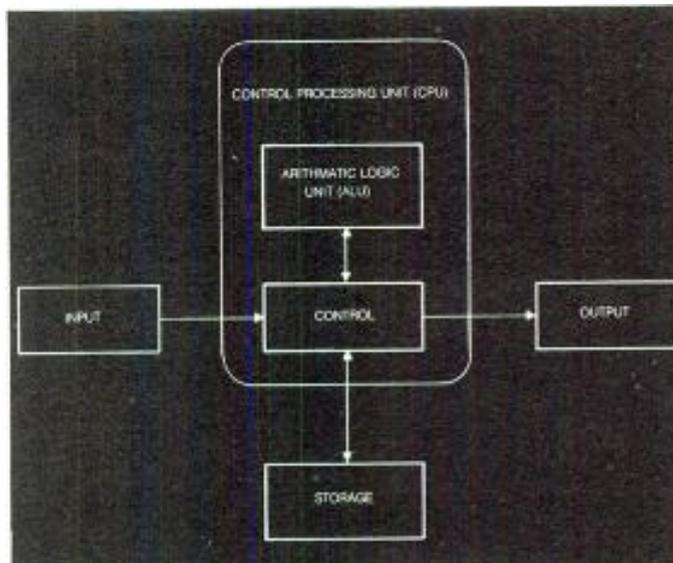


Fig. 1. All microcomputers contain these five basic elements, with the CPU usually implemented on a single chip

(Read Only Memory), which is "non-volatile" since it will retain data even after power is removed. Of the various types of ROM, "EPROM" is the most common. Since it can be erased with an ultraviolet light and then reprogrammed many times, it's ideal for applications in which some modifications are anticipated.

For the temporary storage of data, read/write memory (RAM) is employed³. Unlike ROM, it may be written into as well as read from, and it's volatile; to retain data, power must be applied continuously. A pocket calculator will serve to illustrate these two memory types. First of all, the program needed to perform the math is stored in ROM and can't be modified. It will always be there whether power is applied or not. Data entered by the user and partial solutions, however, are stored in RAM. If power is interrupted, that data will be lost.

Regardless of memory type, the basic function is the same. Memory consists of arrays of individual memory cells, each of which can store one bit (BInary digiT), which can be either a zero or a one. Most small computers

¹The microcomputer can be thought of as a "black box" logic array with the same number of lines connected to it as the microprocessor has I/O lines. It is capable of doing anything the black box can do, such as code conversion, timing, etc.

²The behavior of the computer is determined by a sequence of instructions called the program, which is written by the user, who then codes it into binary form and stores it in memory.

³"RAM" is an unfortunate acronym for read/write memory since it stands for "random access memory" and both read/write memory and read only memory are random access.

Dedicated Microcomputers

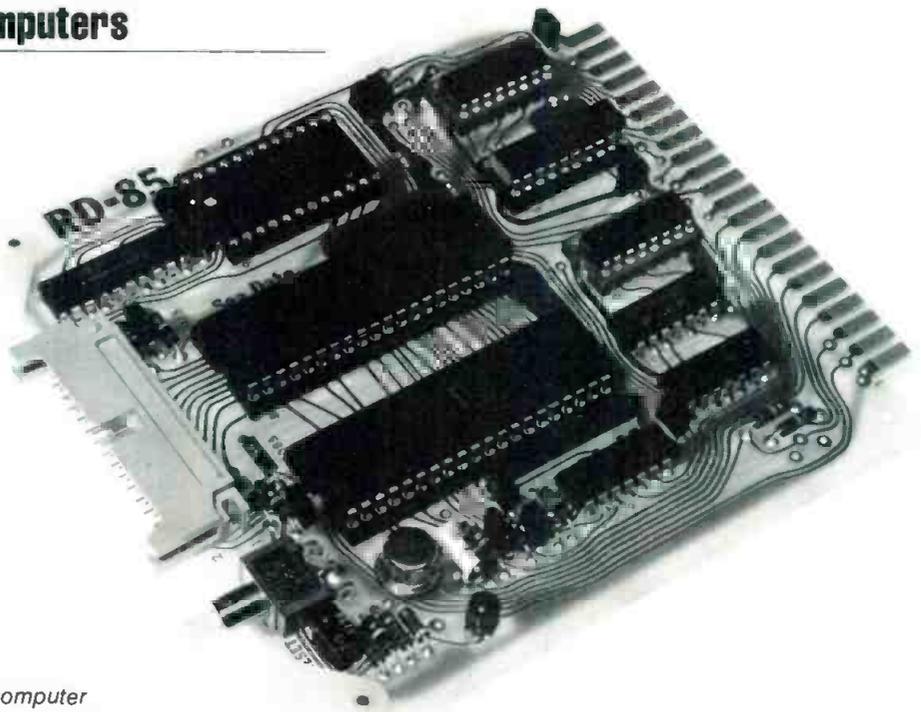
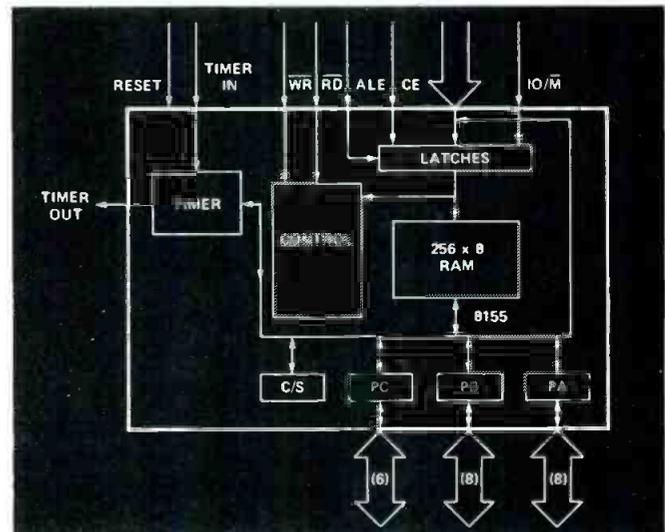
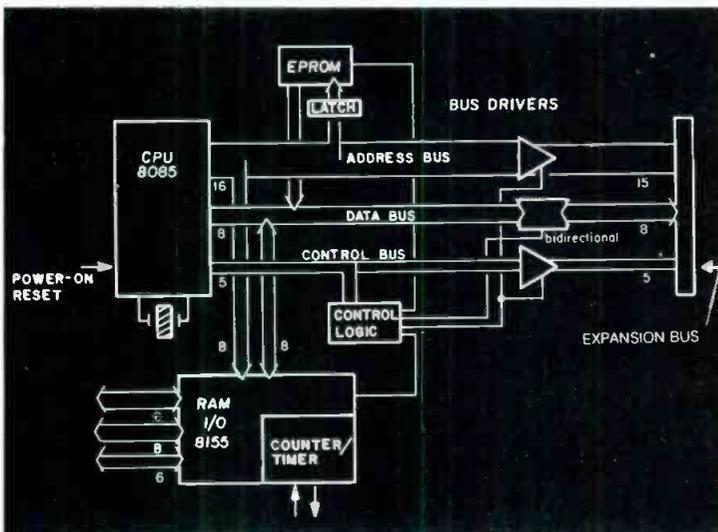


Fig. 2. The actual RD-85 microcomputer measures only 4.5 by 4.5 inches. A block diagram of the RD-85 (below) shows the basic structure of the data handling busses.

Fig. 3. The CPU of the RD-85 is an Intel 8085, but with the addition of the Intel 8155 companion peripheral IC (diagram below) numerous useful features are added to the microcomputer



process data in eight-bit computer "words" called "bytes"; therefore, memory is usually configured to allow access by the byte. Each byte-size location is accessed by its own unique address, and since most microcomputers address memory with a two-byte address (16 bits), they are capable of utilizing up to 64,000 bytes of memory (two to the sixteenth power).⁴

The control section determines what operations are to take place and in what order. It reads program instructions sequentially from the storage section, interprets them, and then performs the actions specified. (Each microcomputer can interpret only a limited number of instructions called its "instruction set.")

The ALU performs all arithmetic and logical operations, and is the data transformation section of the computer. Together with the control section, they are referred to as the Central Processor Unit, or CPU.

⁴The binary numbering system is based on powers of two. Therefore there are only two digits to contend with: a zero and a one. Since only two electrical states are required to express a binary digit, it may be stored in a flip-flop (1=set, 0=cleared), and arrays of flip-flops called registers can be used to store larger binary numbers.

In a microcomputer all these functions are implemented on a single chip — the microprocessor. One of the newer microprocessors on the market is the Zilog Z-80. The chip itself measures about 3/16 inch on a side, yet it contains 8200 transistors.

The input and output sections are specialized registers (typically eight-bit) which are accessible to the outside world. They are essential since without them there could be no communication with the outside world at all. Most microcomputers have the ability to access 256 different input/output registers, or "ports." A one-byte address is required for this.

Discrete logic vs. microcomputer

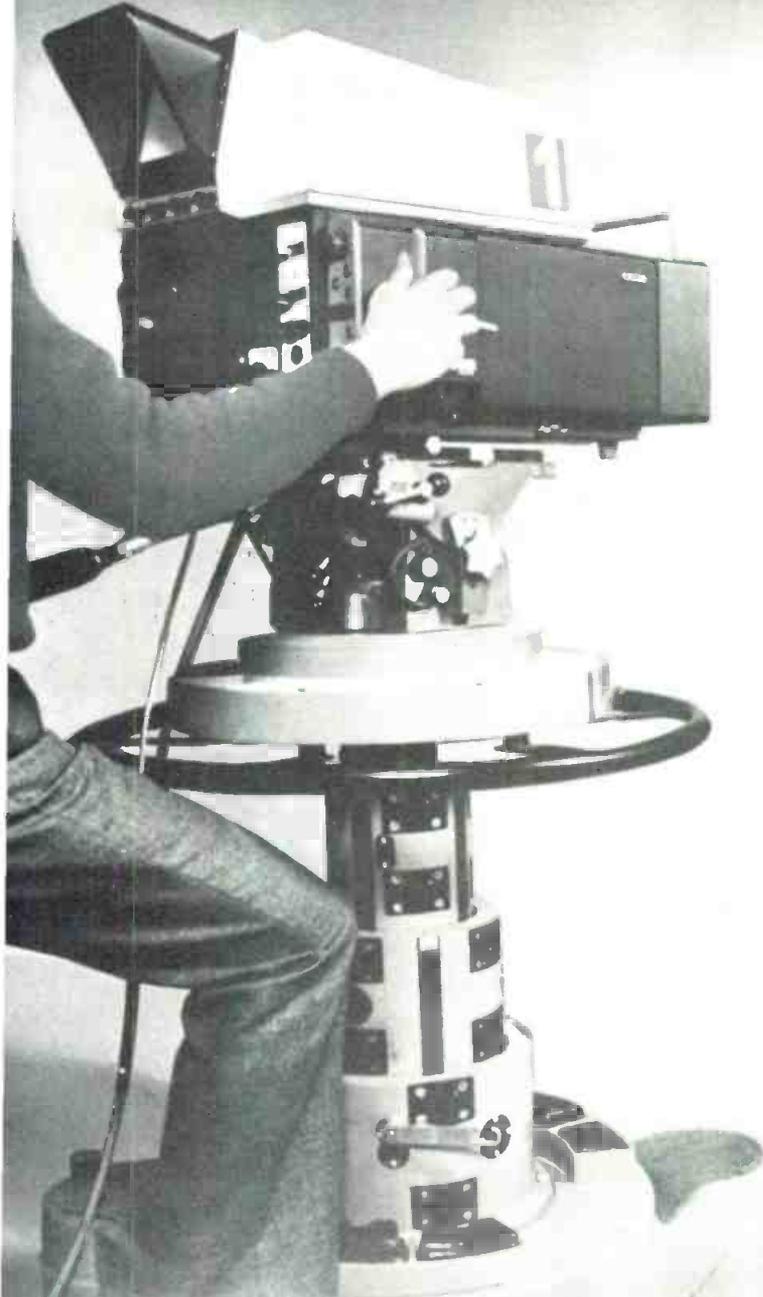
Since the old reliable discrete component designs have served us so well for years, why bother with all this? Two reasons — cost and flexibility. Since these new chips are so dense, they're able to replace whole boards filled with simple logic chips. The reduced parts count lowers costs in several obvious ways: smaller power supplies, simpler

continued on page 76

The NEW MARK IX Family of Color Cameras

We Have It All!

- Studio/Remote/Portable • Multiple Configurations • Standard or Triax Cable • Low Power Consumption (400 Watts) • 110/220 VAC or 24 VDC
- Manual or Automatic Registration/Operation • Over ½ mile with Standard Cable, up to 1 mile with Triax • Compact, Lightweight CCU • Select from choice of view finders 1", 3" or 7" • Selection of pick-up tubes includes Bias Light and HOP
- Remote Control Operation up to 500 ft. . . . and much more!



STOP PRESS!!
1" Helical Type C VTR's
We've Got Them!

See Them All At NAB-Booth 322

Marconi Electronics, Inc.

100 Stonehurst Court Northvale, New Jersey 07647 (201) 767-7250

Circle 145 on Reader Service Card

Dedicated Microcomputers

circuit boards, and so forth. But price is also reduced in an equally important but subtler way. Since these ICs and thus the hardware built with them are so generalized in their nature, one hardware design can satisfy many widely varying applications. This in turn has encouraged the development of a wide range of general purpose hardware which is very competitively priced — priced so low, in fact, that the question is not, "What components shall I use to design a board?" but rather, "Whose board shall I buy?" A case in point is the Sea Data RD-85. The whole microcomputer is contained on a circuit board measuring only 4.5 by 4.5 inches (figure 2), and yet it's a complete digital computer in every respect. The microprocessor used in this design is the INTEL 8085. In conjunction with a companion peripheral IC, the 8155, the following features are implemented: up to 2048 bytes of EPROM (Read Only Memory), 256 bytes of RAM, a timer, and 22 input/output lines. It sells for less than \$200. Since this board is so straightforward and simple, it will serve well in the examples to follow.

Define the job

Now that some of the basics are out of the way, an actual design can be explored. There are several clear-cut stages a project must pass through. First of all, as with any

hardware design, you must very clearly define the task to be done. We are especially interested in establishing the number of input and output lines which will be needed by the computer for communication and control. Additionally, an estimation of memory requirements is needed (both RAM and ROM).

Once the project has been defined, thought can be given to selecting a microcomputer board. There are many to choose from, ranging from quite simple ones, such as the RD-85, to very complex boards containing on-board video interfaces and sophisticated operating systems in ROM.⁵ Consider the power requirements of your candidates as well. One especially nice feature of the ICs used in the RD-85 is that they run on a single five-volt supply. Many others do not. Obviously, the board selection process is one of the most important steps, and since you will be selecting from a variety of general purpose boards, it may be necessary to select one with more features than you feel you require. It's certainly better to overestimate your needs than to underestimate. Leave room for expansion if possible. Remember, one of the strengths of a microprocessor-based system is its flexibility. Careful planning at this stage will make future expansion and modification a snap.

Doing it

Since an entire project is not within the scope of this article, one small segment will be focused on in some detail. As was mentioned earlier, the input/output section

continued on page 78

⁵"Introduction To Microprocessors-Part 3" (July '78 BM/E)

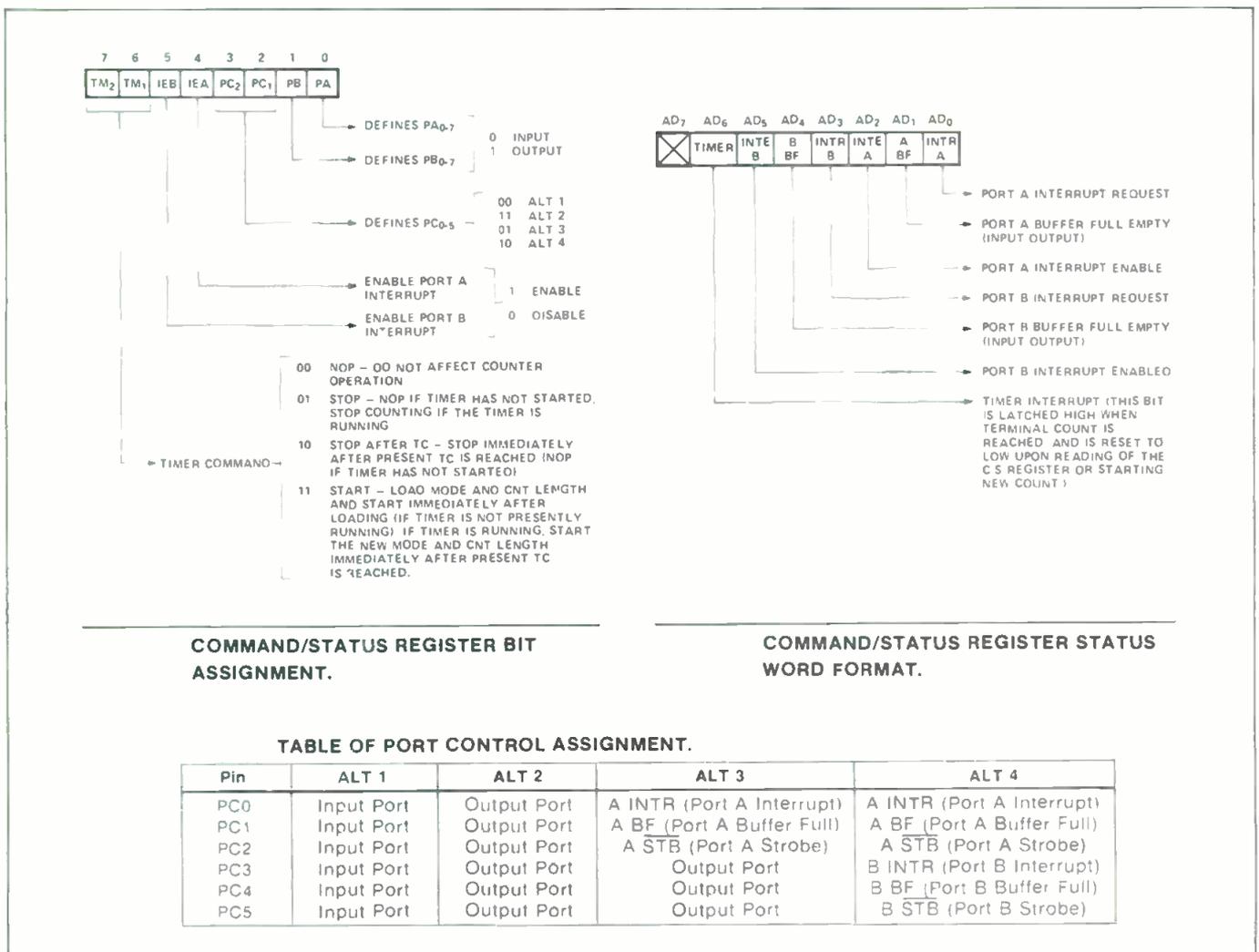


Fig. 4. The various operating modes are selected through the command/status register according to the bit assignment chart, provided by the manufacturer of the component



**WHEN
IS LESS
ANTENNA
MORE
ANTENNA?**

**WHEN IT'S
OUR NEW
SUPERPOWER
FM BROADCAST
ANTENNA.**

Finally, here's the answer to the need for high power antennas using a minimum number of bays. Each of the three models in our new series of circularly polarized FM antennas features much lower Q than the previous designs. And, each has massive 3 $\frac{1}{8}$ inch two-tube baluns which provide much wider match bandwidth than loop coupled designs.

These new antennas actually offer a VSWR of 1.1:1 for approximately 500 KHz, two and one half times the bandwidth

of standard, circularly polarized low power and high power antennas. What's more, increased bandwidth minimizes the impedance change due to icing.

Can we tell you more? Write today for all the details: Phelps Dodge Communications Company, Route 79, Marlboro, New Jersey 07746. (201) 462-1880

**phelps
dodge**
Communications Company

Circle 146 on Reader Service Card

Dedicated Microcomputers

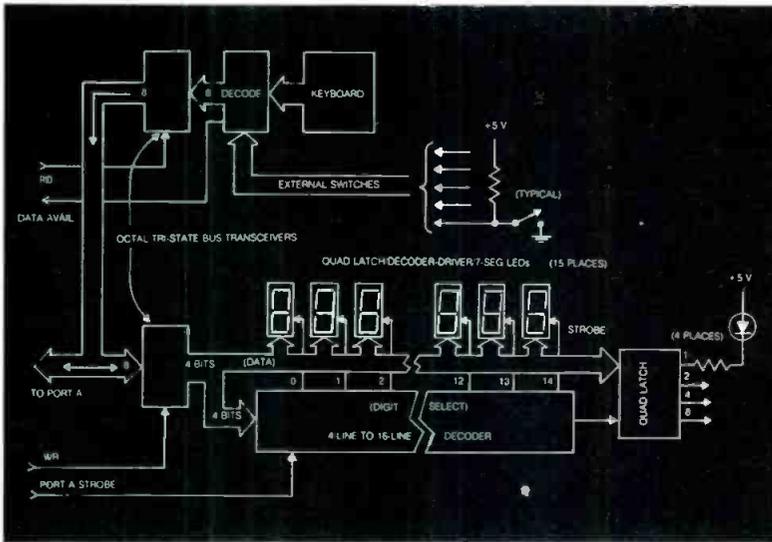


Fig. 5. A great deal of information can be passed through an eight-bit port. Notice how few ICs are required

		<*> OUTPUT BIT ASSIGNMENTS <*>															
LED ASSIGNMENT.....		DATA.....				DIGIT SELECT.....				HEX							
		7	6	5	4	3	2	1	0								
7-SEG	#0	X	X	X	X	0	0	0	0	-	0						
	#1	X	X	X	X	0	0	0	1	-	1						
	#2	X	X	X	X	0	0	1	0	-	2						
	#3	X	X	X	X	0	0	1	1	-	3						
	#4	X	X	X	X	0	1	0	0	-	4						
	#5	X	X	X	X	0	1	0	1	-	5						
	#6	X	X	X	X	0	1	1	0	-	6						
	#7	X	X	X	X	0	1	1	1	-	7						
	#8	X	X	X	X	1	0	0	0	-	8						
	#9	X	X	X	X	1	0	0	1	-	9						
	#10	X	X	X	X	1	0	1	0	-	A						
	#11	X	X	X	X	1	0	1	1	-	B						
	#12	X	X	X	X	1	1	0	0	-	C						
	#13	X	X	X	X	1	1	0	1	-	D						
	#14	X	X	X	X	1	1	1	0	-	E						
		(X=DATA BIT)															
SINGLE LED'S																	
	#1	0	0	0	1	1	1	1	1	1	F						
	#2	0	0	1	0	1	1	1	1	2	F						
	#4	0	1	0	0	1	1	1	1	4	F						
	#8	1	0	0	0	1	1	1	1	8	F						

Fig. 6. This table shows the output bit assignments to access each of the LEDs. The eight bits are labeled from zero through seven, with bit zero being the low-order bit

communicates with the outside world. Normally some I/O is used to communicate with the operator, and some to communicate with the equipment. Our attention will be focused on the operator's end, and since all I/O on the RD-85 board is implemented using the INTEL 8155, a closer look at this IC is in order (figure 3).

Like the 8055, the 8155 is a 40-pin IC. In addition to 22 I/O lines, it contains 256 bytes of RAM and a programmable binary counter/timer. The I/O portion contains four registers: two eight-bit registers (A and B), one six-bit register (C), and an eight-bit command/status register. Ports A, B, and C may be programmed as either input or output. Additionally, port C may be used as "handshaking" for ports A and B. The various operating modes are selected through the command/status register according to the bit assignment chart of Figure 4. For example, to set ports A, B, and C to output, the bit pattern "00001111" would be sent to the status/command register.

⁶ASCII (American Standard Code for Information Interchange) is an eight-bit binary alphanumeric code which is routinely used for this purpose. Bits 0-6 contain the character code, and bit 7 is an error check bit called the "parity bit" which is usually ignored in smaller systems. In addition to complete alphanumeric capabilities, ASCII includes many special codes such as end of transmission, line feed, and carriage return.

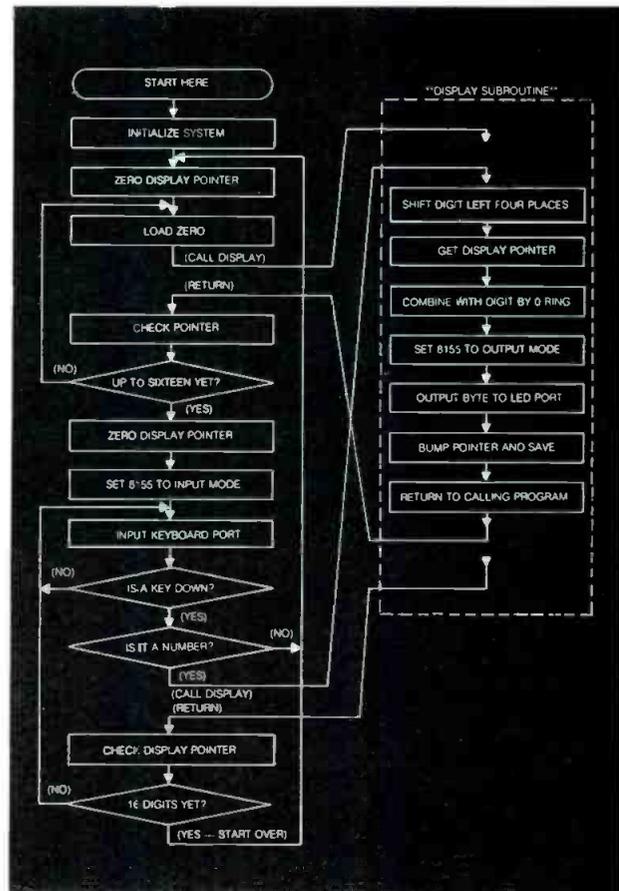


Fig. 7. The flow chart is a software "block diagram." Notice that all operations are carried out sequentially

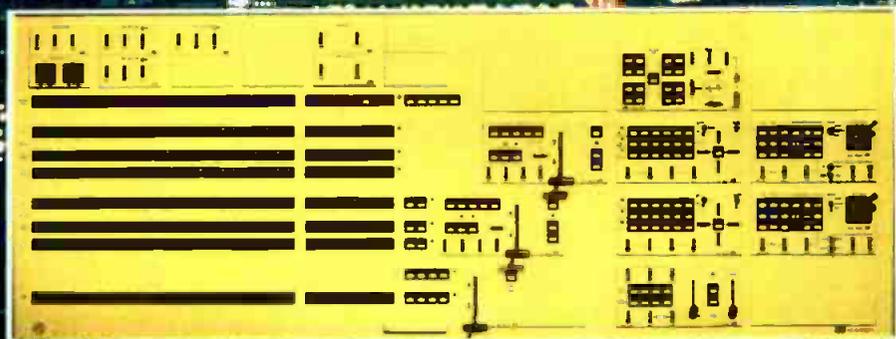
Since there are 256 possible eight-digit binary numbers, an entire alphanumeric keyboard is easily interfaced to a single eight-bit port by coding the various keys into unique binary numbers.⁶ In addition, several special purpose switches and pushbuttons could be included.

Since operator input can be accomplished with one eight-bit port, let's attempt to confine output to that same port. It would be nice to have the ability to display letters as well as numbers, but since a video display is quite complicated, let's narrow the choices to some type of segmented display. Seven segments is sufficient to display all 10 numbers as well as a few symbols, but 15 is about the minimum for alphabetic display. To eliminate the need for 15-segment LEDs, though, the non-numeric information could be displayed by using individual LEDs with labels on the front panel, and various colors could be used to enhance the appearance and clarify their meaning.

We now face the task of not only displaying a number, but of selecting the proper LED as well. Since only four bits are needed to uniquely specify one decimal digit, the remaining four can be used to point to one of 16 seven-segment displays. Or, we could choose to limit the number of seven-segment LEDs to 15, and instead decode the unused sixteenth position to drive four individual LEDs (figure 5). Fortunately, since several manufacturers now produce seven-segment displays which contain not only the binary to seven-segment Decoder/Driver, but a four-bit latch as well, all of the seven-segment LEDs can sit on the same external four-bit data bus in parallel. Here's how it works: Let us assume that a 7 is to be

continued on page 80

dynamic & competitive



**That's why
New York epitomizes
the broad spectrum
of CD-480 users.**

Network and Independent broadcasters, and Post Production houses, large and small, rely on the outstanding production power and versatility of the CD-480 video switcher to produce the highest quality television... from News and Live Opera to Commercials and Daytime Soaps.

Why? For most, the reason is the amazing power and flexibility of the unique CD-480 SFX amplifier that permits you to artistically control four video signals in any combination, with one fader handle.

For some, it's the 480's modular construction at off-the-shelf prices. That also means fast delivery.

For all, it is CDL's 20 years of worldwide leadership in video switcher technology.

If we can satisfy New York's competitive challenge with variations of one switcher, we can design a CD-480 for you. Call us.

