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