The CD-480 gives you the competitive advantage



CENTRAL DYNAMICS LTD

Chicago
331 West Northwest Hwy.
Palatine, IL 60067
(312) 991-4720
TWX—910 693 4805

New York
(914) 592-5440

Los Angeles
(213) 789-0574

Atlanta
(404) 491-9037

Dallas
(214) 741-3332

Denver
(303) 623-7603

CANADA—Montreal
(514) 697-0810

**See us at NAB
Booth 344**

Circle 147 on Reader Service Card

Dedicated Microcomputers

displayed on LED-2. According to the bit assignment table of figure 6, the binary number "01110010" must be outputted from port A to the external circuitry. The four high order bits "0111" (decimal 7) are routed to the four-bit data bus, and the low order bits "0010" (decimal 2) are sent to the digit select IC. After pausing a few hundred nanoseconds while the data settles, the 8155 will enable the port-A strobe line which will in turn enable the digit select IC. Its number two strobe line will then latch the data from the four-bit data bus into LED-2's internal quad latch. From there it will be converted to seven-segment code and displayed. No other displays will be effected since their strobe lines were inactive.

In order to prevent interference between the keypad and the LEDs (they share the same eight-bit port, don't forget), some means of selectively connecting either input or output is needed. This is handled by the two tri-state bus transceivers. Observe the "RD" (Read) and "WR" (Write) pins on the 8155; these are control lines from the 8085 and determine direction of data flow. They'll also be used to control the bus transceivers, and since the 8055 will never attempt to input and output at the same time, only one of the bus transceivers will be active at a time. (The inactive transceiver will go to a high impedance state.)

Software at last!

The first step in software development is to design the algorithm, the sequence of steps required to accomplish the task. The algorithm can be presented as a flow chart,

and since computers operate sequentially, our flow chart must be sequential, too. The object of the flow chart is to break a complex task down into a series of small, easily comprehensible program modules, in much the same way as a complex circuit is presented in a block diagram. Each module can then be written, tested, and de-bugged individually. This modular concept produces programs which are much easier to understand, and much easier to modify and debug. If a particular program module is required repeatedly, it can be written as a subroutine and called into operation when needed by the main body of the program.

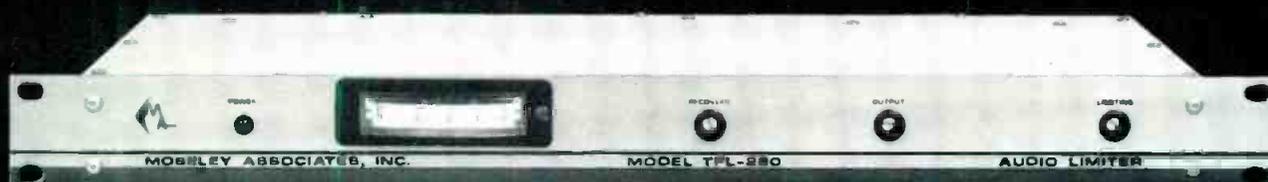
Now let's make the hardware do something (figure 7). Since the display section will come up in a random state when power is first applied, one of the first orders of business would be to initialize all digits to zero and turn off the four individual LEDs. Here we go . . .

First we have to set up the location of our stack. The stack is an area in RAM which is used by the processor as a First In/Last Out buffer (I'll explain later). Next, we'll set a single byte in RAM aside to store the current display pointer, and zero it. (This byte will be accessible to any routine in the program.) Now we'll zero out one of the processor's internal registers. Let's pick register "C" and call the display subroutine.

Now, back to the stack. The processor normally executes a program in much the same way as you are reading this article — one step at a time, top to bottom, and in sequence. It keeps track of the next instruction's location by storing it in a register called the program counter. As each instruction is executed, the number in the PC is incremented, so as always to point to the next instruction to be executed. But, when an instruction is decoded which

continued on page 82

TV AURAL IMPROVING? ...be prepared!



WITH THE **MODEL TFL-280 AUDIO LIMITER** FROM **MOSELEY ASSOCIATES**

Now, get clarity and loudness without compromise — an on-air sound like the original program source! Moseley Associates' TFL-280 precisely controls the modulation levels of TV aural and FM transmitters . . . TV aural, FM monaural, stereo, quadraphonic, FM SCA are all expertly processed. This frequency-conscious limiter cleanly solves the problems associated with the transmission of pre-emphasized audio, including the ringing (over modulation) produced by low-pass audio filters. Contact us now for information and details.

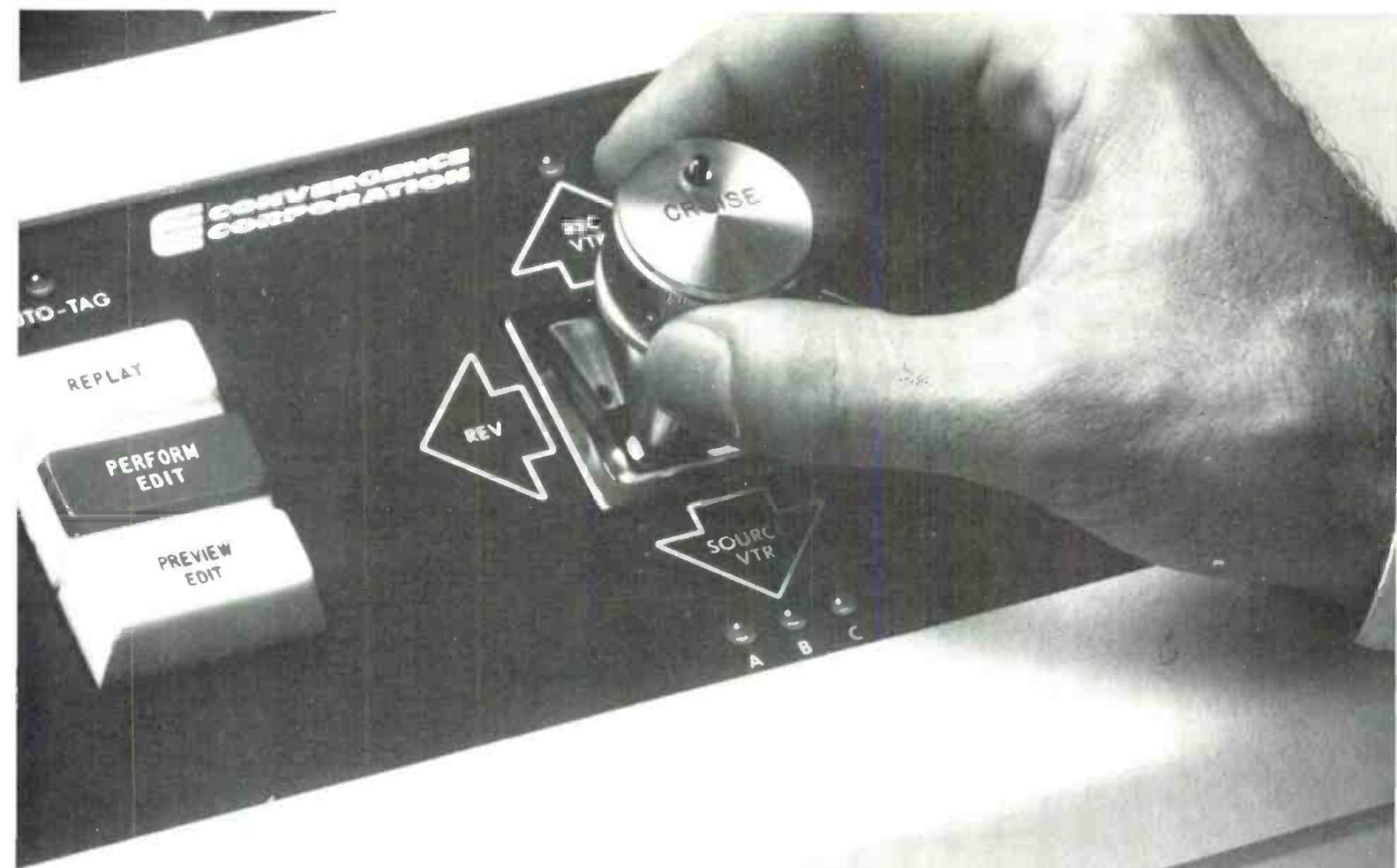
WRITE FOR OUR
BULLETIN-255



MOSELEY ASSOCIATES, INC.

A FLOW GENERAL COMPANY

SANTA BARBARA RESEARCH PARK, 111 CASTILIAN DRIVE • GOLETA, CA 93017
(805) 968-9621 • CABLE: MOSELEY • TELEX: 658-448



Creative tape editing simplified.

Superstick gives you complete creative control. Superstick — a Convergence exclusive — makes videotape editing as easy as working with film. Without taking your eyes off the monitors, this single control lets you switch between scenes and move tape forward or backward at any speed you select. It's that simple.

Liplock® makes sense out of fast talk. Our "Liplock" audio control delivers accurate sound at regular, fast and slow speeds — no more "Donald Duck" or "growl." You can select audio cues in record time with Liplock.

See the Superstick at NAB/378

For information Circle 149
For demonstration Circle 150

Cut/Lap™ produces deceptively simple "dissolves." This Convergence breakthrough simulates dissolves quickly, economically. Viewers like what they see, and you'll love the low cost.

Ask for a demo — no cost or obligation. See for yourself how Convergence videotape editors let you concentrate on the creative, instead of fighting with the equipment. You'll get the results you want quickly, precisely, and economically. Write or call for details. We'll send information by mail and call you about a demo, at your place or ours.

Editing means Convergence.

CONVERGENCE CORPORATION

17935 SKY PARK CIRCLE, IRVINE, CA 92714
(714) 549-3146 TWX: 910-595-2573

new... multi-phase meter/ VIRS inserter



ENGINEERS....

BEFORE YOU BUY ANOTHER SCOPE TO MEASURE PHASE... (BURST, VIRS, H) REMEMBER WHO WILL BE USING IT!

If it's you, great! Because you know professional scopes are expensive, not very portable, and take lot's of skill to obtain the correct measurements.

NEW MULTI-PHASE METER: If it's not you, consider buying VACC's new Model 4000 Multi-phase Meter to measure BURST/VIRS/H-Phase. You get five times more resolution and your personnel will find the dual lighted analog meters easier to read, easier to use and an ideal aid for insuring consistent, high quality color video.

VIRS INSERTER: With the Model 4000 you can insert VIRS downstream manually or automatically, and if you like, you can insert external line 19 video, such as color bars to equalize video tape playbacks.

LOW COST: You will like the low price of the Model 4000 at only \$1295, which is a lot lower in price than those professional scopes, more accurate and easier to use.

OTHER MODELS: If you do not need VIRS, consider VACC's BPM-1. Ideal for use at the output of a switcher, your director can tell you that Burst is off phase in keys or special effects. Or, if you need Burst and H-Phase simultaneously, VACC's BPM-1 Option:03 is a great choice.

NEW TECHNICAL CATALOG: Free for the asking, VACC's new 1979 catalog is loaded with technical articles and products.



**VIDEO AIDS corporation
of colorado**

phone USA (303)-667-3301
Canada (800)-261-4088

325 East 7th Street, Loveland, Colorado 80537

Dedicated Microcomputers

disrupts the normal sequential flow, such as a subroutine call, some means of keeping track of the old address must be found — the stack! Here's what happens: when a subroutine call is decoded, the data in the program counter (the address of the next instruction in sequence) is copied (pushed) onto the stack, and the address specified in the subroutine call is copied into the program counter. Since the processor always gets the address of the next instruction to be executed from the PC, off it goes. It will then continue to execute the instructions in the subroutine until it comes to "Return." This instruction always appears in one form or another as the last instruction of a subroutine. When this is decoded, the address previously stored on the stack is recovered (popped), and copied back into the program counter. The processor continues to follow the address in the PC, and thus returns to where it previously left off!

Meanwhile, back at the subroutine (the processor has arrived with "00" in the register C), the computer is then instructed to shift the four low-order bits to the left four places. (Since they're all zero, it doesn't matter in this case.) Then it will go to the area previously set aside for the display pointer in RAM and copy that byte into another register within the processor. The two four-bit numbers can then be "Or'ed" to produce a byte with the four high-order bits containing the LED address (1 to 16). Next the 8155 must be put into the output mode, if not already there, and then the composite byte just constructed can be outputted to the LED port. Meanwhile, the display address byte is still intact in register C. That will be incremented by one, and the new value copied back into its location in RAM for any section of the program that needs access to it. Next the processor will hit the "Return" instruction, and immediately return to the main program.

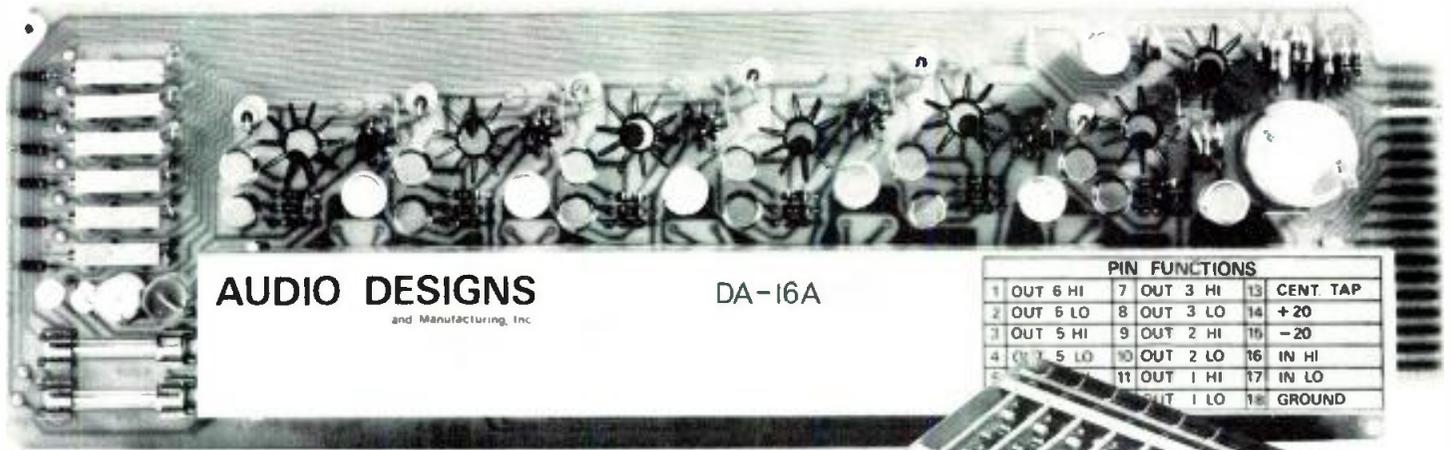
The rest of the display initialization routine consists of checking the pointer to see if the last digit has been cleared. The program will continue to loop through the subroutine, each time incrementing one position, until it has cleared the last LED. Once this takes place, the display pointer will be zeroed, and the program will "drop" through to the keyboard input module.⁷

Look for a key stroke

The keyboard input module will return the 8155 to the input mode and enter another loop checking the keyboard port for a non-zero output. Once this condition is detected, a test is conducted to see if the character is numeric. If so, back to the display subroutine, but this time with the number to be displayed stored in register C. By now, the flow chart should be self explanatory, so I'll leave the remaining portion for your analysis.

Once the algorithm is committed to paper, it should be thoroughly examined and any necessary corrections made. (The most common problems which usually slip by are special cases which have been overlooked.) Only after an intensive review of the entire project should the process of converting the algorithm to binary machine instructions begin. This process is called coding, and since it requires an intimate working knowledge of the microprocessor to be used, it will be the subject of a future article. **BM/E**

⁷The ability to modify program execution based on the results of various tests is one of the most powerful characteristics of this type of technology.



The ultimate audio distribution system.

ADM[®] quality throughout.

The DA16/CH20 is the broadcaster's answer to audio distribution. It offers a *unique* and *versatile* solution to this age-old problem.

- Each amplifier is a one-input, six-output plug-in card with +24 DBM input and output capability.
- The input is transformer coupled and each of the six outputs is individually transformer-isolated.
- Amplifiers have individual front panel gain

adjustments and individual test points for both power and audio.

- The CH20 rack frame has redundant power supplies with automatic changeover.
- The DA16/CH20 system is designed and built to demanding Audio Designs and Manufacturing quality standards.

There are many more features. For complete information, contact us today.

AUDIO DESIGNS AND MANUFACTURING, INC.

ADM *The Audio Company*

16005 Sturgeon, Roseville, Michigan 48066 • Phone: (313) 778-8400. Cable: AUDEX TLX-23-1114

DISTRIBUTED OUTSIDE U.S.A. BY **AMPEX** INTERNATIONAL OPERATIONS, INC.

The new generation TK-47 camera from RCA: automatic setup, automatic operation at the touch of a button.

The all-new TK-47 is a quantum leap into the automatic camera age. This advanced camera gives your video operator total freedom to concentrate on picture creativity in a way no other camera can match. Because no other camera is fully automatic.

The first truly automatic camera.

The new TK-47 incorporates microprocessors and advanced electronics that provide sequential setup in minutes—not hours—all automatically. The touch of a button creates a new high in color standards—automatically.

The automatic TK-47 also provides a single-button daily performance check to assure optimum performance.

Many benefits for you.

The technical achievements of the new TK-47 give you



these benefits, among many:

- Constant camera readiness—no costly production delays.
- Consistent camera performance—never a variation in color consistency.
- Unusual system flexibility—one setup terminal can operate virtually any number of TK-47s and other television cameras.

Contact RCA now.

To learn more about the new TK-47, or any of the RCA family of quality television equipment, simply contact your RCA Representative or write us, RCA Broadcast Systems, Bldg. 2-2, Camden, N.J. 08102.



RCA

**TK-47: the new
video freedom in a camera
—automatically.**

A Systems Approach To Transmitter Output Networks

By Grant Bingeman

There are many approaches to broadbanding AM antenna systems, but most are only partial solutions. The AM antenna system must be given a thorough examination, paying strict attention to the output network. If a systems approach is taken to broadbanding, a cleaner sound may result to give your station a real selling point.

IN HIGHLY COMPETITIVE AM markets, the importance of antenna system bandwidth becomes apparent when it is found that, in some cases, no amount of tinkering with the audio chain can produce clean and brilliant high frequencies at the receiver.

A muddy or weak audio high end is caused largely by RF bandwidth limitations in the antenna system (assuming the rest of the equipment is up to par). Contrary to popular belief, many car radios and home portable radios have relatively good high-frequency response, and an informed listener can tell the difference between a station operating into a narrowband antenna and one operating into a wideband antenna. The listener may not be able to describe exactly what that difference is, but he will have a preference, and that is the crux of the matter.

Programming may be a large percent of the battle, but a cleaner sound can be a real selling point in a highly competitive market. Of course, you still have to promote the new sound to your listeners — the new sound will not necessarily sell itself. An informed audience is a discriminating audience.

To date, many treatments of the bandwidth topic have largely ignored the exact output network of the transmitter, using a simplified model of the network instead — usually a Smith chart. A Smith chart is a model of a transmission line, and is extremely useful as such. However, there are some very important features of some transmitter output networks which are overlooked if the network is approximated by a transmission line. In fact, it is quite possible to degrade transmitter performance if a Smith chart alone is used in the analysis of a bandwidth problem.

In the following paragraphs I will show how an antenna having a 10 kHz sideband VSWR of 1.5 had an “optimized” PA sideband VSWR of 2.0. The PA load was adjusted for symmetry,¹ but no attention was given to sideband VSWR. This very significant impairment of bandwidth occurred simply because the analysis ignored the exact characteristics of the output network. Yet, when the correct model of the network was used it was found that the sideband VSWR could be reduced to 1.2 using the

Grant Bingeman is a senior engineer with the Antennas Operations group of Harris Broadcast Products.

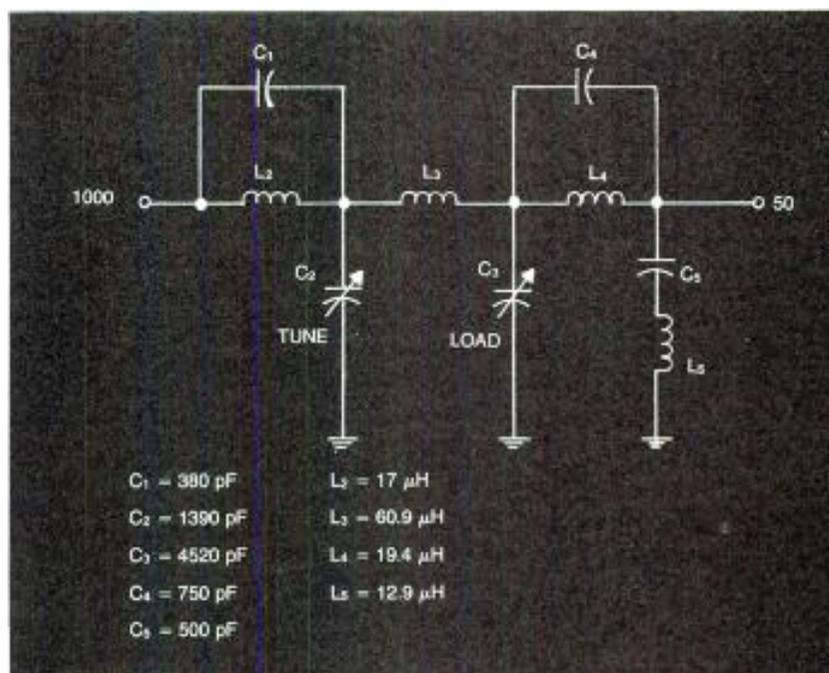


Figure 1. Schematic diagram of a Harris 600 kHz MW-50 transmitter output network

same adjustment technique (this paper assumes that the carrier VSWR is always 1.0).

A 660 kHz Harris MW-50 output network (Figure 1) is designed to have a minimum of interaction between its PA tuning and loading controls, hence the nominal -135 degrees of phase shift between C_2 and C_3 .² The PA Q of 5.7 (where $Q = RC_2 = 1000 (2\pi \cdot 66) \cdot 00137 = 5.7$) creates a 10 kHz PA sideband VSWR of 1.3 from an initial output sideband VSWR of 1.0. PA tube efficiency is improved by the third-harmonic resonator formed by C_1 and L_2 , which appears inductive at 660 kHz ($+j79.3$ ohms). C_4 and L_4 form a second-harmonic trap, which also appears inductive at 660 kHz ($+j107$ ohms). This inductive reactance forms an L network with part of C_3 . C_5 and L_5 form a third-harmonic trap, which appears capacitive at 660 kHz ($-j429$ ohms).

¹Complex conjugate sideband impedances.

² ± 15 degrees.

Transmitter Output Network

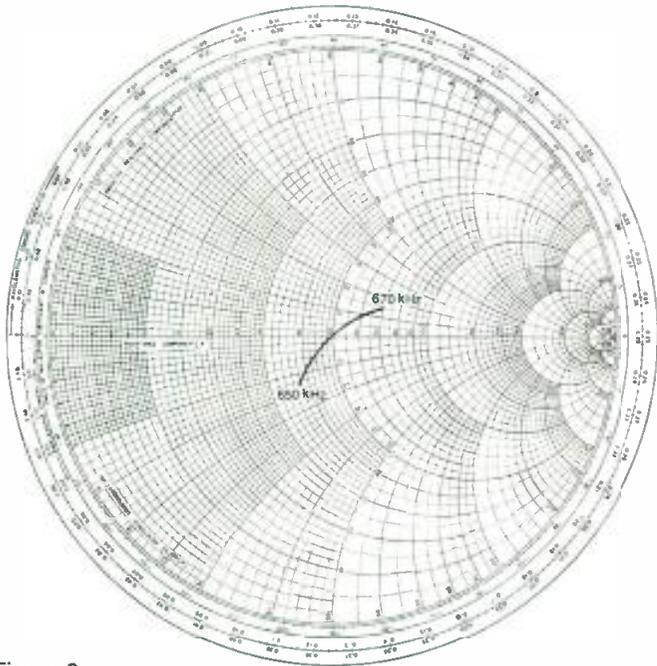


Figure 2

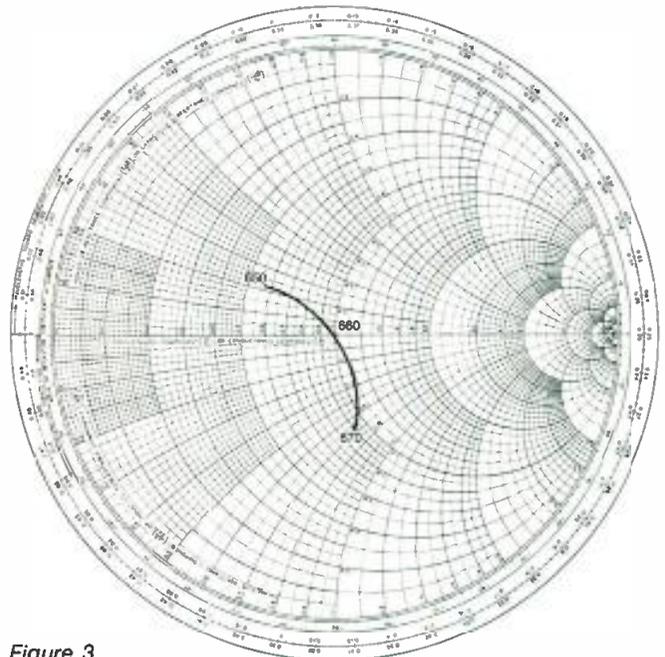


Figure 3

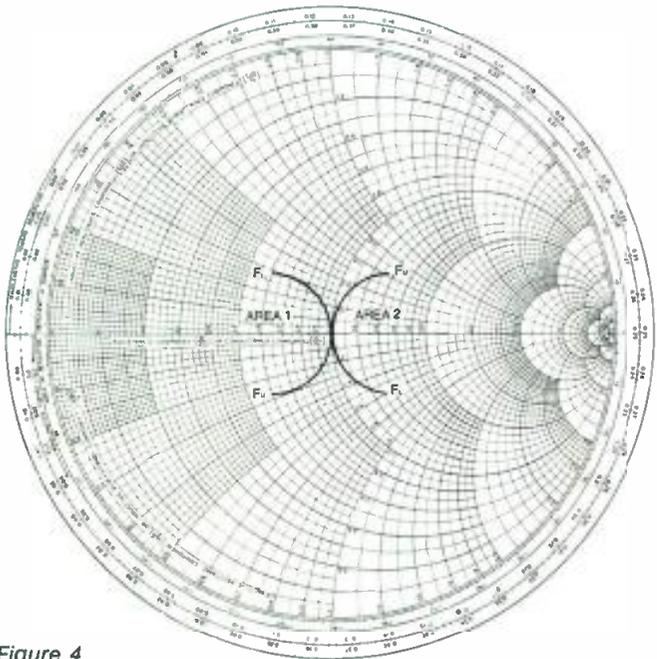


Figure 4

The initial antenna impedances seen at the output of the transmitter were (see also Figure 2):

Freq. (kHz)	Z (ohms)	VSWR
650	$38 - j13$	1.50
660	$50 + j0$	1.0
670	$69 + j14$	1.49

The initial load impedances seen by the MW-50 PA tube were (see also Figure 3):

Freq. (kHz)	Z (ohms)	VSWR
650	$571 + j206$	1.87
660	$1000 + j0$	1.0
670	$915 - j668$	1.99

Please note that a change in VSWR has occurred from the transmitter output to the PA tube. This change would not be indicated by a transmission line model of the output network. The closest PA sideband symmetry area on the Smith chart (Figure 4) is about 36 degrees away from the initial PA load of Figure 3. If we were to insert -36 degrees of transmission line between the transmitter output and the antenna, we would obtain the following impedances at the output of the transmitter (see also Figure 5):

Freq. (kHz)	Z (ohms)	VSWR
650	$33.7 + j3.7$	1.50
660	$50.0 + j0$	1.0
670	$63.9 - j18.0$	1.49

continued on page 88

When it comes to high performance TV monitors, you've got two choices. Until you take a closer look. Then there's only one. Sharp.

Sharp monitor/receivers offer a selection of models to satisfy the most demanding specifications. With such outstanding performance, there's only one other brand that comes even close.

All our monitor/receivers are built for commercial use (UL listed) to be long lasting, with built-in

reliability. With exclusive features that include push-button degaussing and an auxiliary audio amplifier to accommodate large groups.

Sharp monitor/receivers are all designed with our famous Linytron Plus™ one gun tube. Giving you an amazingly reliable picture, no matter how hard you work it.

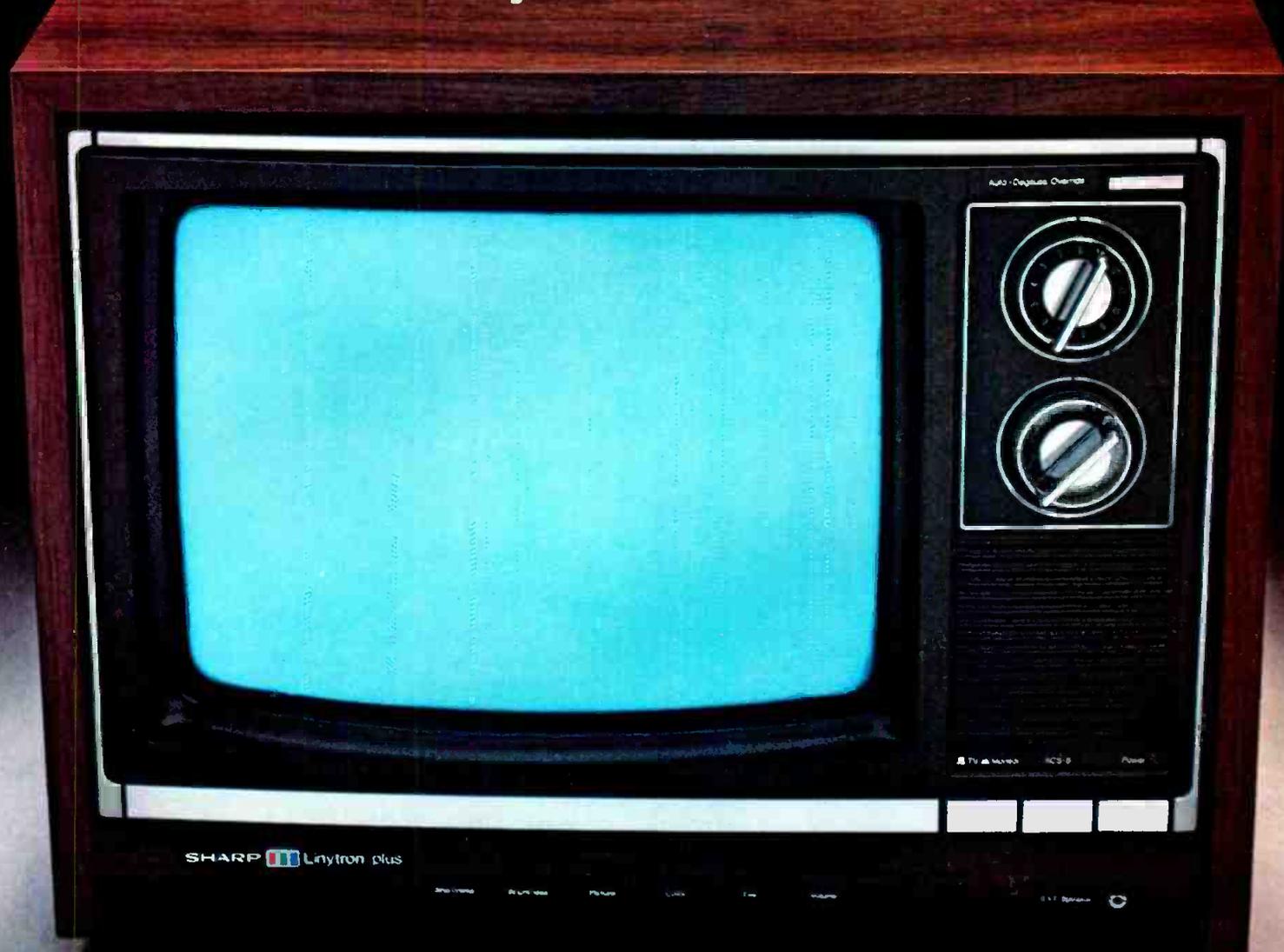
And to make sure that Sharp TV monitors live up to all your requirements, we've designed these models with ACS-5. Sharp's one-

touch, push-button Automatic Color System to maintain color, tint, contrast, brightness and fine tuning for you.

Take a closer look at Sharp. For everything you always wanted in TV monitors.

For more information, contact your Sharp dealer or call our Professional Products Department at (201) 265-5548 or write Sharp Electronics Corp., 10 Keystone Place, Paramus, New Jersey 07652.

**IN TV MONITORS, THERE'S SHARP,
THERE'S SONY, AND EVERYBODY ELSE.**



Circle 153 on Reader Service Card

Transmitter Output Network

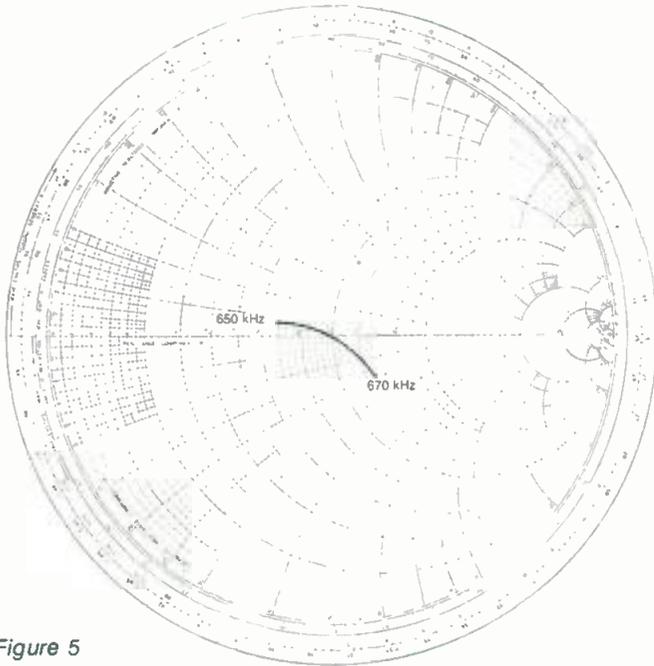


Figure 5

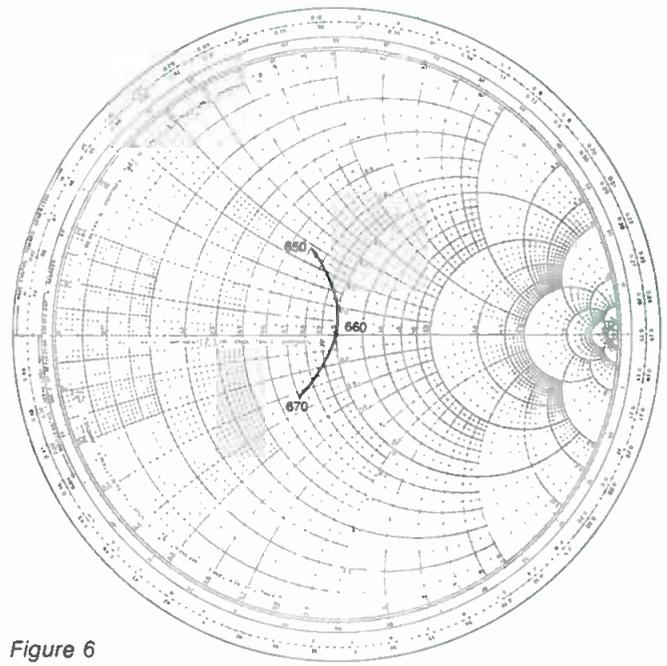


Figure 6

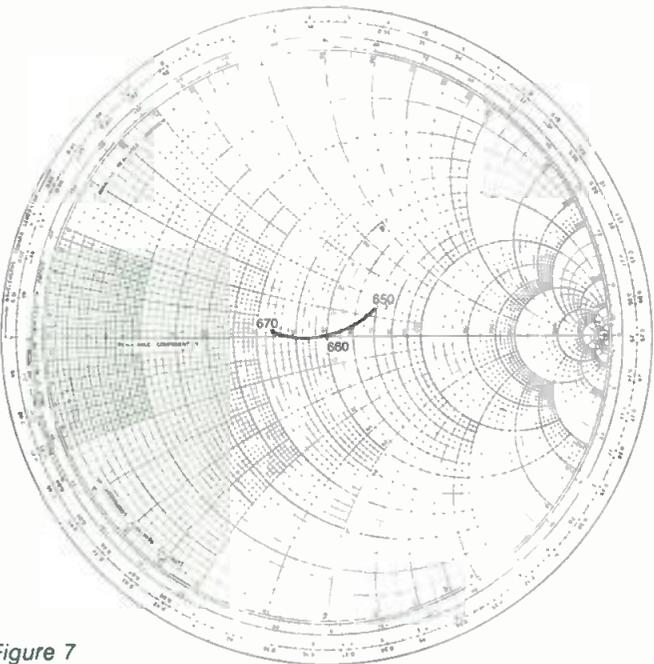


Figure 7

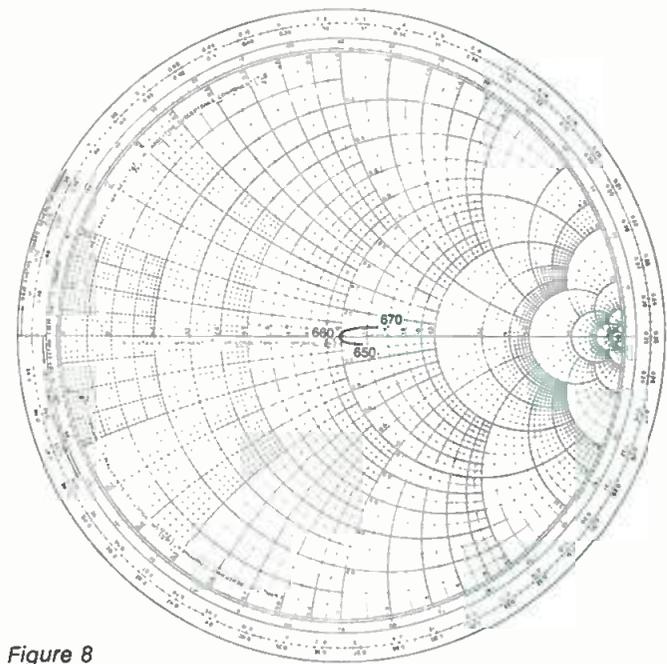


Figure 8

This would yield the following result at the PA (see also Figure 6):

Freq. (kHz)	Z (ohms)	VSWR
650	722 + j477	1.9
660	1000 + j0	1.0
670	704 - j338	1.7

Note that we are now approaching sideband symmetry at the PA, but the VSWR has increased to a very objectionable level. Thus, it can be seen that adjusting for impedance symmetry alone is not enough.

On the opposite side of the Smith chart impedance plot of Figure 6 there is another symmetry area. We can get to the other side of the Smith chart by inserting a +75 degree network in place of the -36 degrees of transmission line. The resulting transmitter output load impedances are (see

also Figure 7):

Freq. (kHz)	Z (ohms)	VSWR
650	68.3 + j13.8	1.50
660	50.0 + j0	1.0
670	34.1 + j0.6	1.49

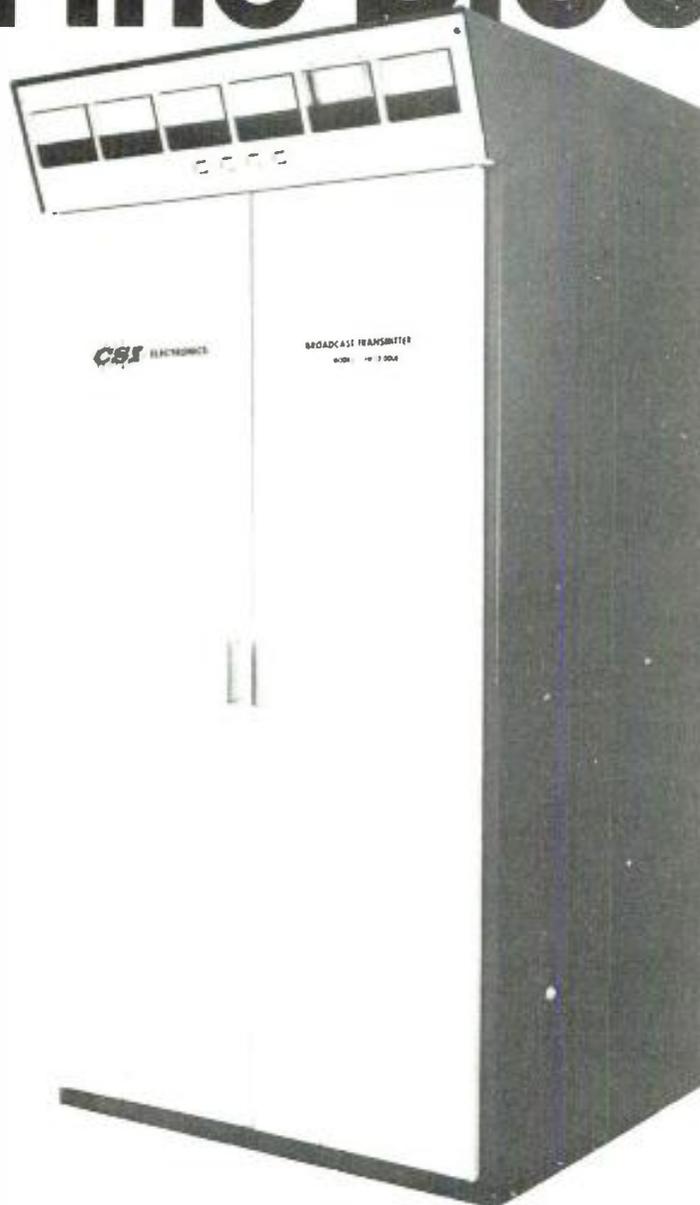
This results in the following PA impedances (see also Figure 8):

Freq. (kHz)	Z (ohms)	VSWR
650	1170 - j50	1.17
660	1000 + j0	1.0
670	1280 + j83	1.29

This very significant reduction in sideband VSWR is obvious when comparing the size of the impedance curves

continued on page 90

The toughest three-year-old on the block!



Three years ago, CSI announced a new line of AM and FM transmitters at the NAB convention in Las Vegas.

In 1978 — three years and 271 installations later we were back in Las Vegas with the NAB and a full line of broadcast transmitters.

Be sure to drop us a line and get acquainted . . . with the toughest three-year-old on the block.

CSI ELECTRONICS INC.

3800 South Congress Street • Boynton Beach, Florida • Phone 305/732-0300 • Telex 513458

IN CANADA, contact Peter MacFarlane, CSI Electronics, Pointe Claire P.Q. Phone 514-695-8130 or 514-484-6601

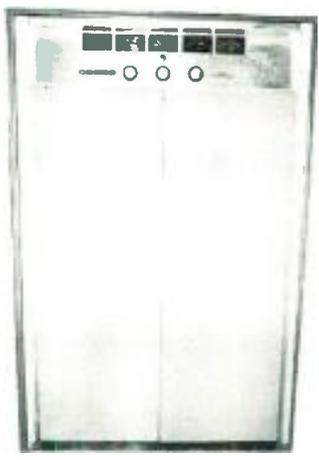
Circle 154 on Reader Service Card

SAVE WITH PRE-OWNED EQUIPMENT

ALL PARTS GUARANTEED FOR ONE YEAR



TRANSMITTER: RCA BTF 20E BTEJ0C FM Exciter and New FM Optimod \$25,000 20 KW FM Transmitter, tuned to your frequency on the air at WSDO, Miami

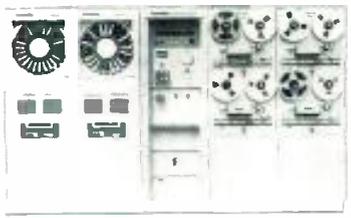


TRANSMITTER: Gates FM 20H3 20 Kilowatt transmitter presently on the air at WLOY, Ft. Pierce, Florida. Best Bid over \$25,000 including TE-3 exciter and new FM Optimod



TRANSMITTER: Presently on the air at WKQS, FM, Boca Raton at 25Kw AEL Transmitter, \$25,000 including new FM Optimod

AUTOMATION SYSTEM: Schafer 800 Automatic System, new capstan motor, pinch roller, new heads for all reel to reel and cartridge equipment, solid state brain, complete package deal, installed, \$16,500.00 - in stock ready for immediate shipment



OVER \$750,000.00 IN STOCK

BA BROADCAST AUTOMATION ASSOCIATES, INC.
 410 METZGER RD. PO BOX 277 FORT PIERCE FLORIDA 34429 (813) 464-5465
 SERVING BROADCASTING WORLDWIDE SINCE 1965

Circle 148 on Reader Service Card

Transmitter Output Network

of Figure 6 and Figure 8. It is hoped that the perceived change in the air sound will be equally dramatic.

An exact model of the output network is therefore desirable in order to take advantage of the system bandwidth improvement capability of the output network. Unfortunately, this VSWR reduction technique usually cannot be applied to output networks which have a wide bandpass characteristic.

Measurement techniques

Occasionally it is found that the PA impedances are high enough to be off the scale of the bridge. This is more likely to occur with a low-power tube-type PA than with a high-power one. These impedances can be brought within the range of the bridge by placing a resistor across the PA. However, this will endanger the accuracy of the measurement. I do not recommend this technique, but if there is no other bridge available, be sure to measure the impedance of the resistor at the generator frequency. Also, do not use a resistor value less than the impedance you are trying to measure (the lower the resistor value, the lower the accuracy).

Be sure to check the validity of your impedance measurements by plotting them on a Smith chart to see that the points travel in a clockwise direction from low to high frequency. If they do not, then there are three things you should consider:

- Was a good ground obtained so that a *sharp* null occurred?
- Was interference present? If so, did you take measurements on either side of the interfering signal, and interpolate between those points?
- Is there something loose in the antenna that could have caused a change in impedance while measurements were being made; e.g., coil clip, tower section bond, etc.?

Remember that when you correct the reactance data for frequency, with some bridges you *multiply* by the frequency in MHz while with others you *divide* by the frequency. Of course, you must correct each reactance with its appropriate frequency — do not make the mistake of correcting all of the reactance data with the carrier frequency. Be sure to use a frequency counter or some other means to determine exactly what frequency your generator is producing. By the way, if you modulate the generator you may affect the accuracy of the frequency counter.

Tone modulation can affect where the null occurs, since the generator sidebands will see impedances which differ from what the generator carrier sees. Thus, it is important to modulate with a low-frequency tone so that the generator sideband frequencies are close to the generator center frequency.

When making PA impedance measurements, leave the PA tube in the circuit. The tube has a significant amount of plate-to-ground capacitance, which must be considered as part of the output network. Keep in mind that the loading and tuning controls affect not only the carrier impedance, but also the sideband impedances. The output network controls should be adjusted to their normal operating positions before making impedance measurements at the PA.

BM/E

Audio-Technica rewrites the book on professional phono cartridges.

Introducing The Professionals

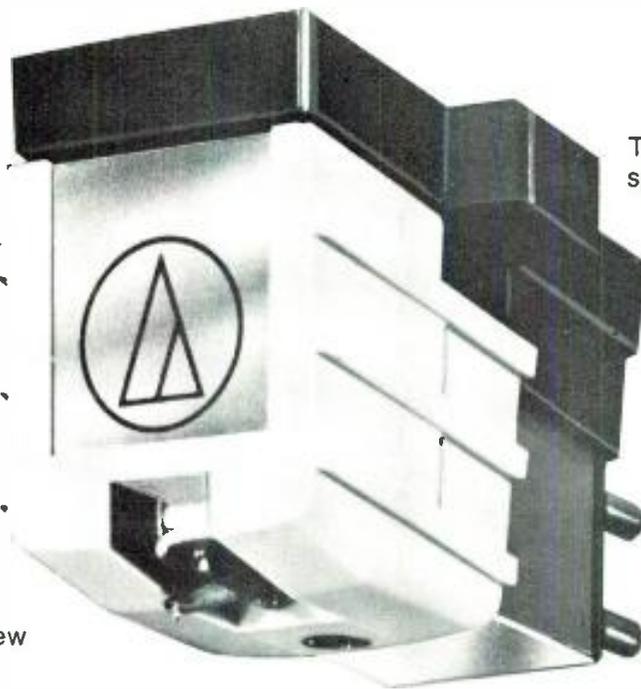
The new Audio-Technica ATP Series Dual Magnet™ Stereo Phono Cartridges

What do you really need from a professional phono cartridge? Impeccable quality. Reliability. Uniformity. And reasonable cost. The goals we've met with the new ATP Series cartridges.

The new ATP Series are flat, smooth, low distortion performers that will do your station, studio, disco, library, or commercial installation proud. They are also very tough... the next best thing to "bullet proof". Because we know that "needle drop" isn't just a way to pay for music or SFX. It's a fact of life!

Both ATP cartridges and styli are *uniformly* excellent. When you at last need to replace a stylus, you always get "like new" performance again, and again, and again.

Don't confuse the ATP Series with other "professional" cartridges that are merely modified home units. ATP units don't have to be treated with kid gloves. And yet we haven't sacrificed tracking ability to make them rugged.



The all-new ATP cartridges were specially developed for the working environment. Three models provide a choice of either spherical or elliptical styli. Each cartridge is hand-tuned for optimum performance, with stereo channels matched within 1.5 dB to eliminate balance problems.

All ATP cartridges feature tapered cantilever tubes that combine high strength with minimum moving mass. There's no problem with back cueing, and the brightly colored cantilever tip is readily visible so that you can spot an LP cut quickly and accurately.

ATP cartridges are priced from \$30.00 suggested professional net. Write for complete specifications. Try the ATP Professionals on your own turntables. We know you'll be pleased with what you hear. From the thoughtful pros at Audio-Technica.



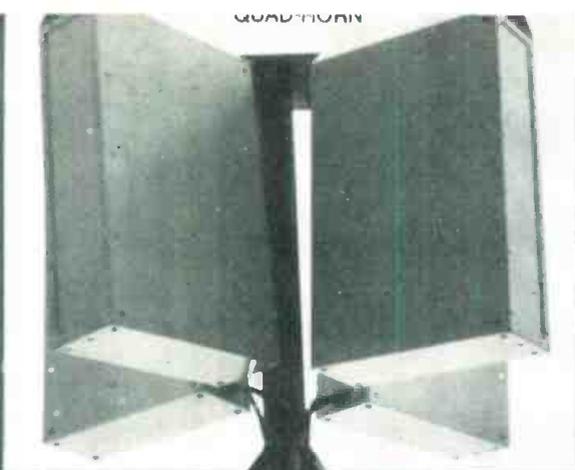
Upgrade your entire record-playing system with new ATP tone arms. Rugged and precise, like ATP cartridges. Professional in every respect. Model ATP-12T or ATP-16T just \$125.00 suggested professional net.



audio-technica
INNOVATION □ PRECISION □ INTEGRITY

AUDIO-TECHNICA U.S., INC., Dept. 298M, 33 Shiawassee Avenue, Fairlawn, Ohio 44313 • In Canada: Superior Electronics, Inc.

Circle 155 on Reader Service Card

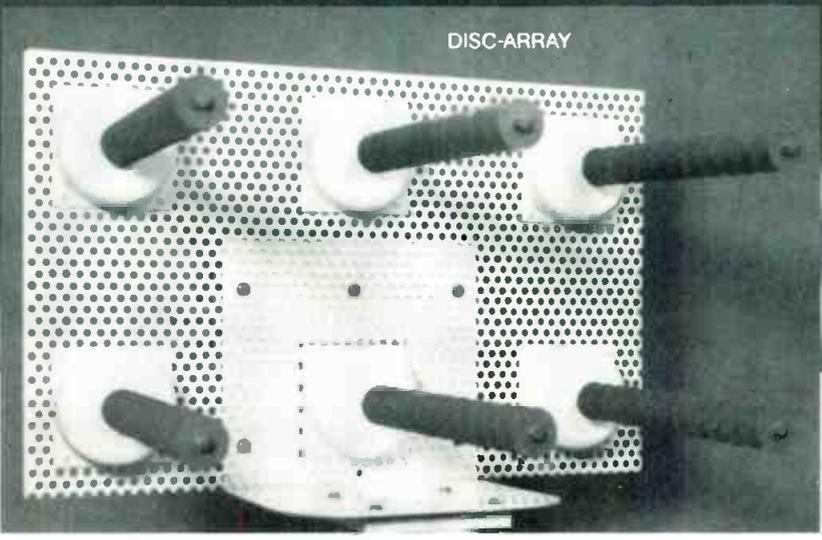


QUAD-HORN



DISC-ROD

GOOD NEWS TRAVELS FARTHER



DISC-ARRAY

DISC-ROD portable transmitting antennas in single, dual or quad design with variable polarization, interchangeable elements and up to 24 dBi gain.

DISC-ARRAY receiving antennas with continuously adjustable polarizer, up to 24 dBi gain and only 30" in diameter by 35" high.

QUAD-HORN central receiving antennas designed for sector type coverage. Achieve superior out-of-band signal rejection, minimal wind loading.

...with new ENG antennas by Microwave Associates We're Microwave... first name in ENG and now the first name in high performance antennas that extend your ENG range and minimize multipath interference.

Give your ENG operation more clout, more reaching power with the new Microwave Disc-Rod™, Disc-Array™ and Quad-Horn antenna systems... the perfect performance match for Microwave ENG radios.

Antennas by Microwave Associates are designed to give you the edge in the real world of ENG with exclusive engineering features like these: Continuously adjustable polarizer lets you match the polarization of the received signal to minimize interference. With up to 24 dBi gain on transmitter and receiver, you can achieve unprecedented range fully equal to the performance of 4-foot parabolas. With less than 1/3 the surface area, there is that much less wind load.

For full details on the complete line of antennas by the ENG pioneer, write or call Microwave Associates, Communications Equipment Group, 63 Third Ave., Burlington, MA 01803 (617) 272-3000.

Field Sales Offices: Atlanta, GA (404) 455-3815.
 Dallas, TX (214) 234-3522, Kansas City, MO (816) 891-8538.
 Sunnyvale, CA (408) 734-8777, Seattle, WA (206) 232-3550.
 Honolulu, HI (808) 537-3991, Edina, MN (612) 831-3920.
 Columbus, OH (614) 451-9844.

 **Microwave Associates**
 A M/A-COM COMPANY

Circle 156 on Reader Service Card

BM/E's Panels Of 100 Survey Reveals Broadcasters' Greatest Areas Of Interest In Technology For 1979

AM stereo in all its many forms will draw close scrutiny from radio broadcasters, while television broadcasters seem convinced that one-inch VTRs will open new vistas.

THAT SPANKING NEW Texas city of Dallas will play host to thousands of broadcasters beginning March 24, and they'll be doing some very serious looking and shopping among the expected 350 manufacturers' exhibits. Radio broadcasters will be poring over any equipment associated with the promise of AM stereo and television broadcasters will swarm around one-inch videotape equipment like bees to honey.

This year, *BM/E* expanded and refined its Panels of 100 Survey of Broadcast Industry Needs and managed to achieve an even more reliable sample of opinion from radio and television engineers and management. One heartening result of the survey was the clear indication that in all but a few areas of broadcast technology, management and engineering showed a greater uniformity of opinion.

General observations about this year's NAB

Attendance of broadcasters to the Dallas NAB Convention and Exhibit will most certainly be up in all areas. More radio management and more radio engineers will attend, as will more television management and engineers.

Of those attending, most will be going to the exhibit halls with specific objectives in mind. What will be different this year from previous years, however, is that the interest is more spread out over production, control, transmission, and test and measurement equipment. While interest in production equipment still holds the highest ranking by broadcasters, the other three areas showed marked increase. In 1978, for instance, television and radio broadcasters listed production equipment as their major concern nearly twice as often as any other category. This year, there was only an 18-percentage point spread between the highest rank category, production (38 percent), and the lowest, control (20 percent).

This spread of interest seems to have led to a number of other trends. For one thing, all broadcasters say they will be visiting more booths (50-plus) than they did last year, and spending slightly

more time doing it. With 350 booths expected in Dallas, however, this could present a problem and broadcasters might be well advised to pack roller skates as essential convention gear. Generally, engineers expect to spend slightly more than 16 hours visiting the exhibits while managers will spend slightly less than ten hours on the exhibit floor.

Another example of the interest spread was apparent in the ratings of specific product interests. Broadcasters were asked to check off their degree of interest (very, some, low, none) over a wide range of specific product categories. Compared to last year's results, the spreads were much closer, resulting in fewer products dominating the interest of broadcasters. This can be attributed, in part, to the increase in sample size and response — but it is also possible that broadcasters will be shopping more cautiously in 1979 than in 1978.

Radio's most wanted list

As mentioned earlier, AM stereo equipment will be high on the lists of radio broadcasters visiting Dallas. This is the only area of radio equipment where the highest interest level (very) dominated the overall statements. The types of stereo equipment that AM broadcasters are interested in, however, were probably reflected in the very high rankings of studio tape recorders (ranked number one with 79 percent of the respondents listing very or some interest) and consoles/mixers (ranked number two, with 77 percent). In fact, the interest in stereo cart player/recorders (71 percent) pushed them up in the rankings from number six last year to number four this year.

The continued strength of FM stations was reflected this year as most products associated with FM broadcasting pushed their way up in the ratings. The only FM technology that took a beating was FM quad, which was in last place in 1978 and dropped deeper into the hole in 1979. In another part of the survey, broadcasters were asked to indicate the technologies they thought would have the most impact on their operations in the coming two years. They showed their frustration with FM

quad with only six percent indicating that it would have any impact on radio.

Other product categories that showed strong interest levels were audio processors, test equipment, microphones and accessories, and remote pickup and STL. Turntables and antennas both showed good improvements in their relative rankings, but ATS equipment plummeted from ninth place to eighteenth, showing only a 44 percent interest factor, compared to 55 percent last year.

As far as the near-term future goes,



Studio tape recorders continue to dominate radio broadcasters' interests. Scully will present its full line at NAB

radio broadcasters believe that AM stereo is likely to have the most profound effect, while more reliance on computerized equipment and increased use of digital audio equipment are in a virtual tie for second place. The survey attempted to ascertain whether radio broadcasters would be using more or less audio processing in the future, but though the implication was that they would use more, no statistically valid answer resulted from the question. Interest in the further adoption of earth station equipment seemed healthy, but two years may be too short a term for most radio broadcasters' expectations.

Television's most wanted list

In television, product interests went through a real shakeup. There appears to be a general acceptance of the notion that one-inch VTR technology is the key to a new era in television which is likely to see broadcasters doing more commercial and field production. For the first time in several years, ENG cameras were supplanted in first place by interest in one-inch VTRs that showed a clear 90 percent interest level. ENG cameras are not far behind, however, taking second place with 86 percent.

Panels Of 100 Survey

Overall Interest In Radio Equipment

Rank		Percent Actively Interested ¹
'79	'78	
1	1	Tape Recorder/Players (studio) 79
2	2	Consoles, Mixers 77
3	3	Audio Processors 76*
4	6	Cartridge Players/Recorders 71
5	4	Test Equipment 69
6	5	Microphones, Accessories 69
7	7	Remote Pickup & STL 62
8	8	AM Stereo Equipment 61*
9	15	FM Monitoring Equipment 59
10	12	Turntables 57
11	10	Noise Reduction Systems 53
12	16	FM Transmitters 51
13	11	AM Transmitters 50*
14	20	Antennas 49
15	18	AM Monitoring Equipment 49
16	14	Monitor Speakers 49
17	13	Automation Equipment 45
18	9	ATS Equipment 44
19	21	Tape Recorders/Players (field) 43
20	17	Business Automation Systems 36
21	19	Reverb & Special Effects 33
22	22	FM Quad Equipment 27

¹Percentage checking very interested or some interest.
*Indicates those products which showed the greatest intensity of interest; that is, degree of interest was weighted towards the highest end of the scale by a wide margin.

Overall Interest In TV Equipment

Rank		Percent Actively Interested ¹
'79	'78	
1	2	VTRs (one-inch) 90*
2	1	TV Cameras, ENG 86
3	4	Time Base Correctors 78*
4	5	VTRs (3/4-inch) 77
5	16	Digital Effects Devices 74*
6	6	Videotape Editors 73
7	3	Test Equipment 73
8	10	Video Monitors 73
9	8	Microwave for ENG 72
10	22	TV Cameras, EFP 71
11	7	Frame Synchronizers 68*
12	12	Character Generators 62
13	17	TV Cameras, Studio 62
14	11	Electronic Still Stores 62
15	24	Image Enhancers 61
16	14	Time Code Equipment 59
17	13	Routing Switchers 57
18	20	Audio Consoles, Equipment 56
19	15	Switching Automation 56
20	9	Noise Reduction Systems 54
21	23	Production Switchers (large) 53
22	18	ATS Equipment 53
23	21	Master Control Switchers 52
24	19	Remote Control (status, etc.) 52
25	26	CP Antennas 52
26	30	Production Switchers (small) 48
27	27	Lighting Equipment 47
28	25	Film and Slide Chains 41
29	28	VTRs (quad) 37
30	31	Transmitters 33
31	29	Slow Motion Recorders 24

Connected to the interest in one-inch, however, was the astronomical rise of interest in EFP cameras, which shot up from twenty-second place last year to tenth place this year with 71 percent interest. Another big, and perhaps associated, winner, was digital video effects devices, moving from sixteenth place in 1978 to fifth place in 1979.

It may also be that television broadcasters are looking to digital video effects systems to do a lot more for them than just effects. While interest in other digital devices, such as TBCs and frame synchronizers, remains high (in fact, TBC interest is up and may be attributable to the current blanking width controversy), it is also possible that TV broadcasters are expecting to get frame synchronization, noise reduction, and time base correction thrown into the same digital effects bargain.

One-inch VTRs are most certainly going to impact quad VTRs, but the survey indicates that they probably will not affect U-type 3/4-inch VTRs appreciably. In this case, broadcasters seem to feel the U-type machines still have a vital role to play in news gathering, where speed and portability are still the most needed attributes. As far as improving the on-air appearance of U-type recordings goes, broadcasters seem to be opting for more image enhancement, which showed a significant climb in the ratings from twenty-fourth

place last year to 15th place this year.

Generally, most product categories on the television side showed continued strength, with few products taking nose dives. Slow motion devices slid into last place this year, and this too may be attributable to one-inch since the Type C machines are capable of providing this function. Nevertheless, equipment that has traditionally been high on the shopping lists remains there, such as microwave for ENG, videotape editors, character generators, test equipment, and video monitors. Another encouraging sign that television broadcasters are taking audio more seriously is that audio consoles moved up again this year into eighteenth place from twentieth, with a 56 percent active interest factor.

The four products this year which showed the most intense interest in terms of being weighted to the high end of the interest scale were one-inch VTRs, TBCs, frame synchronizers, and digital effects devices.

The most important short-term expectations for new technology as expressed by television broadcasters show that the next two years won't be that different from the past two. Television broadcasters uniformly noted that the adoption of more ENG equipment would be the source of greatest change in the next two years. The switchover to all-ENG will continue, but at a modest pace with no wholesale rush to reach

Editor's note: The percentage figures given on the Panels of 100 chart indicate the overall active interest (very/some) in the individual product categories. The ranking of the products does not necessarily indicate a comparison of the products, but instead, the relative enthusiasm for each product. Since, for instance, cameras, microphones, and test equipment are relatively ubiquitous and are replaced more often than transmitters, of which there are fewer units per station, it is logical that the former products should generally outperform the latter in level of interest. The ranking does, however, provide significant information when similar classes of products are compared, such as the higher ranking of EFP cameras when compared to last year's position.

this point. The other most important trend that television broadcasters see is an every greater reliance on computerized equipment. Interest in going to CP transmissions is considerable, though it could not be fairly described as passionate. On the other hand, television broadcasters were more interested in earth stations for satellite communications than we had expected, and the day of the "bird" might be closer than we expect.

continued on page 96

Out in the field, we're way ahead of the field.

A pretty dramatic statement, we'll admit.

But Sony Broadcast has dramatic equipment to back it up.

What would you say to a professional U-matic color videocassette recorder, and a broadcast quality 3-tube ENG color camera, at a combined weight of under 40 pounds.

And that includes little things like camera head, and viewfinder, and lens, and videocassette, and even rechargeable battery!

Surprised? You shouldn't be. After all, portable Sony equipment has been leading the ENG revolution for years.

And combining our BVU-50 recorder with our BVP-300 camera gives you one of the most advanced news gathering and field production teams we've ever fielded.

Look, first, at our BVP-300 camera.

It's a state-of-the-art 3-tube color camera in a completely self-contained package. A camera that combines broadcast-quality pictures with the ENG advantages of extremely small size, light weight, and low power consumption.

Three Plumbicon* or Saticon** pickup tubes provide the exact pickup system that suits your needs. Extra sensitivity lets you bring your stories to light...even if you have just 2 footcandles to work with. And automatic controls make setup a snap.

Next, look at our BVU-50 recorder.

It saves space and weight by having record-only circuitry. Yet a unique video confidence head system lets you know you're getting adequate RF signal on the tape. Framing servo insures



proper frame orientation. And professional picture quality makes the BVU-50 equal to any ENG or EFP situation.

Now look at them both together. And see how far ahead of the field Sony Broadcast really is.

Your BVU-50/BVP-300 system will operate for up to 74 minutes on a single BP-90 NiCd battery.

You can start and stop the recorder by the camera trigger.

At the end of each shooting sequence, the BVU-50 automatically backspaces the tape for clean scene-to-scene transitions. You get continuous usable video for the full length of your recording tape.

While you're recording, you can monitor all VTR warning functions in both camera viewfinder and earphone.

And while you're in standby mode, the BVU-50 head drum rotates at slower speed, reducing power consumption by two-thirds.

In short, you get an ENG/EFP package that gives you the size, weight, and convenience you'd normally expect from 16mm film equipment. Yet retains all the economic and electronic advantages of video.

Advantages that can keep you way ahead of the game.

For more information, write Sony Broadcast, 9 West 57th Street, New York, N.Y. 10019. Or call us direct. In New York, our number is (213) 371-5800. In Chicago, we're at (312) 792-3600. And in Los Angeles, at (213) 537-4300.

SONY BROADCAST

*trademark, N. V. Philips
**trademark, Hitachi Co.

Sony and U-matic are registered trademarks of Sony Corp.

Circle 157 on Reader Service Card

Equipment Manufacturers To Answer Broadcasters' Needs

AT THE SAME TIME that we asked broadcasters to specify their equipment needs and expectations for the coming year, we asked manufacturers to give us an early line on what they would be featuring at the NAB show. A peek behind the curtain (full details will be revealed in our March issue) reveals that manufacturers are generally on track for meeting the needs expressed in our Panels of 100 survey.

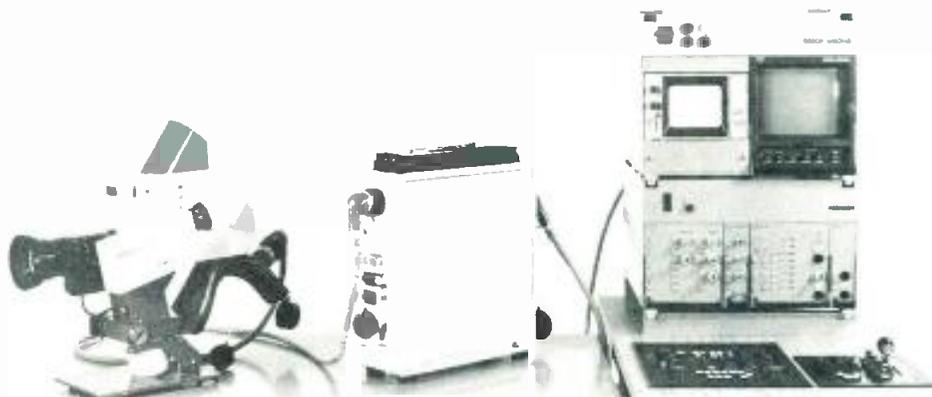
Radio and audio equipment

Radio broadcasters who indicated considerable interest in the **consoles and mixers** should find plenty of equipment on hand, particularly with manufacturers such as LPB, Micro-Trak, and Audio Designs rushing to the foreground with new stereo consoles just in time for AM stereo conversions. Other consoles will be in evidence, too, including offerings from Broadcast Electronics. QRK Electronic Products promises its six- or ten-channel Omega Audio Console, while Ampro Broadcasting will feature its Microtouch console series. Hallikainen and Friends plans to introduce its TVA142 mixer, a six-input rackmounted module with audio follow video capability.

Manufacturers have responded to the continued demand for **recorder/reproducers** with several major new product lines. 3M's Magnetic A/V Products Division will demonstrate its new Centracart system, which it promises will record and play carts with the same sound quality as open-reel decks.



Plan to see digital effects systems and character generators, such as this new desk-top model of MPB's VISTA 80, as early as possible since interest in these products runs extremely high



Bosch Fernseh indicates several new developments in its camera and BCN VTR lines, including this automatic setup for its KCA-90 camera

The 3M system will feature a newly-designed cart that it claims will maximize head/tape contact and optimize tape path alignment capability. Broadcast Electronics also promises a new 2100 Series cart machine. IGM claims to have discovered a new, off-air use for its Instacart system, and will show broadcasters how they can increase station revenues by using it.

Though not promising anything new, International Tapetronics will demonstrate its Series 99 1K automated cart player system, which will handle over 1000 carts simultaneously. Edco, too, will be offering its standard product line (including the CA-77B cart editor and production tool with dbx noise reduction, variable speed control, automatic sequencing, and stereo/mono capability).

One potentially interesting development in the **cart machine** field is United Research Lab's introduction of a self-aligning ball bearing pinch roller with an extremely durable, high friction coefficient coating.

In the **open-reel** area, Otari will be featuring its standard line of studio recorders. Gotham Audio will be showing the Telefunken M 12 A tape recorder as well as the EMT 244 digital reverb unit. There is no word yet from other manufacturers except for Scully, which hints at something new but gives no details.

The **microphone** area holds promise of several new developments. Electro-Voice continues to expand the shock-mounting capability of its mics, particularly important in ENG/EFP applications. New offerings will include the RE 18 shock-mounted variable "D" cardioid, the DO 56 shock-mounted omni, a new shock-mounting clamp for EV's other mics, and the AC 24 power supply for condenser mics. Gotham Audio will display the Neumann KMR 82 shotgun condenser, designed for boom work.

RF mics, too, should prove to be of considerable interest. HM Electronics' WM 152 Flat Pac, an extremely small, flat, portable receiver with a 95 dB

dynamic range, will be on display, while Alan Gordon Enterprises will demonstrate Swintek's radio mics with their newly developed UHF/VHF antenna system and diversity receivers. Vega and Thomson-CSF are also expected to exhibit their RF microphone lines.

Those interested in **transmitters** will find a wealth of new products and developments. Bayly Engineering plans to introduce its new PDM (pulse duration modulation) transmitter line at the show, in addition to some new two-way radio communications units. Sintronics will be unveiling its new FM transmitter line, including 1.5, 3.5, 5, 15, and 27.5 kW versions. McMartin Industries, too, will be showing a new FM transmitter line, in addition to a new 5 kW AM transmitter and remote pickup and audio amplifiers. LPB will offer a new 150 W FM transmitter. In general, the large number of new FM transmitters on the market points to the continued health of FM radio for the coming years.

AM has not been forgotten. Continental Electronics will be at the show with its complete line of AM transmitters, while Potomac Industries will be demonstrating its new automatic transmission system for directional AM antenna arrays. Though not heard from at the time this report was prepared, most of the other major antenna and transmitter manufacturers, including Harris, CCA, and others, are likely to be on hand with a host of exciting products.

Remote control and STLs, in radio and television, continue to play a major role in the developing trend toward modern, sophisticated radio broadcasting. Time & Frequency Technology, for instance, will have its Model 785 single-channel FM preselector on hand, along with its system for microprocessor remote control and logging. Micro Control Associates promises a "totally new concept" in aural STLs. Moseley Associates, a long-time leader in the field, will show its MRC-1 micro-

continued on page 98

A product line that satisfies everyone's editing equipment requirements

**DATATRON SUPPLIES
VIDEOTAPE EDITING SYSTEMS
AND PERIPHERAL EQUIPMENT FOR
EVERY EDITING APPLICATION -
AND EVERY BUDGET**

DATATRON 2000 — THE ALL NEW THIRD GENERATION VIDEO—TAPE EDITING SYSTEM FEATURING DISTRIBUTED PROCESSING, AN INTERACTIVE COLOR CRT OPERATOR INTERFACE, CONTINUOUS RECORD VTR ROLL CAPABILITY, FLOPPY DISK EDIT LIST STORAGE, USER BITS, AND A HOST OF OTHER REFINEMENTS. THE MOST ADVANCED ELECTRONIC VIDEOTAPE EDITING SYSTEM YOU CAN BUY.

TEMPO 76 — THE FIRST VIDEOTAPE EDITING SYSTEM THAT PUTS BOTH SMPTE TIME CODE AND CONTROL TRACK TECHNOLOGIES AT YOUR FINGERTIPS IN ONE UNIT. WITH ENHANCEMENTS SUCH AS TEXT EDITING, EXTENDED MEMORY, SYSTEM DEBUG AND EXPANDED INTERFACE CAPABILITY, TEMPO 76, IS STILL THE MOST SOPHISTICATED AND FLEXIBLE EDITING SYSTEM IN ITS CLASS.

EDITMATE III — A NEW, FULL FEATURE CONTROL TRACK EDITOR WITH EDIT DECISION LISTING CAPABILITY. SOPHISTICATED EDITING FEATURES AT A SURPRISINGLY LOW PRICE. ALSO AVAILABLE IN AN EDITOR—ONLY VERSION (EDITMATE II), AND IN AN EDIT LISTER—ONLY VERSION (EDITMATE I).

PERIPHERAL EQUIPMENT — DATATRON'S EDITING SYSTEMS ARE BACKED—UP BY A COMPLETE ARRAY OF FULLY COMPATIBLE PERIPHERALS, INCLUDING SMPTE CODE READERS AND GENERATORS (WITH OR WITHOUT USER—BITS), CHARACTER GENERATORS, JAM—SYNC GENERATORS, ROUTING SWITCHERS, PAPER TAPE PUNCHES AND READERS, AND MORE.

WRITE OR CALL TO LEARN MORE ABOUT THE MOST COMPLETE LINE OF EDITING PRODUCTS IN THE INDUSTRY.

DATATRON 2000

datatron, inc.

1562 Reynolds Ave., Irvine, California 92705 (714) 540-9330 TWX 910-595-1589
Mailing Address: P.O. Box 11427, Santa Ana, California 92711



5150 SMPTE CODE GENERATOR



5250 SMPTE CODE READER



5260 SMPTE/USER BITS READER



5170 SMPTE/USER BITS GENERATOR



5152 JAM SYNC GENERATOR



9 x 3 ROUTING SWITCHER



5450 CHARACTER GENERATOR

EDITMATE
EDITORS &
EDIT LISTERS



TEMPO 76
EDITORS

SEE US AT NAB BOOTH 491

Circle 158 on Reader Service Card

Panels Of 100 Survey

processor remote control system. Halikainen & Friends, continually expanding the uses to which digital technology can be put in broadcasting, will show the new display for its TEL-171 digital telemetry adapter for the Moseley TRC-15A, and a new digital telemetry adapter — the TEL-172 — for the Moseley PBR-30.

Several companies will also demonstrate **microprocessor applications** to a wide range of other radio broadcast applications. Broadcast Electronics, for instance, has a new economy version of its Control 16 program automation system which can be expanded as the station's needs grow. The company also has a new high-speed intelligent logging system for the Control 16. Sono-Mag claims to have made substantial developments in a broadcast automation system, though details are not yet announced. Bloomington Broadcasting follows the line of most computer system manufacturers by offering increased software capabilities from year to year; in 1979 they promise enhanced software for sales, traffic, billing, general accounting, payroll, and management functions alike. Other companies, such as Groton Computer and Jefferson Data Systems, will continue to offer their standard product lines.

Finally, though interest in **audio processing** remains high among radio broadcasters, we learned of few companies who have new product offerings in this field. One exception is Moseley Associates, which will show the TAL 320 AM stereo audio limiter. Another company with an early commitment to AM stereo processing is Edco, which

will again show its STE-100 stereo phase enhancer, along with its full line of Dyna-Mite pulse distribution, distortion, and equalization amplifiers. Audio and Design Recording will be featuring a new compressor/limiter/expander and parametric and graphic equalizer in addition to its new Scamp affects modules.

Television equipment

Television broadcasters are likely to find less new equipment than they might have anticipated with the current prosperity of the market. It appears that manufacturers have spent the past year in refining production techniques for getting their newly developed products into users' hands rather than investing in more R&D. Nonetheless, there are some exciting new developments, many stemming from intensive exploration of digital technology.

One-inch VTRs, which continue to dominate broadcasters' interests, will be in evidence everywhere, with both Sony and Ampex having capitalized on the SMPTE's adoption of a standard Type C format to rush units into production. They will no longer be alone in the field, however, since both NEC and Hitachi have announced plans for one-inch Type C machines. NEC claimed last year that they would have full production models of the TT-7000 unit on display at the 1979 Show. Hitachi, too, claimed it would have demonstration models of its one-inch unit in dealers' hands by the end of 1978 and would be in full production by the time of the show, though no specific details have been released yet to *BM/E*.

Other one-inch units will be on display throughout the show. Bosch Fernseh will be showing the latest lightweight cassette version of its BCN

Type B system. Cinema Products will be displaying NEC's lightweight TTR-7 and portable TTR-5 one-inch helical Type D machines. Other manufacturers licensed to produce one-inch systems by Sony and Ampex, such as RCA and Philips, will expand the number of opportunities for broadcasters to look over these new machines.

Editing systems to interface these decks are also starting to appear. Convergence will again demonstrate its ECS-100 Series Superstick multiple source editing control system with special effects. Bosch Fernseh will show its EPS 70 editing system, demonstrated at the SMPTE show last year. Datatron and CMX, too, will show their lines of computer-assisted editors. A new development in editors is promised by Video Associates Labs, which will unveil its 60 Hz playback vertical lock and H lock modification for the Sony VO-2860. BTX will offer a new SMPTE time code controller to interface audio with video recorders.

ENG/EFP cameras and production tools will also once again be in evidence throughout the show. Thomson-CSF will have its one-piece Microcam, the Model 601, in a full production version, with a four-and-a-half-inch viewfinder, remote control for EFP applications, and a 2 GHz video link and 950 MHz audio link microwave system. Ikegami's HL-79A will be shown as a production model, along with the new crop of extremely lightweight cameras from manufacturers such as Philips, RCA, Panasonic, Sharp, JVC, Hitachi, Sony, Cinema Products, Bosch Fernseh, NEC, and several others. Other developments on the ENG/EFP scene include three new ⅜-inch Plumbicon® tubes from Ampex, new models of fast-charging batteries and battery packs and belts for cameras and VTRs from Cine 60, an ac/dc portable audio and video production console from Camera Mart, new zoom lenses for EFP applications from Rank Precision Industries, Canon, Angenieux and Fujinon Optical, and camera-to-RCU cable assemblies from Boston Insulated Wire and Cable.

In **microwave**, Van Ladder will offer a van-mounted aerial ladder with facilities for mounting a microwave dish. E-N-G Manufacturing will again offer some new, pioneering equipment for ENG/EFP microwave applications — this time a backpack containing both a transmitter and receiver, together with associated antennas, for relays in remote locations.

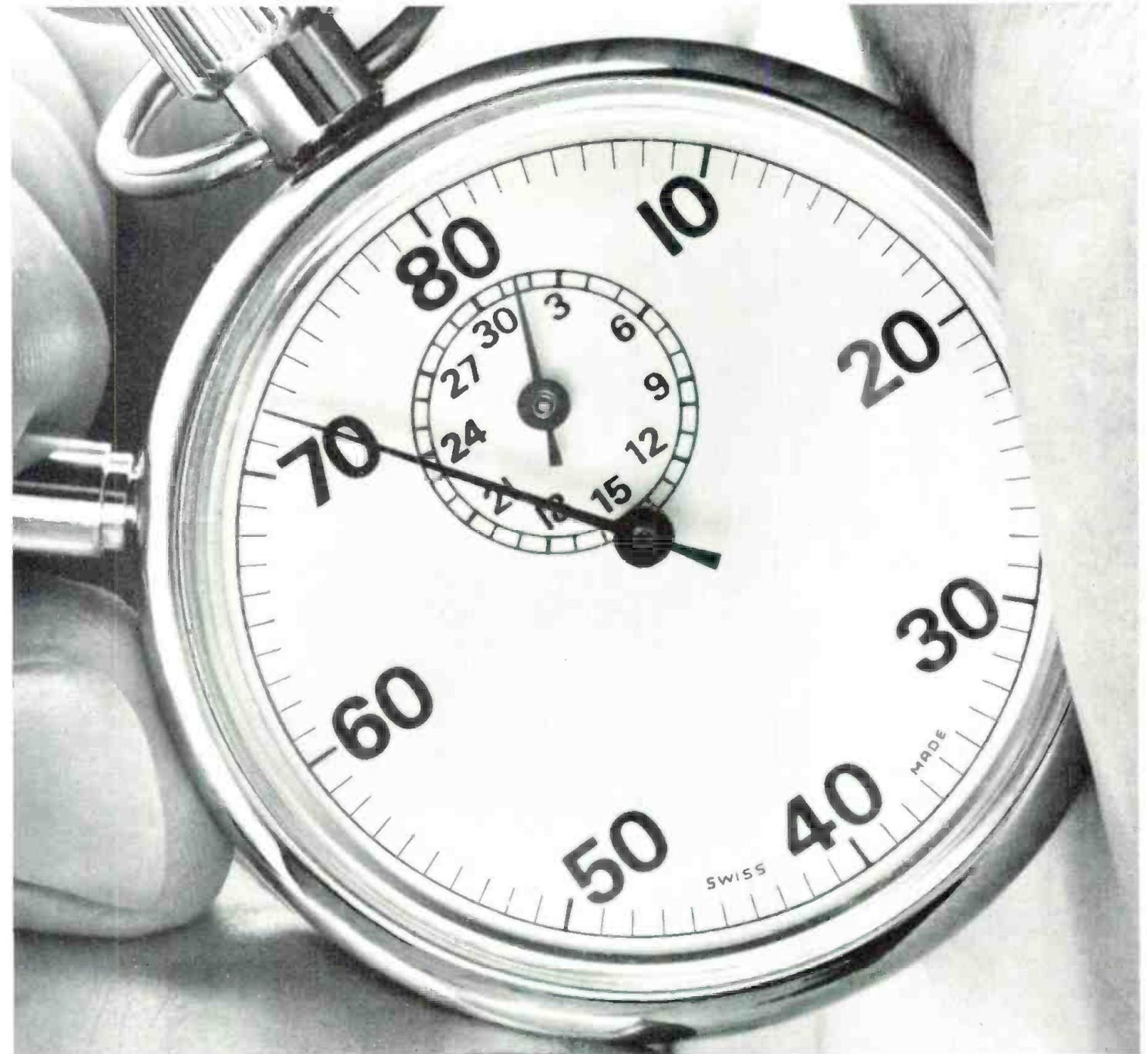
Considerable interest is likely to be generated by the expansion of digital technology into the **special effects** and **switching** areas. Central Dynamics, not to be outdone by PSAS or E-MEM, has announced plans to demonstrate a

continued on page 100



Testing and measuring continues to be important to the engineering sector of the television industry. Several companies promise new developments in this area, including QSI, which will unveil its color bar identifier at the NAB show

NEW PROCESS RVNP FROM KODAK GIVES YOU THE ONE THING EVERY NEWS DIRECTOR NEEDS:



A LITTLE MORE TIME BEFORE AIR TIME.

Kodak announces a faster processing method for video news film over the widely used Process VNF-1. This new alternate processing procedure can reduce by 8 to 18 minutes the time formerly needed to process 1000 feet of film, depending on your processor speed. Excellent broadcast quality is maintained.

What news director wouldn't like to move the film deadline as much as 18 minutes closer to air time? Or have those

extra minutes to use for editing, screening and rehearsal?

The new Process RVNP (Rapid Video News Process) uses most existing film processing equipment. The procedure is easily implemented by your personnel. To learn more, ask your Kodak Sales and Engineering Representative, or write Eastman Kodak Company, Dept. 640, Rochester, New York 14650.



© Eastman Kodak Company, 1979

Circle 159 on Reader Service Card

Panels Of 100 Survey

new system for computer memorization of complex production sequences, which it has dubbed CAP. Vital Industries will have a full production model of its Squeezoom on hand. Other manufacturers of digital effects systems, such as MCI/Quantel and Grass Valley Group, will also undoubtedly have their systems in full operation. MCI/Quantel will offer evidence of one advantage of digital as it begins supplying its first software updates to users. Other popular items are likely to be Colorado Video's new Model 274 video frame store, Bosch Fernseh's slow motion programmer for its BCN VTRs, and Edutron's new TBC with a wide window and genlock.

Electronic character generators and graphics systems manufacturers will also probably have long lines at their booths, with interest in these systems remaining extremely high. Chyron will be demonstrating its newly developed Election Reporting System, which ties into a nationwide network of time sharing computers with its in-plant hardware. MPB will be using the show to introduce a desk-top model of its VISTA 80 system. Knox Video Products, too, is working on some new de-

velopments in character generators which may be ready by March. Though not heard from by the time of this writing, TeleMation and Thomson-CSF (Vidifont) will undoubtedly have their systems in full swing at the show. System Concepts, too, will have their Q-III and Q-IV character generators with new software features on hand.

Although **testing and measuring** equipment was of less interest to management than engineering in the Panels of 100 survey, several new items are likely to catch the eyes of any broadcasters interested in maintaining the quality of their operations and images. Videotek will introduce its Model DM-4R demodulator and eight-inch portable color monitor. Lenco will have its full product line of waveform monitors, vectorscopes, waveform analyzers, high resolution monitors, and adjustable blanking width modules on display. Barco will display a very high quality color video monitor well suited to EFP applications. Video Aids of California will feature its model 4000 VIRS inserter and combination H-phase, burst phase meter. Tentel will distribute a "Tape Tips Guide" with valuable information on maximizing the use of many different formats of VTRs in conjunction with its Tentelometer, which measures tape tension.

QSI Systems has a newly developed color bar identifier for instant logging and identification, as well as a full line of clocks including a backtimer. Conrac will demonstrate its full range of monitors. A particularly important new development in testing and measuring is the Tektronix tuneable down converter for its 1450 demodulator. Marconi will demonstrate its new Model 2920 television interval timer.

Based on the results of the Panels of 100 survey, a number of other units are likely to be popular on television engineers' "must see" lists. These include Cohu's new encoder/enhancer/auto balance unit and Dynair Electronics' new high density routing switcher system, which can be used with a versatile "intelligent" control system. Engineers, who traditionally have problems selling routing switchers to their managements, should also check out the Di-Tech line of audio and video routing switchers, in addition to the systems offered by manufacturers such as NEC and Grass Valley.

Lighting equipment, which continues to be of fairly low interest, nonetheless continues to demonstrate significant technological gains, particularly in the area of computer control. Kliegl Brothers plans to introduce a

continued on page 102

THE STANDARD

QUADS IN CHICAGO



NURAD, Inc.

2165 Druid Park Drive • Baltimore, Md. 21211
TELEPHONE (301) 462-1700 TWX/TELEX (710) 234-1071

Nurad components are the standard to which all others must be compared. Since the introduction of the original 20 QP1 QUAD in 1973, we have been the leaders in ENG/EJ microwave antennas, with innovations such as the SUPERQUAD™ Receive System and the famous GOLDENROD™ Series of transmit antennas.

By themselves, the QUAD and SUPERQUAD™ are state-of-the-art receive systems with Nurad performance, quality, and reliability. This is not a vague promise. More than 200 Nurad antenna systems are in everyday service with all three networks and with leading stations throughout the country as well as in the U.K., Brazil, Australia, Hong Kong, the Bahamas, France, Israel, and elsewhere. Today's Nurad components incorporate innovations based on years of ENG/EJ field experience.

But we are much more than the leader in ENG/EJ microwave antennas and components. Nurad also offers complete Microwave TV Systems. We utilize our years of field-proven expertise and experience to plan, design, engineer, and install the complete system.

Whether you're planning your first ENG/EJ microwave system, or expanding your present system, let Nurad, the leader in state-of-the-art microwave design, provide you with total ENG/EJ capability.

Circle 160 on Reader Service Card

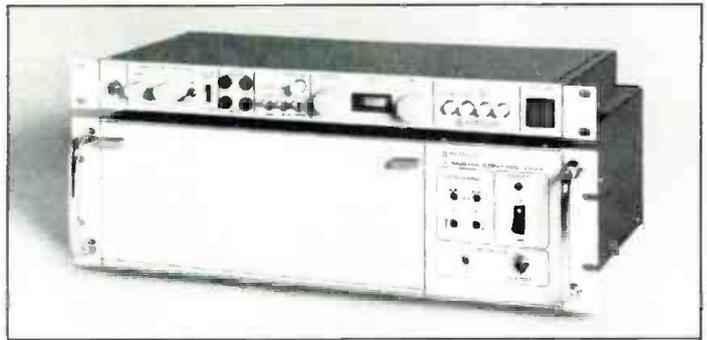
Today's Professional Studio Deserves Hitachi FP1011

Announcing a color camera that offers a rare degree of sophistication for its price. Three 2/3" Saticon tubes, proven or matchless picture quality. Tilttable and detachable 7" viewfinder. Adaptability to self-contained use for total portability. And, the convenience of a true operating remote control panel. With it, the FP1011 can range far and wide (up to 1000 feet) through your studio or a remote location while all operational camera functions are controlled from central location.

Functions that can be adjusted from the R.C. panel include iris and pedestal...color temperature...color paint...intercom...and automatic or manual white balance and black balance.

The FP1011 features a compact Camera Control Unit with built-in color bar generator...NTSC encoder...and H-detail circuit and vertical image enhancer. Just as important, all are incorporated as plug-in modules for easy maintenance.

Hitachi's seven regional offices stand ready to answer any questions you have about Hitachi's newest studio camera today. And the field engineers in each regional office will back you up with superior service tomorrow.



Camera Control Unit and Remote Control Panel



HITACHI

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

Executive Office: 58-25 Brooklyn-Queens Expressway, Woodside, N.Y. 11377 (212) 898-1261 Offices in: Chicago (312) 344-4020; Los Angeles (213) 328-2110; Dallas (214) 233-7623; Atlanta (404) 451-9453; Denver (303) 344-3150; Seattle (206) 298-1680.

Circle 161 on Reader Service Card



Panels Of 100 Survey

new memory control console at the show, while Electro Controls will be featuring its Plexus 1000 modular memory control system. Berkey Colortran will again demonstrate its presettable console series.

Two companies, Electro Controls and Berkey Colortran, plan to introduce new scoop lights which are particularly suited to TV studio applications. The former will offer 14- and 18-inch 2k scoops, while the latter will offer both 1k and 2k versions. A new special effects strobe unit designed to be hung from curtains — Starstrobe — will be offered by the Great American Market.

Grip equipment has also registered significant gains, keeping pace with the new lighter weight ENG/EFP cameras. O'Connor Engineering has a new quick-release adjustable balance camera mounting platform with double handles for its Models 3, 50, 100, and 150 fluid heads. Listec Television Equipment will have a new compact fluid head. For studio applications Listec has also developed a three-stage pedestal with a 38-inch range.

For portable location lighting, both

Lowel Light and Cine 60 offer a complete range of sun guns and other units.

The strong commitment indicated by broadcasters to **earth station** technology in the Panels of 100 survey, as well as transmitter and antenna needs, will be more than adequately met by manufacturers at the show. Scientific-Atlanta will be demonstrating its new Metsat system for weather reporting and forecasting using satellite data. Andrews Corporation, following a trend towards smaller, more efficient earth stations, will exhibit its new 12-meter receive and transmit earth station. Both Western Union and Mutual Broadcasting will be explaining how their services offer satellite programming to subscribers. TerraCom promises new developments in digital audio program channels, while RCA Americom will introduce its satellite capabilities to broadcasters.

At this point, it appears that the only new **transmitter** that will be offered at the show will be a 5000 W VHF model from Electronics, Missiles, and Communications, although Comark Industries hints at a new transmitter in the works. Varian Associates, however, will demonstrate new power grid and klystron tubes. Other manufacturers will be on hand with their standard

product lines, including Collins Transmission Systems, Ceco Communications, and Cetec Jampro, which will present information on its spiral circularly polarized antennas. Also in the CP area, Micro Communications will introduce a new channel combiner and dual transmitter phase comparator. Bogner will also demonstrate its full line of TV antennas.

In conclusion, it is safe to assume that whatever your broadcast equipment needs are, there will be at least one exhibitor at the NAB show who will be showing a prototype or a production model of just what you are looking for. Many of the 350-plus manufacturers who are expected to exhibit at this year's show declined to provide details of their new products at this time, but there is an old maxim that says, "If you don't go to the NAB show with something new, don't bother to go at all." We expect that by next month, when many more companies have firming up their plans, we will be able to give you a more complete picture of what will be shown in Dallas. The March issue of *BM/E* will provide a complete rundown of what each exhibitor is showing, and by then, new information many reveal a bumper crop of new technology. **BM/E**



Pre-enhance your cassettes

A revolutionary process that puts the highest picture quality into your original cassette recordings is now available to users of U-Matic and other color-under VTRs.

The secret is in the new YFI Record Booster, an add-on device which compensates in advance for the usual picture degradation that $\frac{3}{4}$ " and $\frac{1}{2}$ " cassettes suffer in normal playback operation.

TV stations and production facilities that have used the Record Booster are impressed with the substantial improvement in picture quality, while liking the "non-enhanced" look the Booster gives. How is this paradox achieved? Well, this latest addition to the YFI line of image improvers crispens the small details in the picture without enhancing large outlines. As a result the playback image does not have the usual

flat pasty appearance with over-emphasized edges that other enhancers produce.

To get even more further advantage from this unique signal process, the Record Booster generates a pedestal around small image details, allowing your playback enhancer to reduce luminance and chroma noise without loss of detail, and thus eliminating the "cartoon-like" appearance typical of too many ENG programs.

THE RESULT

A sharper, crisper, more detailed image that **does not look enhanced**. It looks as if it came from a much better VTR.

It makes sense to do it this way. The Record Booster goes in your signal path **ahead of the VTR**, after the camera or high quality picture source (film, quad master, etc.).

That means the enhancement is built into your original master cassette recording. So it will always be present in subsequent generations.

RACK OR PORTABLE CONFIGURATIONS

The Record Booster is available in rack mount form or in a portable battery-operated configuration as an add on (less than 3 lbs.) to portable VTRs. Easy video in/video out connections.

SEND FOR DATA

YFI enhancers are in widespread use today. Send for our detailed data and get further improvement in picture quality with our Record Booster.

See us at NAB Booth 412

YVES FAROUDJA INC

• 199 First St. • Los Altos, CA. 94022 • (415) 941-3555
Dealer inquiries invited

"I had a second chance to build a complete remote control facility and..."

KDTV Chief Engineer
George Ledoux sticks
with a winner



"I ordered a second helping of TFT 7600."

George Ledoux, Chief Engineer of San Francisco station KDTV, had an idea—trade frequencies with a lower frequency educational station to provide better coverage and TV dial identity for KDTV. So, channel 60 became the educational channel for the College of San Mateo and the college's channel 14 became KDTV. Part of the trade provided, as a gift, all KDTV transmitter equipment to the college. TFT remote systems were a major part of the package. Thus, George had a second opportunity to select all new remote equipment. **HE SELECTED THE SAME TFT GEAR HE USED BEFORE!** Here are George's reasons why:

On Capability

"... The TFT systems do what they're advertised to do. They work perfectly from the first plug-in and go on working no matter what kind of data parameters I include. The instant status lights and direct ON/OFF controls are great. They give you an extra dimension of control and data assurance. Single-man calibration saves us time and minimizes the chance of error. They've also got a double-scan/compare data transmission technique that makes the system almost foolproof."

On Flexibility

"... The engineering of the gear is so clean that I can get into the

equipment and customize it for my own needs...like building up audio channels, combining status inputs to trigger special alarms—whatever I want to do. TFT has always been very helpful in working with me on these things—whether or not they sell any gear as part of the deal."

On Expandability

"... The TFT 7600 system is designed to grow right along with our needs. I can add channel expanders, fail safe units, automatic path selectors, multi-site selectors, computerized monitoring, anything I want—it's all available from TFT. There's even a software package available for computations of things like VSWR."

On Service

"... I know what it's like to disconnect and code over 300 wires on other systems. TFT's detachable rear panel design is just great although I've never had to use it because the equipment has never needed maintenance."

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

TFT 7600 Pioneers
THE NEW ERA
IN PERFORMANCE-PROVEN DIGITAL REMOTE CONTROL

TFT TIME AND FREQUENCY TECHNOLOGY, INC.
3090 OAKMEAD VILLAGE DR., SANTA CLARA, CA. 95051 (408)246-6365 TWX 910-338-0584

Circle 163 on Reader Service Card

INTERPRETING THE **FCC** RULES & REGULATIONS

Contest and Promotion Pitfalls

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

ON A SEEMINGLY regular basis, the Commission assesses monetary forfeitures or short-term license renewals because of misleading or deceptive station contests and promotions. The Commission's rules and policies are clear that a station must refrain from misleading listeners and/or advertisers as to the *mechanics* or *prizes to be awarded* as part of station contests and promotions.

Almost without exception, broadcasters tagged for violating these contest and promotion policies have acted in good faith. There appears to be no intention to mislead the public or advertisers, nor to be deceptive in any manner. Nonetheless, violations continue to occur. Sometimes this may be due to the lack of knowledge about these FCC policies by new employees. At other times, the violations occur because of management failure to adequately oversee station operations.

In any event, two recent cases should emphasize to broadcasters how easy it is to violate the FCC's contest and promotion policies. The Commission issued a short-term license renewal for one station and imposed a substantial forfeiture against another station for violating these rules and policies.

Ali-Norton "knockout" contest

An FCC-conducted field investigation of the operations of a Connecticut radio station revealed that the station had aired an Ali-Norton "knockout" contest. Listeners were instructed to enter the contest by telephoning the radio station at certain times, as announced by a disc jockey. The disc jockey asked the listener calling to guess whether the listener could knock out Ali in a make-believe fight. After the caller made a guess, the disc jockey played a pre-recorded tape cartridge which simulated a one-minute fight with Ali and announced whether the listener had won or not.

The Commission determined that the contest was misleading.¹ The disc jockeys were in possession of a schedule and instructions concerning whether a listener at a particular hour would be a winner or a loser.² Thus, it was predetermined that, at a particular hour, the caller, whoever it might be, would automatically lose the simulated fight. At other specified hours, the caller would automatically win the fight.

The Commission determined that there was another misleading aspect of this contest. Listeners were told that the prize for a correct guess would be "tickets to see the

Ali-Norton fight." Additional differently-phrased statements were broadcast. The Commission determined that these announcements misled the listening public into believing that the prize consisted of tickets to see the Ali-Norton fight in New York at Madison Square Garden. In reality, the tickets were for a closed-circuit broadcast of the fight at a local Connecticut theater.

Initially, the station personnel did not know that the tickets were for a theater presentation of the fight. The Commission could not determine from the evidence whether the promotional announcements about the tickets continued *after* station personnel discovered that the prize tickets were not for the "live" fight.

The same station ran another contest that the Commission determined was misleading to the public. In its "Morning Mayor" contest, the station would choose a local citizen on weekdays to receive gifts from local merchants. Listeners were requested to submit nominations for the "Morning Mayor." Over-the-air announcements were made and newspaper ads were run. In all types of promotional material, the station implied that the winners would be selected from listener suggestions.

In reality, the station received insufficient listener nominations to supply five "Morning Mayor" winners each week. Because of this, announcers were allowed to select winners at times when there were insufficient nominations to fill the five per week winner selections.

The Commission acknowledged that there was no "fixing" of the promotion in any manner. Rather, the Commission found that the station had failed to inform the public *accurately* as to the *mechanics* of choosing the winners.

The Commission further concluded that station management was aware that the Ali-Norton and the "Morning Mayor" promotions were not run as promoted. It noted that licensees are required to adequately supervise all contest promotions to assure they are conducted fairly and "substantially as represented to the public."

As a sidelight to its field investigation, the Commission found that the Connecticut radio station claimed in a newspaper advertisement that it had "more power and a stronger signal than the Bridgeport stations." The Commission's records disclosed that two Bridgeport stations have coverage contours greater than that of the station being investigated. In addition, a rate card of the station contained an unmarked coverage contour which exceeds the station's 0.5 mV/m contour. The Commission found the unmarked coverage contour implied that the standard contour coverage for the station was larger than in reality.

continued on page 106

¹Letter to Colonial Broadcasting Co., Inc. (WFIF), FCC 78-819, November 27, 1978.

²The station maintained separate "winner" and "loser" cartridge carts.

Ingenuity and Good Manufacturing

- 1st to use IBM card systems
 - 1st digital logic control
 - 1st MOS memory systems
 - 1st INSTANT random access card unit
 - 1st to use mini-computers & VDT's
 - 1st microprocessor in cartridge playback
 - 1st microprocessors in system control
 - 1st with color display system
- with
- ## BASIC A

CULMINATION OF 25 YEARS AS THE LEADER IN RADIO BROADCAST AUTOMATION EQUIPMENT

THE COMPLETE ONE! BASIC A has ALL its marbles in one package. Nothing else to buy. Just sit down at the keyboard and pick its brains (based on 3 Intel 8085 microprocessors).

You're a HUMAN — tell it in ENGLISH. BASIC A will carry out your commands.

It's BASIC-ALLY BETTER.

See what you're programming, what's on air too, on CRT — black & white or color.

Push one button to operate LIVE ASSIST.

Airing live commercials or PSA's? BASIC gives you 20 programmable descriptions to automatically log them.

Ideal for syndicated formats, because of modular programming concept.

Give search & delete commands without interfering with programming.

FREE education for operator. FREE system installation.

STAY WITH THE FIRST FAMILY.

IGM
A DIVISION OF N.T.I., 4041 HOME ROAD, BELLINGHAM, WA 98225 (206) 733-4567

Circle 164 on Reader Service Card

FCC Rules & Regulations

It noted that this violated its policy requiring licensees to deal candidly with advertisers and potential advertisers, and emphasized the need for full and accurate disclosure to the general public and advertisers.

Finally, the Commission's field investigation developed evidence that a salesman for the station had called potential advertisers incorrectly claiming that he was a representative of the "Safety Council" in an effort to sell advertising time on the station. The "Morning Mayor" promotional announcements were not appropriately logged as commercial announcements for approximately a two-month period, despite the fact that the announcements contained commercial content.

In light of these rule and policy violations, the Commission granted the station a one-year renewal so that the operation of the station could be monitored and the conduct of the licensee be reviewed at an early date. The Commission stated that had the rule and policy violations occurred within one year prior to the date of its letter to the licensee (which they had not), the maximum forfeiture available would have been imposed in addition to short-term renewal.

Black Book contest

A Washington, D.C., station recently received a Notice of Apparent Liability for forfeiture of \$6,000.³ The station broadcast announcements inviting listeners to call in and give their names and the names of three best friends for recording in a "Black Book." The announcements stated that the station would call friends listed in the Black Book. If the friend called was listening to the station, both the friend and the person that provided the friend's name would win a prize. No specifics about the prizes were given. In addition, the announcements stated that the winners would qualify for all 1978 station contests.

The Commission found that this contest violated Section 73.1216 of the rules, which requires that a station "fully and accurately disclose the material terms of the contest." In its announcements, the station *failed* to indicate the exact nature of the prizes. (The prizes were quite legitimate — record albums and pairs of tickets to events at a Washington-area sports and musical entertainment

³United Broadcasting Company (WOOK(FM)), FCC 78-838, November 30, 1978.

center). The winners were informed of these prizes when they were called. Nonetheless, the Commission found that the material terms of the contest were not fully disclosed in the announcements, as required.

The Commission declared that it appeared the announcements stating that the winners in the Black Book contest would qualify for all 1978 contests were false.

Thousand Dollar Dial contest

The same station conducted another contest in which it announced that persons would be telephoned to determine if they were listening to the station. If they were, they would win \$1,000.

On one announcement taped by Commission personnel, the statement was made repeatedly that calls would be placed to listeners in the Washington area. The licensee informed the Commission that contestants were chosen at random from District of Columbia and Maryland telephone directories. The Commission concluded that it did not appear that listeners in the Virginia suburbs of Washington could possibly participate in the contest, although these Virginia residents clearly fell within the listening area of the station. The Commission concluded that these announcements concerned "a material contest term since they described a factor defining operation of the contest and affecting participation therein."

The Commission also noted that it did not appear that the station used names of winners in the Black Book contest as part of the Thousand Dollar Dial contest, despite the previously announced claim that the Black Book contest winners would qualify for all 1978 station contests.

In light of the two apparent repeated failures to conform to the Commission's contest and promotion policies, the Commission advised the Washington station of apparent liability for forfeiture of \$6,000.

Conclusion

Radio stations continue to create imaginative and exciting contests and promotions. Sometimes, the station personnel, in their enthusiasm, fail to insure that the contest or promotion conforms to the Commission's rules and policies.

Management personnel should make a policy of reviewing *all* contests and promotional ideas before full on-the-air development. It would be wise also to consult with your communications counsel during development of contests and promotions.

BM/E

DON'T BUY MORE PROCESSING AMP THAN YOU NEED.

The P-50 Processing Amplifier does it all and works almost anywhere: before a transmitter, at the output of a production switcher or VTR, or as a remote camera control unit. Use the P-50 where you need complete control over the video signal. It also includes a cross-pulse output with automatic brightening.

For more information, circle our reader service card number. 3M Video Systems. Watch us in action.



3M

Circle 165 on Reader Service Card

"this Auditronics 110 in the Louisiana Superdome..."



... handles over 80 events a year ranging in complexity from Saints football and NBA basketball, to the Spinx-Ali fight to rock festivals and religious revivals", says WWL's Hugh Burney, Director of Technical Operations. "Its 22-in by 6-out flexibility lets us use it for on-the-air TV and radio as well as network feeds, and some commercial production."

"We needed a board to handle a great variety of tasks at the Superdome, and we checked out half a dozen different brands. The stretched version of the Auditronics 110 gave us the greatest flexibility for the lowest cost, and they customized it for exactly what we needed. With Auditronics modular design, we essentially got a custom board with the quality we required for the Superdome at the price of a standard item."

"How does it work? Well, in two years on the air, it's done everything we've asked of it, and it's never failed in use. We like it well enough that we've since bought a second Auditronics 110 that's working eight hours every day in our commercial production studio."

If you'd like to know what WWL and over 300 other broadcasters and studios have learned about Auditronics quality and reliability, circle reader service number or call us.



Louisiana Superdome, largest indoor arena in the US, site of WWL's sports broadcast studio shown above.

3750 Old Gerwell Road, Memphis, Tennessee 38118 (901) 362-1350



auditronics, inc.

Circle 166 on Reader Service Card

SPEAK OUT

More On Blankety-Blank Blanking

Editor's note: "Blankety-Blank Blanking," the recent Speak Out authored by Gerald Evans (BM/E, December, 1978), posed some genuine questions about the FCC's concern over excessive H and V blanking widths. At the time, we called for a continued discussion by broadcasters of this important issue, and invited those concerned to write and express their views. Some of the responses are printed as this month's Speak Out.

Dear Editor:

I concur completely with Gerald Evans' Speak Out in the December, 1978 issue of *BM/E*, and I simply wish to add another perspective to the subject. The FCC is concerned with the interests of the viewing public. What the public views is, of course, the picture and not the blanking which is hidden behind the TV set's mask. Let us therefore determine if the "blanking problem" causes a "picture problem."

Using round numbers, H blanking is 10 μ s wide and the picture is 50 μ s wide. Hence, a 1 μ s error in H blanking is a 10 percent H blanking error, while at the same time it is only a two percent picture width error. Similarly, one TV line is equivalent to about .5 percent of picture height. Thus, the "Beirut story" cited by Gerald Evans would have been killed because of a .6 percent picture width error. His rhetorical question whether this makes sense can be answered with a resounding *no*.

In view of the fact that color TV receivers have a range of 12 to 18 percent overscan (*Consumer Report*, January, 1977), the broadcaster's "blanking problem" seems to be a tempest in a teapot.

Hans Schmid
Senior Engineer
ABC-TV

Dear Editor:

May I first congratulate Gerald Evans for stating so eloquently the general attitude of the vast majority of technical and non-technical personnel in the industry concerning H and V blanking and RS-170.

The only comment I would like to add to Mr. Evans's observations is that I believe the entire blanking dilemma is merely one example of industry con-

trolling government! By this statement, I am suggesting that someone, somewhere out there in manufacturing land, built a "black box" that would correct this comparatively insignificant problem. Then, after they started production of these "black boxes" they discovered that very few, if any, television stations were willing to make such an exorbitant capital investment for the box to correct a problem that didn't seem to bother anybody to any significant degree. They therefore had to *create* a market for the new toy. So, they probably petitioned the FCC to crack down on violations of RS-170 which would, in effect, blackmail television stations into purchasing the "black box." An analogy would be the way Detroit pawned off the infamous catalytic converter and unleaded gasolines on us (rather than building more efficient engines) to meet EPA standards. Where will these unscrupulous and insidious acts end?

I'm all for keeping the technical standards of television high, but let's put our problems in their proper perspectives. First, I think we should have finite standards defined for what we transmit *between* the horizontal and vertical sync pulses (e.g.: percent noise, percent color saturation, tolerance of color phase or hue, etc.). Then, and only then, should we concern ourselves to this degree with what we transmit off the viewing screen. I am saying this only because heretofore we have had no significant or acute H or V sync problems using contemporary state of the art sync pulse generators.

Myles H. Marks
Engineer
WIIC-TV
Pittsburgh, Penn.

Dear Editor:

I never really thought I would find myself defending the actions of the FCC. But recently there have been so many criticisms of their enforcement of blanking widths that I think it is time to bring things into their proper perspective.

Some critics seem to promulgate the idea that there is a conspiracy to do away with many wonderful and worthwhile programs under the guise of some nebulous thing called wide blanking, be it horizontal or vertical. They also think

this is a newly devised scheme. It may be true that some worthwhile programs are temporarily not airable, but this will be short-lived. Several equipment manufacturers have already started to come to the rescue and soon will be affordable.

For many years the FCC has been citing stations for wide blanking violations (also serrations and equalizing pulses). These rules are not new, the enforcement is not new, and I don't understand why any knowledgeable TV engineer would think it is. The problem lies with people or companies that have not obtained the knowledge or cared enough to do the job properly. Care must be exercised in camera setup, system adjustments, system timing, and videotape setup.

Once cameras are properly set up with regard to proper pulse widths, they usually remain relatively constant unless there is a problem. Timing is a variable and should be checked at frequent intervals. Videotape machines are the biggest culprits in taking normal blanking widths and stretching them. Here the operators will also have to share part of the blame. Improper adjustments of the horizontal position control will most certainly introduce wide blanking by no more than .05 μ s. Any more than this means it is time for some serious maintenance.

It is important for the VTR operator to check and double-check during editing sessions. Use the well-calibrated (we hope) scope on the VTR and make sure both the vertical and horizontal pulse widths are proper. Don't forget the video levels either. Here is where we separate the professional from the amateur. Be thorough, learn the operation of your machine, and set it up properly.

Three-quarter-inch VTRs have opened up new vistas for news coverage and opportunities for amateur TV productions. Slant track machines are capable of pictures with legal pulse widths, but here again, care has to be given to the system and equipment intended for broadcast use must be used.

It is easy to say, "Do away with the FCC rules regarding pulse widths"; I don't know if my poor old TV would agree when it is trying to provide proper aspect ratios. It is my personal feeling

continued on page 110

When you need microphones with "reach," reach for these!

CL42S Shotgun System

The CL42S reaches farther and rejects more ambient noise than any other shotgun of its size ever made. Our exclusive line bypass port makes it more directional at low frequencies so you won't have to sacrifice frequency response when you use it on a boom. Diffraction vanes maintain high-frequency directivity to preserve uniform frequency response if the "talent" gets a little off-mike.

Phantom or AB powered, the CL42S comes complete with windscreen, shock mount, carrying case and handle for hand-held applications. And it's rugged.

CH15S Hypercardioid System

The CH15S is actually more directional than a mini shotgun mike – in a package that's only 4 inches long that weighs less than 6 oz. Specially designed for boom and fishpole use in TV and motion picture studios, but equally at home wherever working space is small and you have need for a compact, highly directional microphone.

Compatible with phantom or AB power, the CH15S comes complete with windscreen, shock mount and carrying case. And, this microphone is rugged.

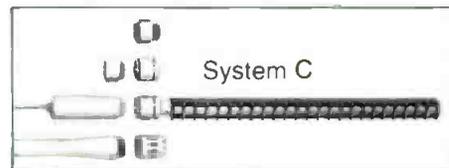
The Electro-Voice Warranty

Electro-Voice backs up these two microphones with the only unconditional warranty in the business: for two years we will replace or repair your CL42S or CH15S microphone, when returned to Electro-Voice for service.

Circle 167 on Reader Service Card

at no charge – no matter what caused the damage!

We can do this because we build these microphones to meet our standards for performance, ruggedness and durability. We accept nothing less, and if you're a professional, buying a professional quality microphone, you shouldn't either.



EV **Electro-Voice**[®]
a gulton company

600 Cecil Street, Buchanan, Michigan 49107

Speak Out

that the FCC is doing us all a favor in its enforcement of the rules. Newcomers and some oldtimers are becoming more quality conscious. This will certainly help improve TV operations.

It is a paradox that the FCC is receiving so much criticism for strict enforcement, when actually they have relaxed the rules to accommodate some substandard programs. If we care enough to do our job properly, things like pulse widths will not be a problem.

Jerry Foreman
Director of Engineering
PTL TV Network

Dear Editor:

Although I'm not an engineer, Gerald Evans's piece on H and V blanking in the December '78 *BM/E* moves me to write. You asked for additional thoughts on the matter, so here's a non-technical view.

First, I agree totally that the industry must meet minimum standards, technical and otherwise. I also agree that if these standards are not met, the FCC should take action. But I don't view the blanking thing as an "all-or-nothing" situation, and I totally disagree that the rules and regulations should keep material that's important to the audience off

the air.

Example: You're in a local TV station, in a town next to a river. It's been raining hard, and the river's about to go over its banks. Your ENG crew has gotten some outstanding tape of the crumbling levees. It's 6:30 p.m.; there's a large housing tract a quarter of a mile from the river, and you know most of those homes are watching your local news. Your chief engineer witnesses a preview of the tape, and says it can't go because of RS-170. What do you do?

If you're responsible, you run the tape anyway — at least in my view. Its content is much more important than its technical quality. I admit that this may be a rather extreme example. But I submit that problems like this are encountered by broadcasters all the time.

If the FCC insists on rigid enforcement of RS-170, the result will surely be deterioration in the content of TV news programming — particularly in "emergency" situations, when content is most important. The ultimate result is that the "public interest, convenience, and necessity" will not be served as well as it could be — because some bureaucrats have decided that the rule is more important than the result.

In a larger, less "immediate" sense, Evans's argument carries much weight, in my view. An obscure, esoteric gov-

ernment regulation that results in less efficient public service, with no discernible public gain, is worthless. In fact, it's detrimental.

RS-170 certainly does not provide public gain; its implementation (or lack) is undetectable on the basic measurement standard for the industry — the picture on the TV sets in people's homes. Broadcasters constantly strive for the highest possible quality in this picture, with or without RS-170; they stand to lose audience (and money) if they don't.

As Evans implied, I think RS-170 is an example of a government regulation that was promulgated in advance of the technology that would make it 100 percent possible. Thus, simple logic would indicate that its strict enforcement should be delayed until the technology is, indeed, there and readily available at reasonable cost.

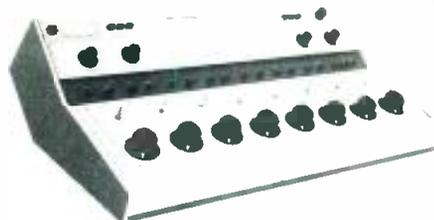
Here in California, we're going through the results of Proposition 13. It's my view that the overwhelming public vote in favor of this initiative happened partly because people are getting sick and tired of illogical government actions that produce more cost with little or no discernible gain.

I hope the FCC will take these points into account in relation to RS-170.

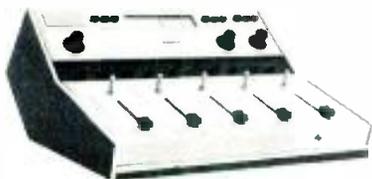
Larry Martz
Sacramento, Cal.

The *NEWBREED* Lets You Mix it Your Way

The McMartin *NEWBREED* lineup features a variety of mixers and consoles, each suited to a particular application and budget, each built to meet the highest standards of performance and reliability in its class.



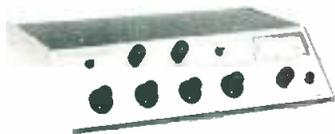
B-1082 8-channel stereo audio console



B-1052V 5-channel stereo console



B-502 5-channel stereo audio console



BR-400 4-channel portable console



MX-5 5-channel mixer preamplifier

B-1000 For demanding studio broadcast and production applications. Mono or stereo — Vertical or rotary attenuators — 5 or 8 channels — Cassette input jack (8 ch. models) — Gold plated PCB contacts — Tantalum capacitors — State-of-the-art ICs — 15 watt monitor amplifier

B-500 For smaller studios and mobile units. Mono and stereo models — Plug-in modular design — Two preselect inputs per mixer — Cue on all mixers — Built-in four watt (rms) monitor amplifier

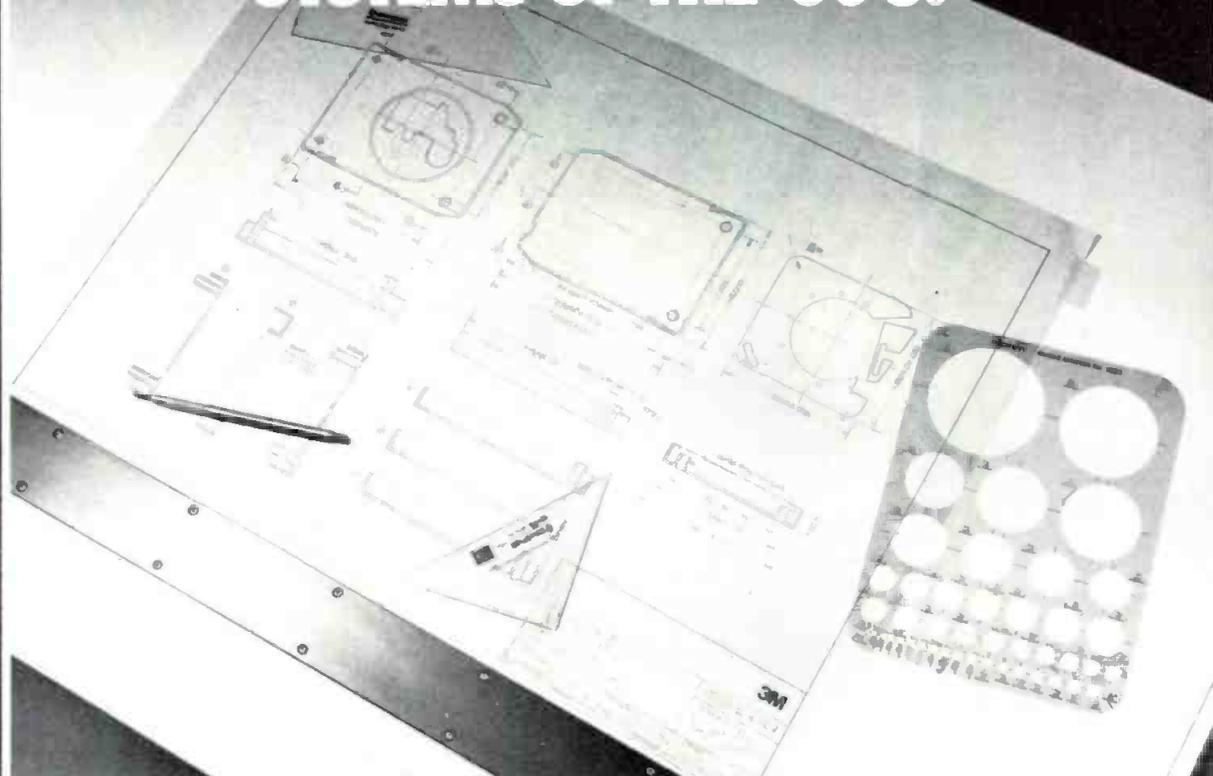
BR-400 Economy and flexibility in a console-style remote mixer. Four mic inputs — Two inputs convertible to either line or RIAA phono inputs — AC or battery operation — built-in tone generator and headphone amplifier

MX-5 For high quality sound reinforcement and low budget broadcast applications. One program and four mic channels — Two mic channels convertible to RIAA magnetic phono — built-in tone generator — AC or external battery operation

MCMARTIN McMartin Industries, Inc. • 4500 S. 76th St. • Omaha, NE 68127 • (402) 331-2000 • Telex 484485

Circle 168 on Reader Service Card

**IT'S ABOUT TIME SOMEONE
REINVENTED THE RADIO CARTRIDGE
SYSTEMS OF THE '60'S.**



AND WE'RE ABOUT TO BE THAT SOMEONE.

While broadcasting technology leapfrogged through the '70's, one system in your station remained unchanged. Your tape cartridge system. It's almost identical to the one that hit the market in the early '60's. And that's not much help when you're programming for the '80's.

Right now, 3M's working on a completely new tape cartridge system called CentraCart™ that's designed to give you the equivalent audio quality of reel-to-reel. It's an inte-

grated system of recorders, players, magnetic tape and a very unique cartridge. And it'll offer better phase stability, better signal-to-noise ratios and longer tape life.

You can't run out and buy one just yet. But you can see and hear one at Booth 439 of the NAB Show or in our demonstration room at The Fairmont Hotel. Come visit us. We'll show you what's in store for the '80's.

CENTRACART™

3M

GREAT IDEA CONTEST

4. Ni-Cad Battery Tester

Victor Castens, Project Engineer,
KOAM-TV, Pittsburg, Kans.

Problem: To provide an accurate method for determining the life of Ni-cad batteries.

Solution: A short time after our station committed itself to ENG news operations, it became apparent that a way of determining the state of battery life was necessary. Numerous batteries were being returned to engineering with the notation, "Won't hold charge." To determine whether we had a problem with the battery or whether it had simply not received a proper charge, we constructed a battery and ENG equipment test set.

Specifications for ENG-type Ni-cad batteries list the Ah rating and state that they should be discharged to 10 volts for a 12-volt pack. The time required is noted.

A battery is first fully charged under our control, then plugged into the test set. Resistor R1, a front panel control, is set to the desired current drain for the

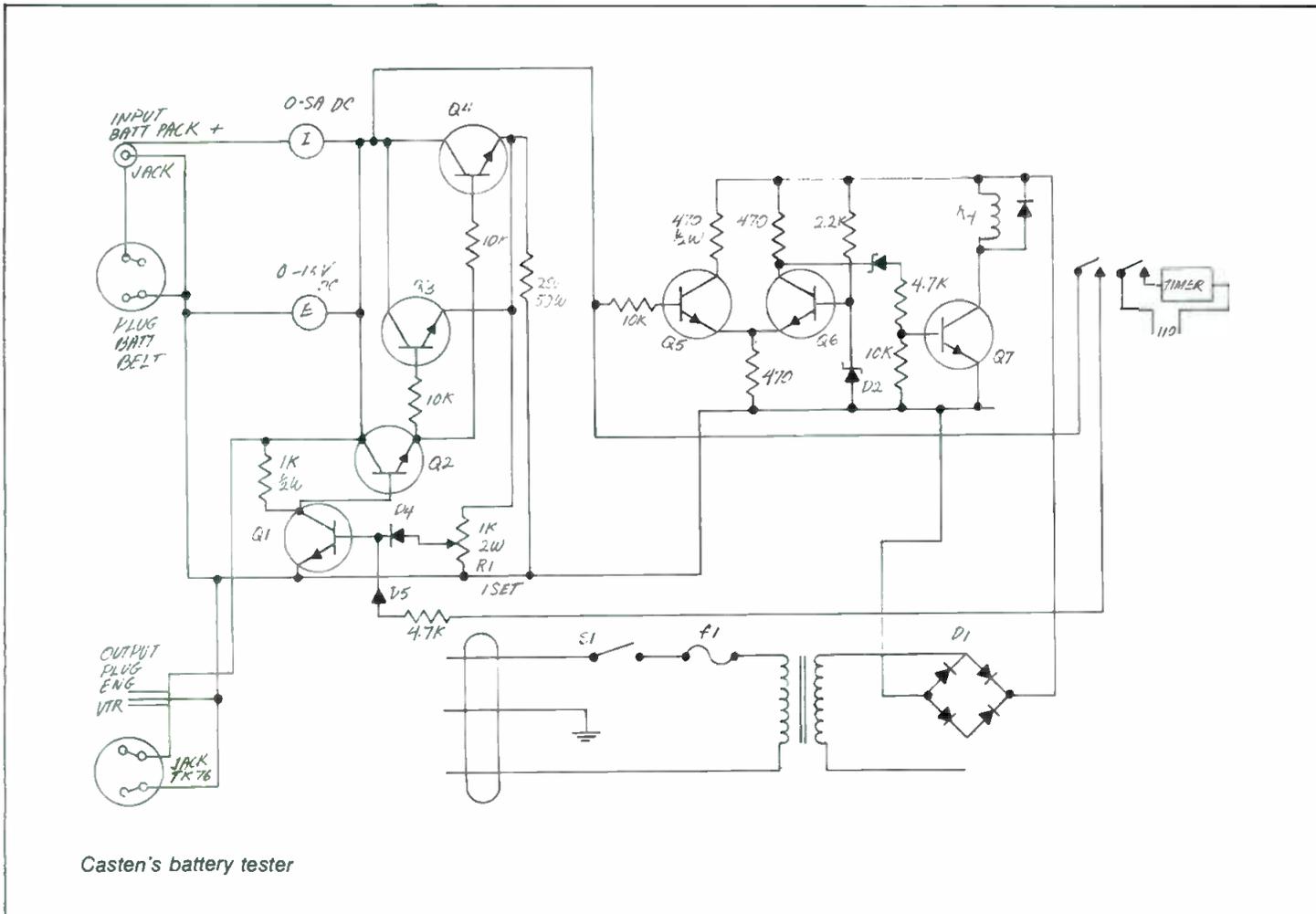
battery under test. Switch S1 is turned on, starting the clock timer. The battery is then allowed to discharge at a constant rate until the monitor circuit senses a drop to 10 volts. Transistor Q1 is turned fully on, turning off pass transistors Q3 and Q4. The timer is also stopped, showing the elapsed time for the discharge operation.

A second useful test for the unit is to turn R1 all the way CCW. This turns off the transistors Q3 and Q4. Plug a battery or a power supply into an input jack. An ENG VTR or camera may be plugged into an output jack. The current drawn by the unit under test can then be recorded. With ENG VTRs, all modes of operation — run, load, unload — may be monitored and compared with what the unit drew when new. This is very helpful in determining defective dc motors or binding conditions.

Transistors Q2, Q3, and Q4 are mounted on heat sinks that will dissipate 25 watts of heat.

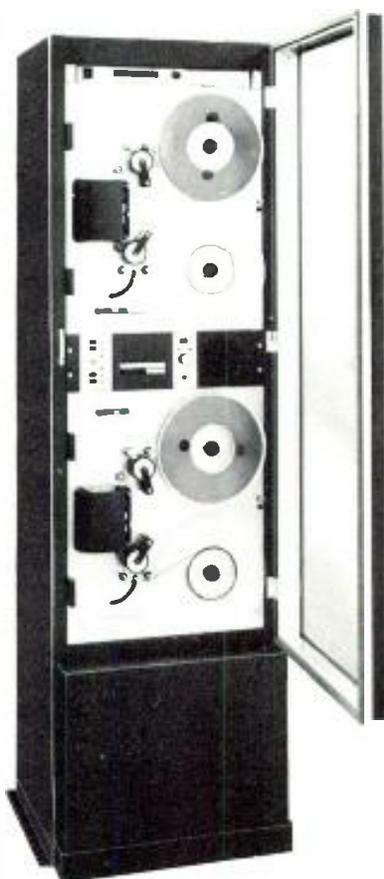
Specifications for the circuit are: Q1, Q2: 2N3053; Q3, Q4: 2N3055; Q5, Q6, Q7: 2N5088; D1: UM08; D2: IM3020; D3: IN4744; D4, D5: IN4002.

continued on page 114



Casten's battery tester

FINALLY: A Broadcast Logging Recorder with all the features of sky-high systems at a down-to-earth price.



THE NEW-GENERATION, COST-EFFECTIVE MAGNASYNC / MOVIOLA TR-2004

Magnasync/Moviola's all new four-channel TR-2004 with time multiplexing is specifically designed for 24-hour broadcast logging and communications recording.

It offers the same high quality and reliability you've come to expect of Magnasync/Moviola's other outstanding products at a surprisingly affordable price. The TR-2004's design is based on over ONE MILLION HOURS of reliable, trouble-free operation by thousands of Magnasync/Moviola customers throughout the world under the most demanding conditions.

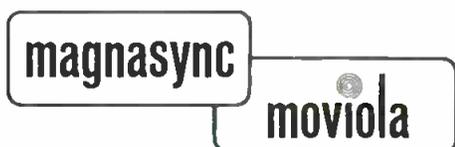
The following exclusive features offer higher quality performance and greater reliability than in any other system available:

- Four Channels Plus Time
- "Simul-Scan" Fail-Safe System
- Square-Wave Bias Technique
- In-Line Vertical Tape Path
- LED Audio Channel Monitoring
- Time Multiplexing with High-Speed Search

No matter what your broadcast logging application, you'll find the *cost-effective* TR-2004 the perfect choice.

Compare the TR-2004's specifications, performance and price with *any* competitive system. Find out why Magnasync/Moviola is the *only* choice.

Call or write today for complete specifications and prices.



magnasync/moviola corporation

5539 Riverton Avenue, P.O. Box 707 / North Hollywood, California 91603
(213) 763-8441 / Cable MAGNASYNC / Telex 67-3199 MAGNA/MOVI

Dealer and representative inquiries invited

Circle 170 on Reader Service Card

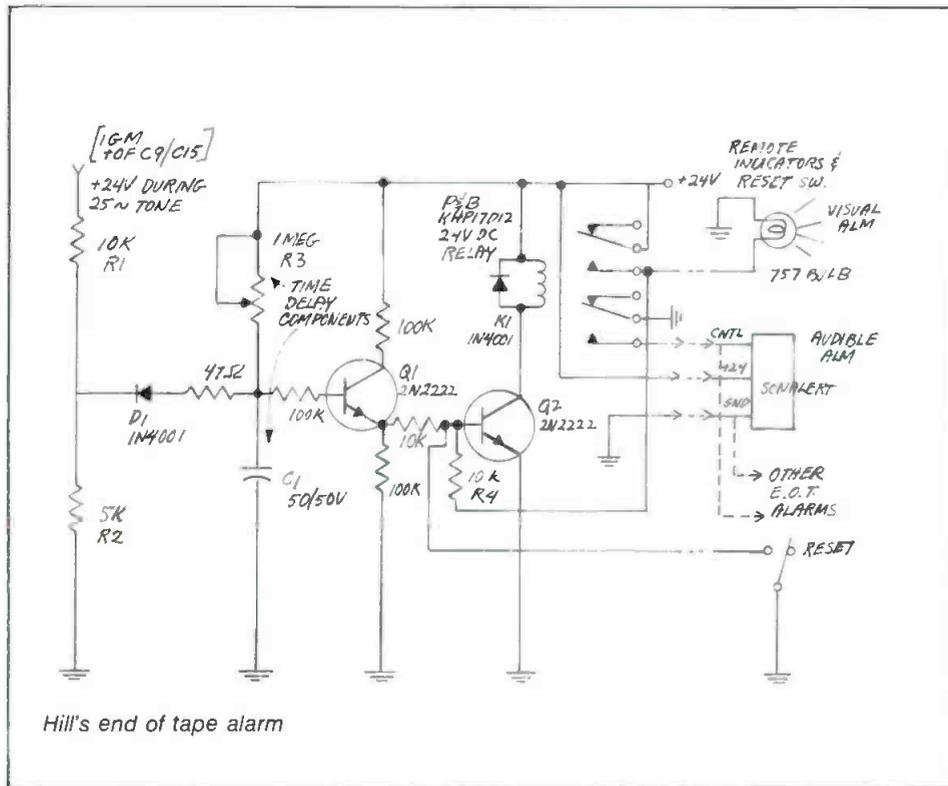
Great Ideas

5. End Of Tape Alarm

Neil Hill, Chief Engineer, KBIQ-FM, Seattle, Wash.

Problem: To stop dead air caused by silent senses when automated music tape has run out.

Solution: Unless an extremely close visual track is kept of music tapes, the first knowledge of a tape running out is the silent sense, with its dead air time. At KBIQ we built an extremely simple end of tape (EOT) alarm that requires only a longer than usual tape (5 to 20 seconds, or more) to operate. Please refer to the schematic to follow the explanation. When the 25 cycle tone is "on," the EOT alarm needs to be supplied around 24 volts. We use IGM detectors, so C9, the capacitor that operates the pulse off relay, was tapped, but normally there are extra relay contacts somewhere that could supply this voltage. The voltage supplied to the EOT alarm input is divided by R1, R2 and fed to D1. D1 normally keeps C1 discharged through R2, but when voltage is applied C1 is allowed to charge at a rate determined by the resistance of

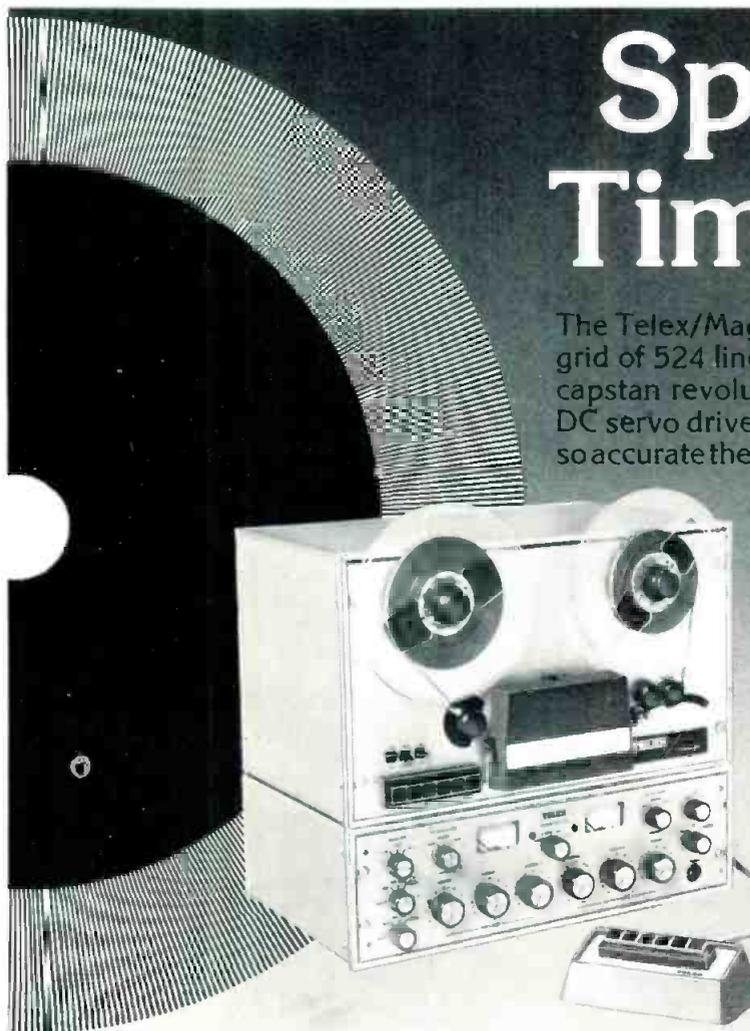


Hill's end of tape alarm

R3, which could be a fixed resistor once its value has been determined. The time constant of C1, R3 determines the time delay of the EOT alarm. Q1 acts as a high impedance follower feeding Q2, a dc amplifier, that causes K1 to operate when voltage on Q2 reaches a proper

level. Relay K1 locks on itself through its contacts and R4 and allows various alarms to be originated. We use both visual and aural alarms. Grounding the base of Q2 causes K1 to release, resetting the alarms. A lamp and reset button

continued on page 116



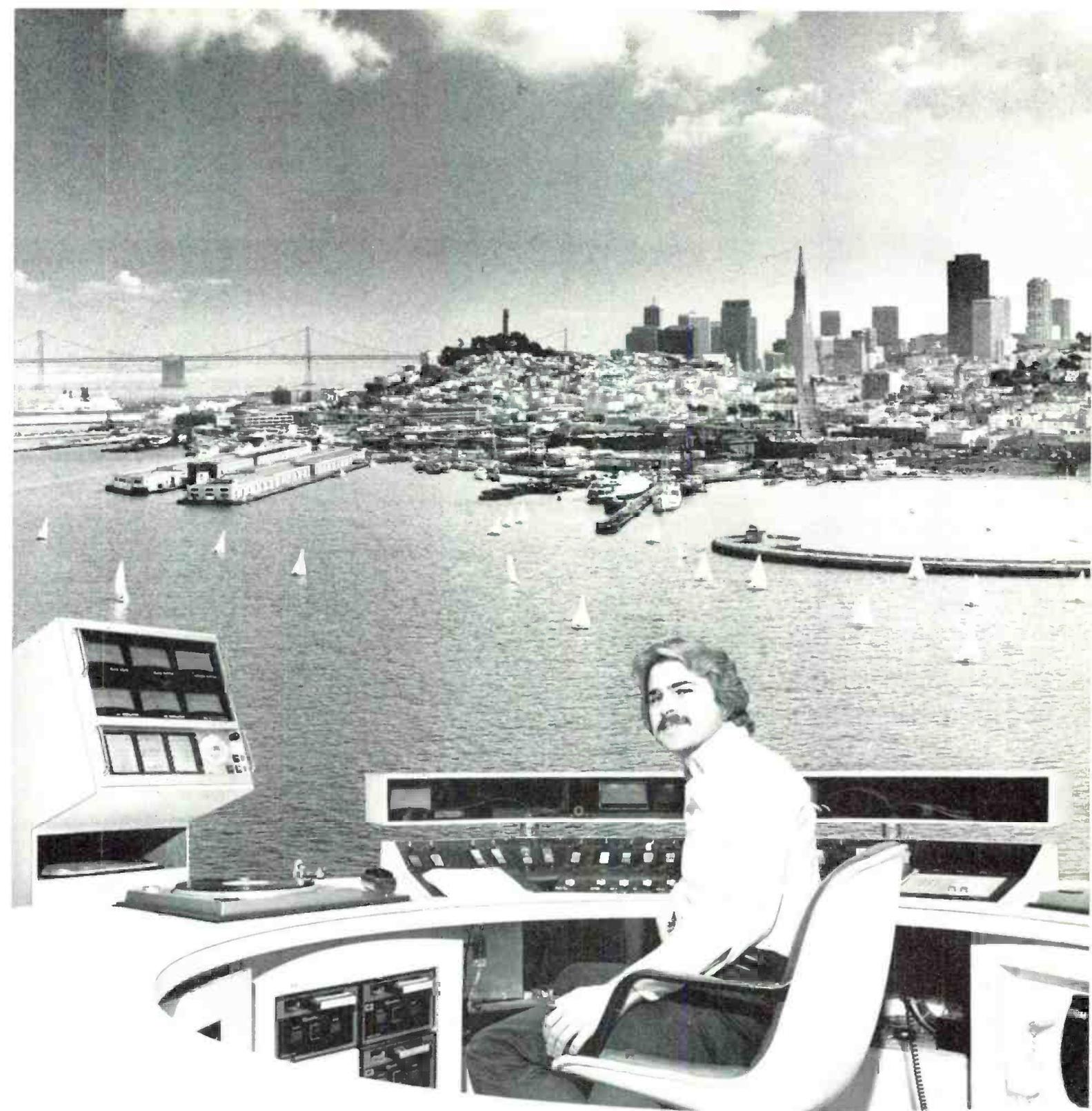
Split Second Time Machine

The Telex/Magnecord 1400 recorder. Split second timing with a grid of 524 lines passing a quartz crystal control reference each capstan revolution. This senses, and corrects the speed of the DC servo drive some 4000 times per second*. Speed stability is so accurate the National Weather and the Environmental Satellite Services selected Telex/Magnecord 1400's over all others to record meteorological display data. Of course, broadcasters also favor the 1400 for the rugged stability of the die cast main frame, DTL logic and exceptionally clean electronics. Compare our speed, specs, and price. We invite you to make a split second decision.

*At 7½ ips, adjustable ± 1% to compensate for tape thicknesses and mechanical wear.



9600 ALDRICH AVE. SO. • MINNEAPOLIS, MINN. 55420 U.S.A.
 Europe: 22 rue de la Legion-d'honneur. 93200 St. Denis. France
 Canada: Telak Electronics. Ltd., Scarborough. Ontario



Sam VanZandt at K101 Studio A

To stay on top

in San Francisco... according to Michael Lincoln, Program Director, K101, "we've got to have the brightest, cleanest, loudest sound free of fatiguing processing side-effects.

"We feel our new OPTIMOD-AM has proven to be as lethal a competitive weapon as our OPTIMOD-FM."

Hear Optimod-AM demonstrated at Orban's Suite at NAB, Dallas. See us at Booth 429 for times and place.

Write or call for complete information about
Orban Associates Inc. 645 Bryant St. San Francisco, CA 94107

OPTIMOD-AM from **orban**

Toll Free (800) 227-4498 In California (415) 957-1067

Circle 172 on Reader Service Card

Great Ideas

are used on each of our five tape machines to show what tape has run out, but only one audible alarm is necessary. The circuit is built on a 2 by 2-inch perf board with the relay mounted upside down next to the board with double-sided sticky foam. Therefore, very little space is needed to install the alarm. The Sonalert aural alarm is mounted externally where it is out of the way, and the visual alarm and reset pushbuttons are mounted on a small relay rack panel next to or between the tape machines.

These units have been working flawlessly for several months now and have greatly cut down on operator frustration and dead air.

6. Color Weather Radar Storm Beacon

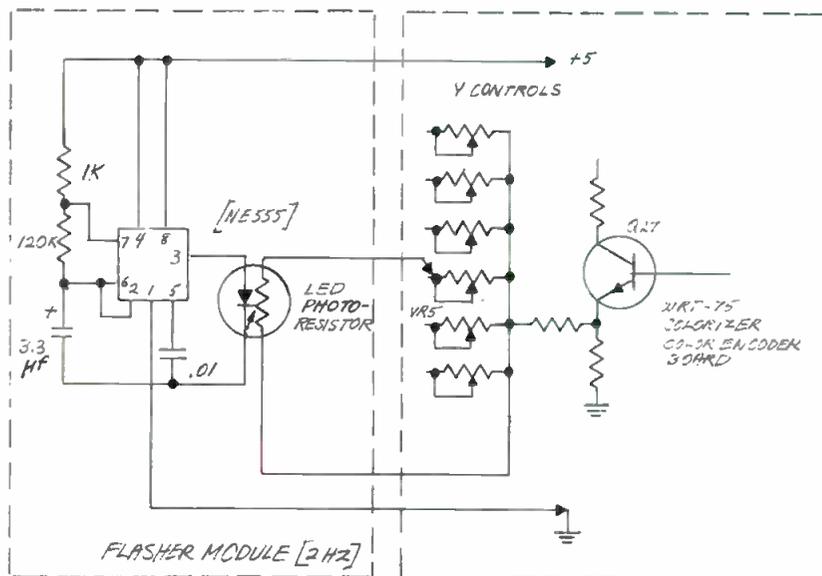
Carl Tuveson, TV Engineer, WSBT, South Bend, Ind.

Problem: To enable viewers with monochrome TV receivers to distinguish "colors" indicating weather conditions.

Solution: Our colorized weather radar uses four colors to illustrate vary-

ing levels of precipitation. This is fine for viewers with color TV receivers, but the luminance differences in black and white were not distinct enough. Red, indicating severe storms, and green, indicating moderate rain, looked almost the same in black and white. We

found that by adding a simple flashing module across the red luminance "Y" control, an effect resulted which made all severe storms stand out like a beacon, even on a black and white TV set. The circuit is simple and can be tacked on in just a few minutes.



Tuveson's storm beacon flash module

Winsted



EDITING CONSOLE

Holds all sizes of ENG/VTR equipment!

MODEL 900A

This totally modular console has every feature for editing efficiency—shelves that adjust on 1" increments, sliding pullouts for added working space and easy maintenance, total access to VTR's, editors, monitors and equipment. Rolls easily on large casters—even into a van to create a mobile unit! For full-line catalog of video consoles, tape and film trucks, film / videotape storage systems, call or write

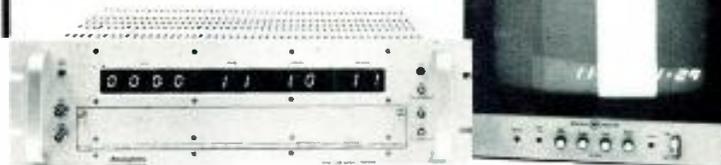
THE WINSTED CORPORATION 8127 Pleasant Ave So., Minneapolis, MN 55420
(612) 888-1957 Toll Free Number 800 328-2962

Winsted

Circle 173 on Reader Service Card

Generator - Reader - Video Generator

Datametrics Model SP-722 Generates / Translates SMPTE Code and Displays Time on Video Monitor along with Subject Matter.



Generate

- Time Code User Bits
- Video Synchronization
- Jam Synchronization

Translate

- 0.25 to 10 Volt Sensitivity
- . to 40 Times Speed
- BCD Outputs

Time Display

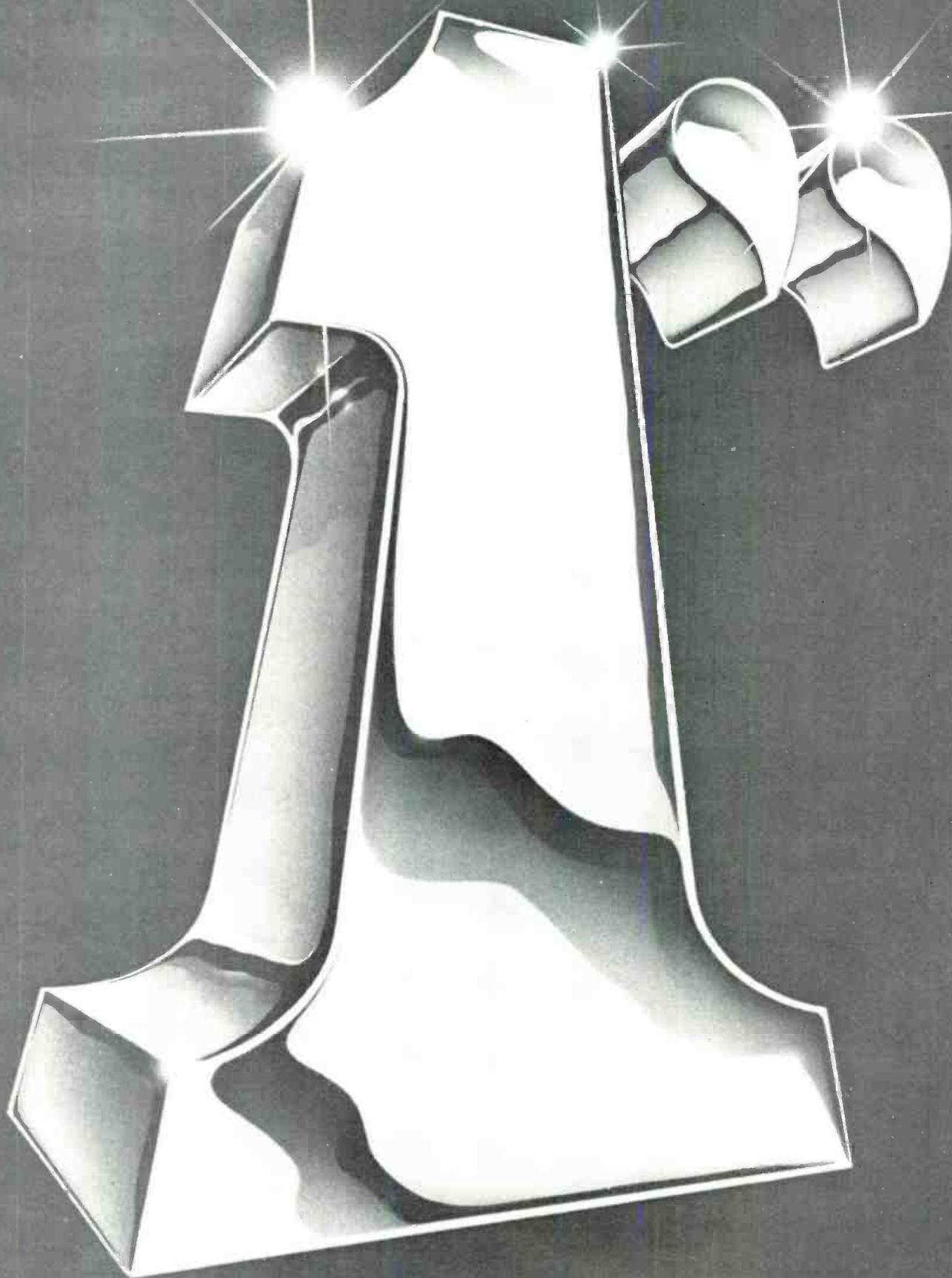
- Infinitely Positionable
- Size and Style Selectable
- Intensity Variable



datametrics

Datametrics Inc.
340 Fordham Road, Wilmington, Mass. 01887
Tel (617) 658-5410 TWX 710-347-7672

Circle 174 on Reader Service Card



Fuji quality is now available in 1"

FUJI

Magnetic Tape Division of Fuji Photo Film U.S.A., Inc., 350 Fifth Avenue, New York, New York 10001

See us at NAB booth 402.

Circle 175 on Reader Service Card

BROADCAST EQUIPMENT



lightweight and comfortable

headsets

- Independently wired phones
- Intercom and Sportscaster Applications

Literature on request from

Television Equipment Associates, Inc.

TEA

Box 260, South Salem, N.Y. 10590

Tel: 914-763-8893

TWX: 710-575-2600

Circle 176 on Reader Service Card

Solid State Workhorses

Jones

FM TRANSLATORS AND FM BOOSTERS



- J-316 1W. TRANSLATOR
- J-317 10W. TRANSLATOR
- J-318 10W. BOOSTER

Tepco TV SUBCARRIER MODULATORS-DEMODULATORS



SUPERB EQUIPMENT LARGELY PREFERRED BY THE PROS!
FOR FULL INFORMATION
WRITE OR
CALL AC 605-343-7200

TEPCO CORP.
BOX 680 RAPID CITY, SD 57709

Circle 177 on Reader Service Card

This month's new equipment section takes a look at a new RVNP (rapid video news process) film processor, a new type of high efficiency arc lamp, and other products significant to the industry.

Film Processor 250

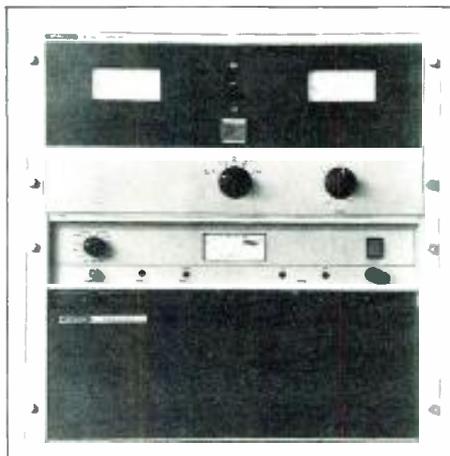
The RVNP-82, designed for use with Eastman Kodak's RVNP (rapid video news process) film, makes it possible to develop motion picture film twice as fast as previously possible. The unit is capable of processing film at a rate of 121 feet per minute with acceptable image quality, and has an average rate of 82 feet per minute. Standard features of the processor include accurate temperature controls, uniform solution agitation, a unique automatic tension adjustment film transport system, and variable speed control from 0 to 200 feet

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

per minute. Available options include a water mixing valve, spare parts kit, mixing transfer tank, and replenishment system with flowmeters and refrigeration. ALLEN PRODUCTS CO.

100 W FM Power Amplifier 252

The B-9100 100 W amplifier, recently FCC type accepted, is designed to be coupled with a 10 W exciter to make a 100 W FM transmitter. The B-9100 consists of a combined two-stage solid state 100 W amplifier in which the driver output is coaxially split and used



to drive two 50 W amplifiers, which in turn are coaxially combined by a hybrid combiner. A resistive reject load is used to absorb excess RF power if one of the final amplifiers should fail. The B-9100 also contains an internal harmonic filter. McMARTIN INDUSTRIES.

Noise Reduction System 253

Model 148 is designed for use in broadcast control rooms where playback only capability is required. Recommended for the playback of tapes recorded with the dbx 142 noise reduction unit, the 148 provides eight channels of noise reduction in a plug-in module. It provides 30 dB of noise reduction and 10 dB of headroom improvement. The 148 system employs two types of playback



only modules, the 408, for tape playback, and the 409, for playback of dbx encoded discs. Transformer inputs and outputs (balanced) are provided for each playback channel. In the event of power failure, the system automatically switches to the bypass mode. \$3000. DBX.

U-Matic Recorders 254

The VC-9207 video cassette player/recorder and the VC-9307 video cassette player are replacements for the VC-8207 and VC-8307. Common to both new machines are an improved video signal-to-noise ratio of 48 dB and a still frame adjustment for stable still



picture playback. Both units include logic memory circuits that allow for direct switching between operating modes without going through the stop mode and automatic rewind and repeat. Optional remote control unit RB-801 is available for both machines. The VC-

continued on page 120

HI-BAND U-format VTR



“Quad” Quality in a $\frac{3}{4}$ ” Format

The model HBU-2860 (Hi-Band U-format video cassette recorder) is a modified SONY VO-2860 with Recortec electronics mounted on top of the unit. The modification provides direct hi-band video recording made possible by tripling the scanner speed and the linear tape speed.

Quality—At the 1200 ips head-to-tape speed the HBU video quality is as good as the “quad” or the new one-inch format. Professional audio quality is also obtained with this modification.

Convenience—Standard and widely available 3/4-inch video cassettes for the HBU allow for simple loading, handling and storage.

Dependability—The HBU does not alter the U-type recording format and thus takes advantage of the proven interchangeability of the U-type recorders.

Economy—Lowest cost in equipment, media and operations for any Hi-Band VTR.

Availability—Ready for delivery at the introductory price of \$14,500 direct from Recortec.

RECORTEC, INC. 777 PALOMAR AVE. SUNNYVALE, CALIF 94086 TEL: (408) 735-8821

Before you settle for an inexpensive but inflexible off-the-shelf console... Or go to the great expense of having one custom designed... look at MAP's new IMPAC™ Series!

Modular Broadcast Consoles... For AM/FM and TV

- Truly outstanding performance specs
- More features
- More flexibility
- Exceptional value — surprisingly affordable
- Readily expandable to meet your growing needs.



This Model 6022, 16 Channel, Dual Output TV Audio Control Center is one of 3 new main frame configurations. Available fully wired. Or in do-it-yourself kit form.



For complete details contact Rick Belmont

MAP MODULAR
AUDIO PRODUCTS
A Unit of Modular Devices, Inc.

50 Orville Drive
Airport International Plaza
Bohemia, N.Y. 11716
(516) 567-9620

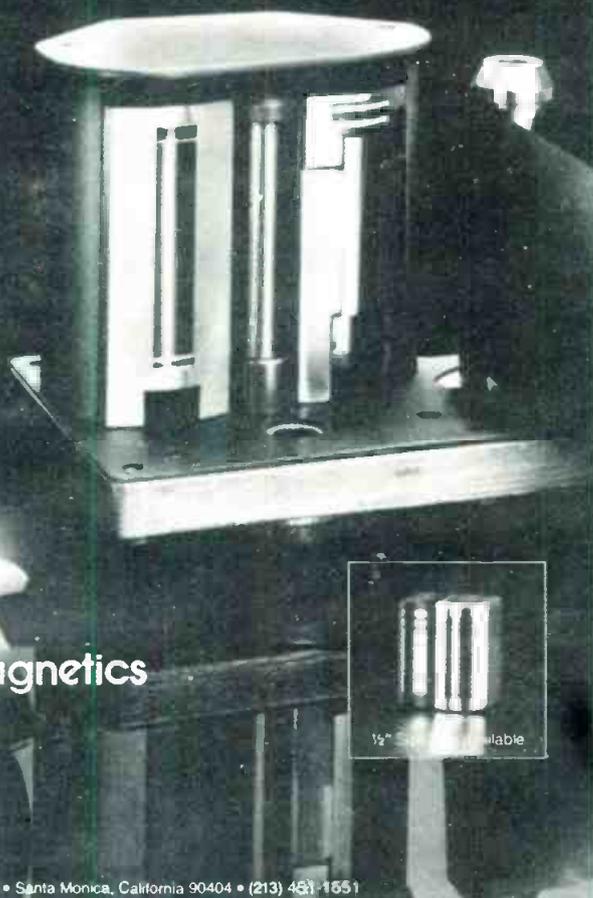
Circle 179 on Reader Service Card

Glass Is Class... It Lasts & Lasts!!!

Think
Glass Bonded Ferrite...
The Jewel of Our Industry.

Update your video recorder with
Long Life Saki Audio Posts.

Ferrite heads available for all
professional recorders.



Saki Magnetics

1649 12th Street • Santa Monica, California 90404 • (213) 451-1551

Circle 180 on Reader Service Card

Broadcast Equipment

9207 has a built-in RF modulator for playback with any conventional TV receiver. This feature is available as an option on the VC-9307 player/recorder. Horizontal resolution for both units is more than 330 lines, monochrome, and more than 250 lines, color (NTSC). NEC AMERICA, INC.

Short Arc Lamps

255

Tin halide short arc lamps, available in 250, 500, and 1000 watt sizes, are especially suited for film, photographic, studio, and stage lighting situations where color rendering and heat dissipation factors are important. The new lamps have a color rendering index of 90 Ra and provide nearly "daylight" conditions during use. A lumen efficiency of 80 lumens per watt allows a much smaller lamp to do the job with significant reduction in power consumption. Limited infrared radiation in the lamps' operating spectrum produces considerably less radiant heat than other types of lamps. The lamps have a lifetime of 1000 hours or more, and unlike compact light sources that operate on dc current with rectifiers, the tin halides require a simple coil and ignitor and operate on normal ac current. NORTH AMERICAN PHILIPS LIGHTING CORP.

Cue Generator

256

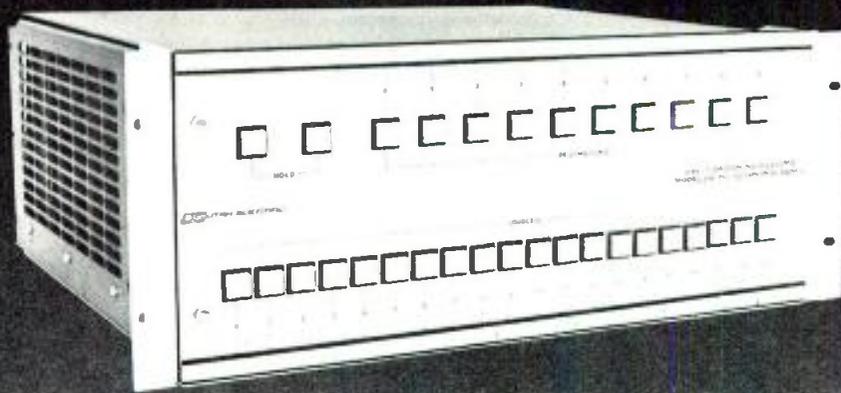
The Dynatel LPG-1 is designed to create a complete VTR leader signal automatically. The unit includes a character countdown generator, a 400 Hz tone oscillator, and a two-by-one audio-follow-video routing switcher. The unit automatically outputs 50 seconds of color bars with a steady tone, then 10 seconds of character countdown with a tone burst on the second. The count ends with an AFV switch to the program inputs. The unit also offers a five-second preroll function and full remote control. Several optional modules are available, including NTSC color sync generator, audio distribution amp, pulse and video distribution amps, staircase generator, and screen splitter. \$1745. ADCOM COMMUNICATIONS.

Video Bridging Switcher

257

The Model PSW-467 is a video bridging switcher that can remotely operate multiple audio switchers from as far away as 1000 feet using standard two-wire audio cable. The PSW-467 will switch video, audio, and SMPTE time
continued on page 122

IF YOU THOUGHT YOU COULDN'T AFFORD A PROFESSIONAL ROUTING SWITCHER. . .



THINK AGAIN!

With our new CAV-7 Series switcher you can have the same best-in-the-industry performance specifications as we give you with our larger AVS-1 switchers, but at patch panel/DA prices.

Professional features that make the CAV-7 the industry's best switcher buy —

- Remote or local control • Audio/video breakaway • Refresh memory with 24-hour memory save • Two-year parts and labor warranty • Multiple-sourced components • Vertical interval switching • Automatic statusing • Pre-wired expansion • Compact - 20 x 10 AFV in 7 in.

With the FSK CONTROL option the CAV-7 is ideal for installation at TV transmitter or microwave sites with control via an audio subcarrier channel or dedicated land line.

MATRIX PRICES

MODEL	MATRIX (IN x OUT)	VIDEO ONLY	MONO AUDIO	STEREO AUDIO	VIDEO AND AUDIO
CAV-20/10	10 x 10	\$ 3,350	\$ 3,050		\$ 4,950
	20 x 10	4,450	3,950		6,950
CV-50/10 and CA-50/10	10 x 10	3,350	3,050	\$ 6,100	6,400
	20 x 10	4,450	3,950	7,900	8,400
	30 x 10	5,550	4,850	9,700	10,400
	40 x 10	6,650	5,750	11,500	12,400
	50 x 10	7,750	6,650	13,300	14,400
CV-20/20 and CA-20/20	10 x 10	3,350	3,050	6,100	6,400
	20 x 10	4,450	3,950	7,900	8,400
	10 x 20	5,250	4,650	9,300	9,900
	20 x 20	7,450	6,450	12,900	13,900
CA-20/10-S	10 x 10		3,050	4,650	
	20 x 10		3,950	6,450	

CONTROL PANEL AND ACCESSORY PRICES

- CPL-20/10, CPL-50/10 or CPL-20/20
- Local Control Panel \$1,000
- CPR-20/10, CPR-50/10 or CPR-20/20
- Remote Control Panel \$1,500
- FSK Tone Control Installed \$500
- BCD Interface Panel, 8-bus,
- Installed in remote control panel \$400
- BCD Control Panels and Cable — Prices on request.

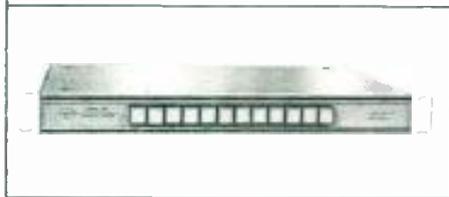


2276 SOUTH 2700 WEST
SALT LAKE CITY, UTAH 84119
PHONE 801-973-6840

Circle 181 on Reader Service Card

Broadcast Equipment

code at the same time, or stereo audio and time code, on ten or more Lenco Model PAF-467 audio switchers. The PSW-467 has ten inputs and two outputs. The unit switches during the vertical interval using the vertical sync derived from the video at the output stage.



There is also an external sync input for non-composite inputs or house sync timing. Power consumption of the 1 3/4-inch high, rack-mounted unit is less than 10 W. \$795. LENCO.

FM Diplexer 258

Model 441 is an FM audio diplexer terminal designed for use in the satellite broadcast of TV-associated audio. The 441 meets or exceeds all specifications finalized by Intelsat for the simultaneous transmission of both audio and video signals through a single Intelsat IV satellite transponder. Use of the 441

will reportedly allow earth station operators to occupy less transponder spectrum and will provide cost savings in separate audio up- and downlink costs. Video filters incorporated in the 441 permit its use in either PAL, SECAM, or NTSC video formats. The unit features audio limiting and squelch. COASTCOM.

Audio Preampifier 259

Beta III is a new audio preamplifier that uses recently developed FET technology throughout its circuitry to provide extremely fast and accurate signal reaction. The 2 3/32-inch high unit's EQ amplifier section consists of direct coupling and dc amplification. The first



stage is a single Cascade differential amplification system with ultra-low noise, high conductance, and dual FETs. At the second stage, a differential amplifier consisting of high voltage

P-CH type FETs is employed. The final stage uses a three-parallel regulated current load source follower consisting of high-voltage N CH FETs. The Beta III also contains a tone control and filter amp sections. \$399. NIKKO AUDIO.

Cue Tone Filter 260

The VIF BR/25 is a new band reject filter designed to remove 25 Hz tones from outgoing signals without affecting other frequencies. The filter has a clipping level of +20 dBm and a signal-to-noise ratio of 63 dB. Typical performance measurements of the unit show 25 Hz to be 48 dB below the 1000 cycle reference frequency, 28 Hz to be down less than 4 dB, and 50 Hz to be down less than 1 dB. Optional balanced line output transformers are available. \$245. VIF INTERNATIONAL.

Rotary Wipe 261

Model 360 is a new plug-in rotary wipe unit designed to operate with any video switcher. The unit is fed sync and blanking and its output is fed into the external key input of a video switcher. Fan, clock, rectangle, and bar wipes are selectable from a remote control panel that also contains ganged faders to control speed of rotation and size of pattern. The unit features a joystick positioner which enables the selected wipe to be positioned anywhere in the picture. BROADCAST VIDEO SYSTEMS LTD.

Shotgun Mic 262

The KMR 82i is an ultra-directional line condenser microphone designed as a significant alternative to many now on the market. According to the manufacturer, it displays a smooth frequency response and a "remarkable" directional pattern which differentiates pat-



tern versus frequency less severely than traditional models now available. The reported result is a microphone less susceptible to off-axis sound coloration. The unit comes with a wind screen. Accessories include elastic suspension, wind-proof blimp, and a unique "active handle" for handheld

continued on page 124

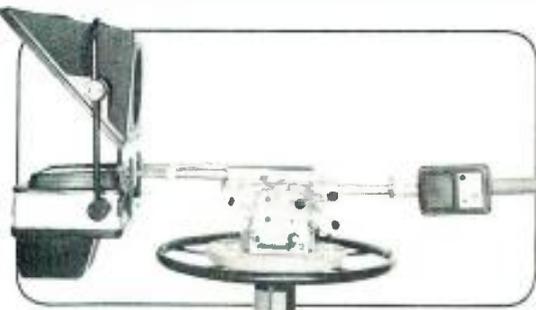
SIMPLIFY YOUR PROMPTING with DIGIVISION

Digivision Prompter features:

- Quick release mount to pan heads
- No balance weights, camera supports, or clumsy rigs required
- Super light 12" monitor or 17" monitor for maximum readability
- Less than 1/4 F stop light loss

702 Script Drive:

- Internal video DA for multiple monitors
- Self-aligning caterpillar drive for varying width and thickness scripts
- 2/3" Vidicon camera



LISTEC TELEVISION EQUIPMENT CORP.

LISTEC
39 CAIN DRIVE, PLAINVIEW, NEW YORK 11803
(516) 694-8963 TELEX 640470
(WEST COAST)
4527 SAN FERNANDO ROAD, UNIT 1, GLENDALE,
CALIFORNIA 91204 (213) 244-0838

Circle 182 on Reader Service Card

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

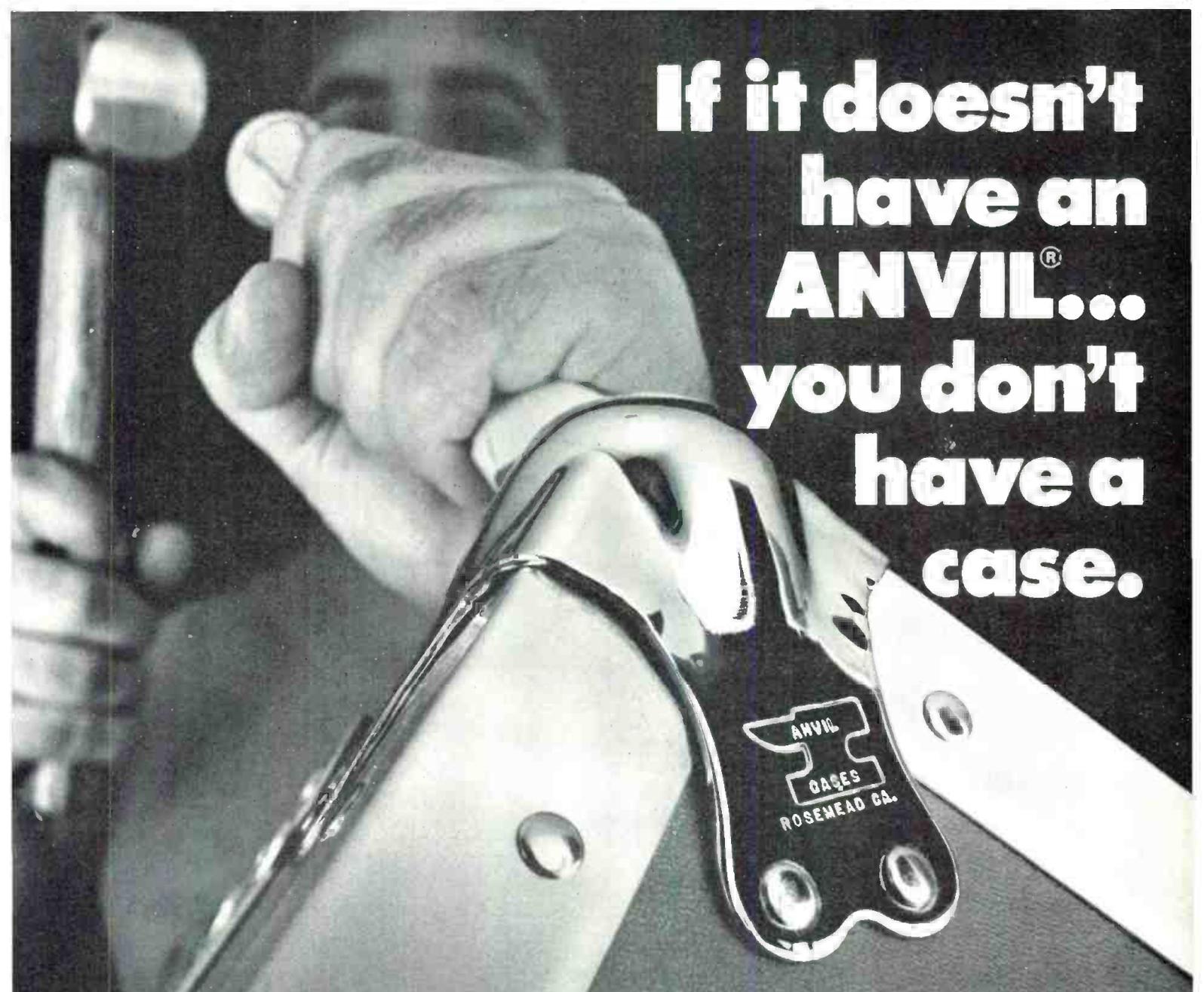


BELAR
AM MODULATION MONITOR



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

Circle 183 on Reader Service Card



**If it doesn't
have an
ANVIL®...
you don't
have a
case.**

It wasn't very long ago that television news reporters had to wait around for news film from a central news pool. But today's television reporters and camera crews don't wait around for anything. They're on the scene — capturing the story as it unfolds — no matter where it is. And this ever-increasing mobility has brought with it a huge demand for the best remote-equipment protection possible.

If your E.N.G. gear doesn't function when you get to the scene of a towering inferno, mass demonstration, or Super Bowl game — you don't get the shot — and the competition does. And since burning buildings, angry pickets, and last-minute touchdowns are once-in-a-lifetime events — you'll never get a second chance.

ANVIL® "A.T.A." cases combine high-impact construction on the outside with specially designed, custom-fitted foam padding on the inside. They exceed rigid Airline Transport

Association specifications for reusable shipping containers.

So if your professional life depends on recording the momentous news and sports events of our time — just look for the ANVIL®. Our cases will get your E.N.G. hardware across town or across the world — in one piece.

ANVIL® cases. Built to take it so you can take it — anywhere.



For more information and the location of your nearest ANVIL Dealer — call us:
ANVIL® CASES, INC., 4128 Temple City Blvd., Rosemead, CA 91770 (213) 575-8614.

Circle 184 on Reader Service Card

Broadcast Equipment

use which contains the 9 V battery for the 48 V phantom powering converter. \$795. GOTHAM AUDIO CORP.

Head-Worn Microphone 263

The SM14 is a new head-worn microphone with dual monitoring capability

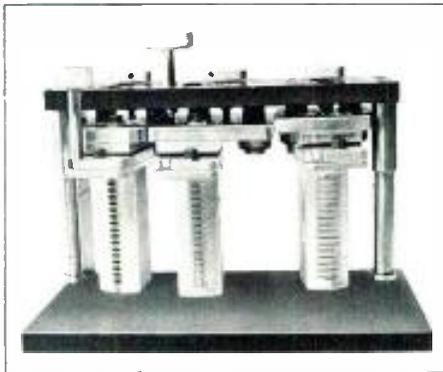


designed for use in a variety of studio and remote applications. The unit consists of a headband, a unidirectional dynamic microphone, and two integral earphone assemblies to permit the monitoring of separate sound sources.

Each of the two earphone assemblies has its own transformer and phone plug. The complete unit is constructed of steel, aluminum, and high-impact thermoplastic. The microphone is mounted on a lightweight cushioned headband and features an adjustment knob to permit the boom to extend or pivot to fit the face and head of any user. \$135. SHURE BROTHERS, INC.

Head Assembly 264

Promix I is a new multi-track head mounting assembly designed specifi-



cally to reduce alignment time and simplify magnetic head maintenance. The unit incorporates a variety of adjustments which give the user complete control over all aspects of head align-

ment. A built-in head subplate enables a technician to remove an individual head to change its configuration, relap it, or replace it without seriously affecting the alignment of the head. The Promix I is designed to fit most studio recorders now in use, and can be customized for special applications. GRANDY, INC.

Camera Crane Arm 265

The Dolphin crane arm is designed for use with all types of portable and ENG cameras. It is a fully counterbalanced unit suitable for use with pedestals and



tripods, particularly the Vinten Tritrack or Vinten tripods type 697 and 718. The unit offers a height range of eight to 70 inches and a full 360-degree pan range. The fully damped unit will accommodate loads up to 50 pounds. LISTEC.

Lighting Memory System 266

Up to six simultaneous, separately-timed lighting actions may be programmed in a single cue with the Light Palette. The six parts of the cue need



not begin or end at the same time, but all are activated with a single push-button. The parts may consist of up-fades or down-fades with separate times, delayed fades, or individual fades, with a wide range of speeds. Two built-in screens display all infor-

continued on page 126



NEW 100-B PROGRAMMER

Controls 8 Sources — 24 Events • Built-In 25 Hz Sensor and Notch Filter • Hold and Continue for Live Assist • Silence Sense

Log 2 and Log 4 Automation Systems

MEI MICROPROBE ELECTRONICS INC
 875 North Michigan Avenue
 Chicago, Illinois 60611
 Dave Collins, (312) 440-3111



REMOTE CONTROL

NEW MODEL 100-B PROGRAMMER

Circle 185 on Reader Service Card

MANAGER RF Systems BROADCASTING

Multi-Billion dollar communications organization is seeking individual qualified to assume responsibility for the operation and maintenance of RF systems for their network O & O based in New York City

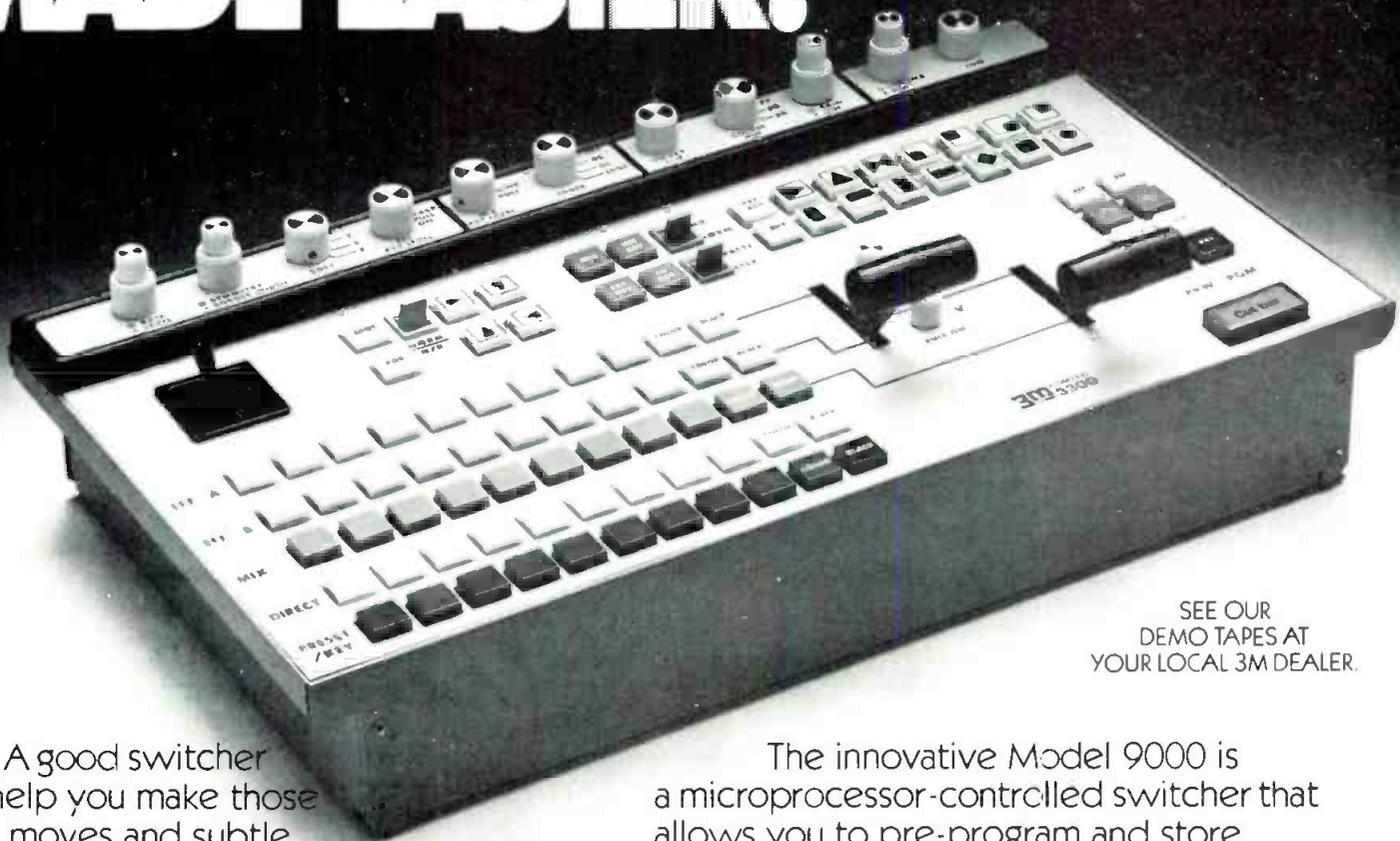
Successful candidate will be responsible for microwave repeaters, communications systems and Harris BT-18 and BT-25 television transmitters. Experience should include a maintenance background in "State-of-the-Art" audio, video, digital and RF circuits and systems. Knowledge of FCC rules and proof of performance measurements as well as ability to effectively manage a technical staff necessary. First class FCC radio-telephone license is required. BSEE degree is preferred.

Salary fully commensurate with experience and background, plus company offers an outstanding corporate benefits package. For consideration please send resume or letter outlining education, work and salary history in confidence to

BOX BME 1394, 810-7th AVE., NY 10019

An Equal Oppty. Employer M/F

TECHNICAL DIRECTION MADE EASIER.



SEE OUR
DEMO TAPES AT
YOUR LOCAL 3M DEALER.

A good switcher can help you make those crisp moves and subtle effects that lift an average production right out of the ordinary. And we make a line of production switchers that pack top performance in four affordable price ranges.

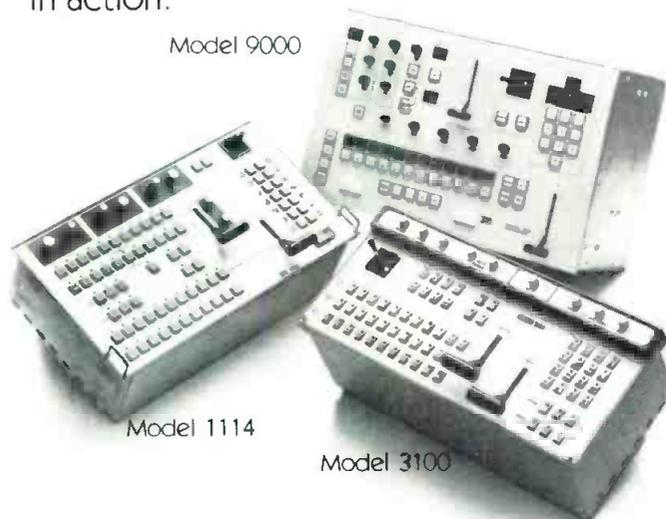
Take our Model 3300, for example. It's an 11-input, 5-bus switcher offering 18 popular effects. Easy to read controls let you punch up preset wipes, dissolve to effects or key, wipe behind mask key and more. Optional internal chroma key and digital effects give you all the flexibility of far more expensive switchers.

Our mid-priced switchers, the Model 3100 and Model 1114 are low-profiled, self-contained units. The Model 3100 features 11-inputs with 3-busses and 19 patterns. The larger 1114 combines 11-inputs with 4-busses, 14 patterns, and a built-in chroma keyer. They're both built with easy to reach plug-in circuit boards.

The innovative Model 9000 is a microprocessor-controlled switcher that allows you to pre-program and store up to eight production set-ups for error-free retrieval during fast-moving productions and editing. 12-inputs, 21-effects, border wipes, and 5-busses are digitally scanned and controlled for maximum operating performance.

To find out more, just circle our reader service card number.

3M Video Systems. Watch us in action.



Model 9000

Model 1114

Model 3100

Circle 187 on Reader Service Card

3M

Broadcast Equipment

mation for any cue, along with the running cue sheet and actual stage intensities. A disc-type memory is used. Light Palette can control up to 512 dimmers. STRAND CENTURY.

Video Receiver 267

The 6600 series is a fixed frequency receiver designed for use with video earth terminals. This modular unit measures 5.25 inches high in a standard 19-inch rack, and features threshold extension demodulation. The unit employs a mother board to interconnect vertically mounted circuit cards with partitions between each board and a ground plane providing isolation. The unit also offers optional conversion of baseband video and 6.8 MHz audio subcarrier and 4.5 MHz audio subcarrier (for microwave applications), and three optional audio demodulators for future audio services. SCIENTIFIC-ATLANTA, INC.

Microphone Cable 268

A new series of single and multi-conductor shielded microphone cables

includes two single conductor designs for outside cold-weather applications in high impedance systems. The 18 and 20 gauge neoprene-jacketed constructions feature an inner conductive-textile wrap shield and a tinned-copper serve shield for 100 percent coverage. The 20

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

and 18 gauge cables have diameters of .19 and .235 inches respectively. Nominal capacitance between conductor and shield is 55 pF per foot for both sizes. BELDEN CORP.

Fiber Optic Cable 269

FIBERdata™ series cable, an armored six-fiber, multi-channel cable for long-haul, high bandwidth applications, is now a standard product available on four- to six-week delivery. The TC-MG05-06 cable can be field-installed by crews with conventional coaxial cable pulling equipment. It can be laid and spliced in a fraction of the time required for twisted wire-pair cables and features strain-relieved subchannels for handling and termination ease, color-coded subchannels with

dielectric strength members, and corrugated aluminum sheathing. The six optical fibers compare in signal-carrying capacity with 2100-pair copper wire cable, though the diameter of the fiber optic cable is only 16.5 mm. VALTEC CORP.

Analog Time Processor 270

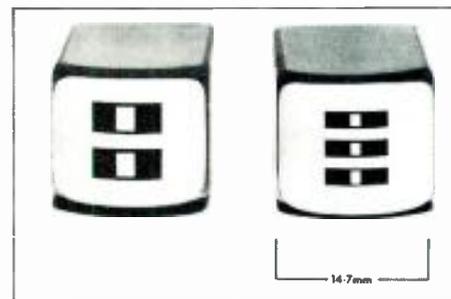
The DN 34 is an audio processor designed with a compander and peak limiter to achieve desired effects. Time-related effects producible with the unit include flanging, phasing, double and triple tracking, vibrato, doppler/leslie, and chorus. All the effects can be achieved without the need for additional outboard equipment and/or mixer console facilities. The unit fea-



tures a frequency response of 30 Hz to 15 kHz, ± 1.0 dB and total harmonic distortion typically 0.2 percent at 1 kHz, maximum 0.5 percent at 1 kHz, 2 dB below maximum level. Input impedance is electronically balanced (or unbalanced) 20 k ohms nominal, and output impedance is electronically balanced less than 30 ohms to drive a 600 ohm load. HAMMOND INDUSTRIES.

Cart Machine Tape Heads 271

Mono and stereo versions of new audio magnetic-tape record and playback heads are reported to raise the performance of broadcast cartridge machines above that of reel-to-reel machines. After small modifications to the cart machine amplifier equipment, the heads will resolve frequencies from 40 Hz to 15 kHz at ± 1 dB, compared to between +3.5 dB and -2.5 dB from



other heads and between +2.5 dB and -2.5 dB from reel-to-reel machines. The two- and three-channel heads (the extra channel, in each case, is for control) meet NAB requirements, and are mechanically comparable with other heads. The standard fully plug-compatible heads have a special profiling and lamination core for extended normal head life. MAGNETIC COMPONENTS LTD.



**Finest
16mm ciné
camera
ever!**

with or
without
FREZZI
side-mounted
amplifier

MADE IN U.S.A.

**"Frezzi-Flex" FR-16
now shooting
commercials,
documentaries
& TV newfilm
world-wide.**

For information (N.J. 201) 427-1160 (N.Y.C. 212) 594-2294



Frezzolini Electronics Inc.
7 Valley St. Hawthorne, N.J. 07506 USA

LENCO, INC., ELECTRONICS DIVISION

The fastest growing video broadcast product company in the United States, offers the following challenging positions to a few outstanding individuals:

VIDEO SYSTEMS PRODUCT MANAGER

Minimum five years professional experience. Must be able to plan and develop state-of-the-art video systems for broadcast applications.

VIDEO DESIGN ENGINEER ANALOG / DIGITAL

BSEE or five years professional experience in broadcast product design.

VIDEO ENGINEERING TECHNICIANS

At least three years experience with state-of-the-art broadcast equipment.

For a bright future with a company that is in the forefront of video technology, send your resume to Personnel Director

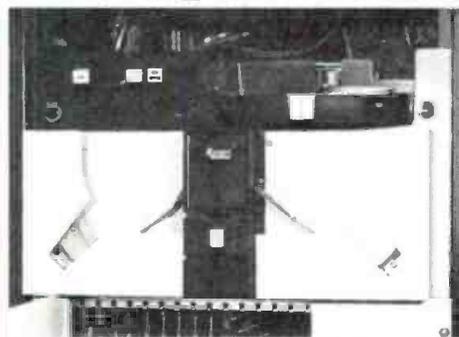
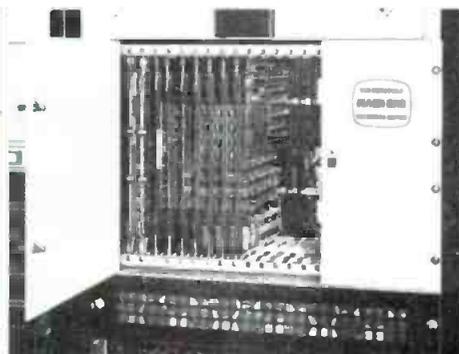
LENCO, INC.,
ELECTRONICS DIVISION
300 N. Maryland Street
Jackson, Missouri 63755
(314) 234-3147



An Equal Opportunity Employer

Circle 126 on Reader Service Card

MACH ONE.



The Editing System for All Reasons.

MACH ONE takes you a step beyond any other computerized video tape editing system now available.

MACH ONE is more versatile, faster and gives you greater list management capabilities.

MACH ONE's dedicated keyboard is editor-oriented and offers one-button commands that eliminate non-essential computer communication which cuts into your editing time.

MACH ONE can be used either on-line or off-line with 2" quad, 1" helical or 3/4" cassette recorders.

MACH ONE provides a total range of editing capabilities with full effects generation and automatic assembly operation.

MACH ONE's space-saving, single-rack electronics are instantly expandable to

upgrade your system from a simple, two-VTR, cuts only to a fully-equipped, six-VTR operation.

MACH ONE includes a one-year package of software updates.

To find out for yourself all the reasons why **MACH ONE** is the final solution to fast, accurate and efficient video editing, call your nearest **MACH ONE** sales and service representative:

Optek, Inc., 5526 E. La Palma Ave., Anaheim, CA 92807, 714/528-2321; *Joe Swiderski, Swiderski Electronics, Inc.*, 1200 Greenleaf Ave., Elk Grove Village, IL 60007, 312/364-1900.

Or write:

MACH ONE Digital Systems, Inc.,
3515 Cahuenga Blvd. West, Los Angeles,
CA 90068, 213/851-3211.



We're Dedicated

See **MACH ONE** at Booth 2505, NAB, Dallas

Circle 188 on Reader Service Card

BUSINESS BRIEFS

Tokyo Shibura Electric Co., Ltd. (Toshiba), a respected manufacturer of broadcast equipment in Japan, is preparing to enter the U.S. market. This new division of **Toshiba International Corp.** will be named **Broadcast Electronic Systems** and will be headquartered in Sunnyvale, Calif. Former president of IVC, **Ron Fried**, is to be the vice president and general manager of the new division, which will exhibit at NAB, Dallas.

The General Services Administration has awarded **Ampex contracts valued at \$6.2 million** to supply federal government agencies with instrumentation and audio and video tapes . . . Ampex has also received an order from the **Christian Broadcasting Network** for 22 VPR-2 one-inch VTRs and associated systems worth more than \$2 million . . . Also announced by Ampex was the sale of **Duca-Richardson switching systems** to: **JSL, N.Y.**; **KOCO-TV, Oklahoma City**; **Creative Images, Anaheim, Calif.**; **KATC-TV, Lafayette,**

Louisiana; **WLVI-TV, Cambridge, Mass.**; and **KGBT-TV, Harglingen, Texas** . . . The first domestic deliveries of their BCC-10 broadcast color camera were also announced by Ampex. Two of the cameras were delivered to **Creative Images, Anaheim**. **WAGA-TV, Atlanta**, and **KOCO-TV, Oklahoma City**, have each ordered three of the BCC-10s.

Chris-Craft Industries, Television Broadcasting Division, Hollywood, Calif., will upgrade its technical facilities at **KCOP-TV, Los Angeles**, and **KPTV, Portland**, with a 50 kW RCA transmitter and a six-bay antenna, and a 50 kW transmitter, respectively. RCA valued the equipment at approximately one million dollars . . . RCA announced that **Westinghouse Broadcasting Co., Inc., N.Y.** has ordered transmitting systems valued at \$850,000. 50 kW transmitters and associated equipment will be installed at **WBZ-TV, Boston**, and **KDKD-TV, Pittsburgh** . . . The **Southwest Texas Public Broadcasting Council** has ordered an RCA 55 kW UHF transmitter and antenna system valued at \$500,000 for **KLRU-TV**, which is scheduled to go into operation soon in Austin . . . **WKAR-TV and WKAR-FM, East Lansing, Mich.**, have installed RCA transmitting equipment valued at \$700,000. The new systems replace those destroyed in a fire at the station's transmitting site this past August . . . **WKRQ-TV, Mobile, Ala.**, is upgrading its broadcasting facilities with RCA television studio and transmitting equipment. The \$850,000 contract calls for the supply of a 50 kW transmitter, two TK-47 color studio cameras, three TK-76s, and a TH-100 one-inch VTR. **WTOP-AM, Washington's all-news radio station**, has announced an **affiliation agreement with CBS**. The agreement enables WTOP to air CBS network news broadcasts on the hour, and selected CBS news/information features at other times. The **Outlet Broadcasting station** also announced a **partial affiliation with Mutual Broadcasting System** to carry their news on the half-hour.

Philips Broadcasting Equipment Corp. announced the sale of three LDK-25 color studio cameras to the **Radio and Television Commission of the Southern Baptist Convention**, to be used in their new production facility in Fort Worth, Texas . . . **Utah Scientific, Inc.** has announced the receipt of orders for routing switchers valued at \$330,000. The orders were placed by **J. Walter Thompson Co., N.Y.**; **WBAL-TV, Baltimore**; **Opryland Productions, Nashville**; and **Taft Broadcasting Corp.** . . . **Telemation** has announced the sale of a dual Compositor Graphics Generator to **KTLA-TV, Los Angeles**.

Scientific-Atlanta, Inc., has been awarded a \$10.5 million contract by **Memphis CATV, Inc.**, to supply and install a cable television system in the Memphis area. When complete, the system will total 1800 miles and will be capable of providing 35-channel TV service to 275,000 homes.

Cinema Products Corp. has been appointed the exclusive U.S. distributor of the Sachtler line of fluid heads and tripods for video and motion picture cameras weighing up to 33 pounds. For further information about the Sachtler line, manufactured in Munich, Germany, contact **Cinema Products Corp., 2037 Granville Ave., Los Angeles, Calif. 90025** . . . **Northport Engineering** has been appointed the **Times Wire and Cable** representative in the upper Midwest. Northport is at 2027 Grand Ave., St. Paul, Minn.

The **Outlet Company and Trinity Broadcasting of Oklahoma City, Inc.**, expect to petition the FCC to allow them to construct and operate, as a joint venture, a UHF television station on channel 14 in Oklahoma City . . . **Scientific-Atlanta** has begun construction of a new 105,000 square foot manufacturing plant for its satellite communications products. The new facility in suburban Atlanta is scheduled for occupancy in late spring of 1979.

Dranetz Engineering Laboratories, Inc., New Jersey, has recently received the President's "E" award, the nation's highest award for export performance. Dranetz, a manufacturer of electronic test equipment, was selected to receive the award in recognition of its outstanding contribution to the export expansion program of the U.S.

Ikegami has announced a move to larger quarters at 37 Brook Ave., Maywood, N.J. 07607. The 35,000 square foot facility includes a demonstration studio and control room, engineering department, repair facilities, spare parts inventories, warehouse space, and administrative offices . . . **Telecommunications Industries, Ltd.**, has moved to larger quarters at 6822 Santa Monica Blvd., Los Angeles, Calif. 90038 . . . **Leasametric** has relocated its Houston center to 10400 West Office Drive, Suite 110, Houston, Texas 77042, and its Dayton center to 5653 Webster St., Dayton, Ohio 45414.

In the Source, *BM/E*, September, 1978, **Fujinon Optical's** address should be corrected to read 672 White Plains Rd., Scarsdale, N.Y., 10583 . . . **Computer Image Video Controllers'** phone number in the Direct Access Guide should be corrected to (303) 935-3514 . . . **Broadcast Automation Associates, Inc.'s** phone number should be corrected to (305) 464-5465.

Field Service Engineer

At last, the right job
in the right location.

The Grass Valley Group has a position available for a qualified Field Service Engineer to provide after sales support for its wide variety of complex broadcast systems. The position offers travel in the U.S. and abroad plus career opportunities in marketing and engineering for this expanding company.

The Grass Valley Group is located in rural Grass Valley, at the foothills of California's Sierra-Nevada mountains, where you'll find a relaxed life-style and abundant recreational activities.

The position requires an individual with experience maintaining and/or designing television systems. Prefer BSEE or equivalent.

Interested and qualified candidates are invited to send a resume in confidence to Val R. Marchus, The Grass Valley Group, Inc., P. O. Box 1114, Grass Valley, CA 95945. An Equal Opportunity Employer M/F/H.

Grass Valley Group

A Tektronix Company

Total Television Camera Support Equipment - from the Ground Up.

The ITE product line has been designed with *your* camera in mind. ITE products provide professional camera support and control for cameras weighing from 5 to 250 pounds. The ITE line is marketed by all leading camera manufacturers and distributors and is in use by stations throughout the world in broadcast,

educational, industrial and closed circuit television applications. No matter what your requirements—pedestals, tripods, dollies, camera heads or accessories—ITE can satisfy them. Call or write us today for our short form catalog and the name and address of your nearest ITE dealer or distributor.



INNOVATIVE TELEVISION EQUIPMENT

6445 De Soto Avenue • P.O. Box 681 • Woodland Hills, CA 91364 • (213) 888-9421

See us at Booth No. 388, NAB, Dallas

Circle 189 on Reader Service Card

Advertisers' Index

- ADDA Corp.** 55
American Data Corp. 32
Ampex Corp. 47
Ampro Broadcasting Inc. ... 12
Amtron Corp. 20
Anvil Cases 123
Asaca Corp. 11
Audio Designs & Mfg. Inc. . 7, 83
Audio-Technica, U.S. Inc. 91
Auditronics Inc. 107

Belar Electronics Lab Inc. .. 122
Robert Bosch Corp./
Fernseh Group 22-23
Broadcast Audio Assoc. 18
Broadcast Automation
Assoc. 90
Broadcast Products Div.,
UMC Electronics Corp. 35

Camera Mart 27
Canon USA Inc. 37
CCA Electronics Corp. 49
Central Dynamics Ltd. 79
Cetec Broadcasting Group .. 57
Cinema Products Corp. 71
CMX 3
Computer Images Video
Controllers/Dytek
Indus. 66
Consolidated Video
Systems 51
Convergence Corp. 81
CSI Electronics Inc. 89

Datametrics Inc. 116
Datatron Inc. 97
Digital Video Systems .. Cover 2
Dytek Industries 66
Eastman Kodak Co. 99
EEV Inc. 13
Electro-Voice Inc. 109

Yves Faroudja 102
Frezzolini Electronics Inc. .. 126
Fuji Photo Film 117

Grass Valley Group 5
David Green Broadcast
Consultants Corp. 10

Harris Corp. 8
Hitachi Denshi
American Ltd. 101

IGM, Div. NTI 105
Ikegami Electronics Inc. .. 16-17
Innovative Television
Equip. 129
International Tapetronics
Corp. 24

Listec Television
Equip. Co. 122

3M Mincom-Video
Products 61, 106, 125
3M Magnetic Tape Div. .. 29, 111
Mach One Digital
Systems Inc. 127
Magnasync/Moviola Corp. .. 113
Marconi Electronics 75
Marconi Instruments 21
McCurdy Radio
Industries Inc. Cover 3
MCI/Quantel 45
McMartin Industries Inc. 110
Microtime 34
Microwave Assoc. Inc. 92
Microprobe Electronics Inc. 124
Modular Audio Products ... 120
Moseley Associates Inc. 80

NEC Broadcast
Equip. Div. 14, 15
Nurad Inc. 100
Orban Associates 115
Otari Corp. 28

Pacific Recorders &
Engineering Corp. 36, 70
Phelps Dodge
Communications Co. 77
Philips Broadcast
Equipment Corp. 38-39
Potomac Instruments 18

QRK Electronic
Products Inc. 60

Ramko Research 30-31
RCA Broadcast Systems 84
Recortec Inc. 119
Rohde & Schwarz Sales Co. . 59

Saki Magnetics 120
Sharp Electronics 62-63, 87
Sono-Mag Corp. 26
Sony Corp. of America 95
Sound Technology 72

Telemation Inc. 52
Television Equipment
Associates 118
Telex Communications
Inc. 25, 114
Tepeco Corp. 118
Time & Frequency
Technology Inc. 103

UMC, Broadcast
Products Div. 35
Utah Scientific 121

Video Aids Corp.
of Colorado 82
Video Data Systems 19
Vital Industries Inc. 9

Ward Beck Systems
Ltd. Cover 4
The Winsted Corp. 116

Yamaha International Corp. .. 40

SALES OFFICES

BM/E—Broadcast Management/Engineering

295 Madison Ave.
New York, New York 10017
Telex: 64-4001

Manager, U.S. Sales

Kenneth F. Luker, Jr.

Eastern & Midwestern States

295 Madison Avenue
New York, New York 10017
212-685-5320

Kevin J. Condon

Kenneth F. Luker, Jr.

Western States

353 Sacramento Street
Suite 600
San Francisco, CA 94111
415-421-7330

William J. Healey

1434 Westwood Blvd., Suite 9
Los Angeles, CA 90024
213-475-8486
Neal Wider

Japan

Intercommunications (Japan) Inc.
Kakyo Bldg. (No. 416)
15-13 Tsukiji 2-chome
Chuo-Ku, Tokyo 104 Japan
03 (543) 0398
S. Yasui

EDITORIAL HELP WANTED

BM/E, and its international sister publication BM/E's World Broadcast News, is seeking a junior editor for its New York office. The right person will be able to show a strong interest in broadcasting and familiarity with equipment as a result of media courses in radio and TV or direct broadcast experience. Send resume and salary history to:

James A. Lippke

Editorial Director

BM/E 295 Madison Ave.
New York, N.Y. 10017

SS8600 STEREO CONSOLE



ON AIR CONTROL — CHUM, TORONTO
ONE OF FOUR NEW CHUM STUDIOS INSTALLED THIS YEAR
UNDER THE DIRECTION OF GEORGE JONES,
DIRECTOR OF ENGINEERING FOR CHUM GROUP RADIO

In 1958 CHUM installed the first of the McCurdy SS4000 Package Console Facilities. After twenty years of continuous operation the original package was replaced by this customized SS8600 System.

McCURDY RADIO INDUSTRIES

TORONTO
416] 751-6262

• CHICAGO •
[312]640-7077

NEW YORK
[201]327-0750



Circle 190 on Reader Service Card

www.americanradiohistory.com

Off to a head start with Ward-Beck!

Around the globe honors graduates compete for admission to the Radio and Television Arts course at Ryerson Polytechnical Institute.

It is Ryerson's insistence upon the very highest standards in all aspects of its operations that has led to such coveted international recognition.

Students now receive advanced instruction on two Ward-Beck custom 2042 production consoles. A logical choice for the best possible start to an exciting career!



First by Design



Ward-Beck Systems Limited, 841 Progress Avenue, Scarborough, Ontario, Canada M1H 2X4.
Tel: (416) 438-6550.

Ward-Beck Systems Inc., 6900 East Camelback Road, Suite 1010, Scottsdale, Arizona 85251.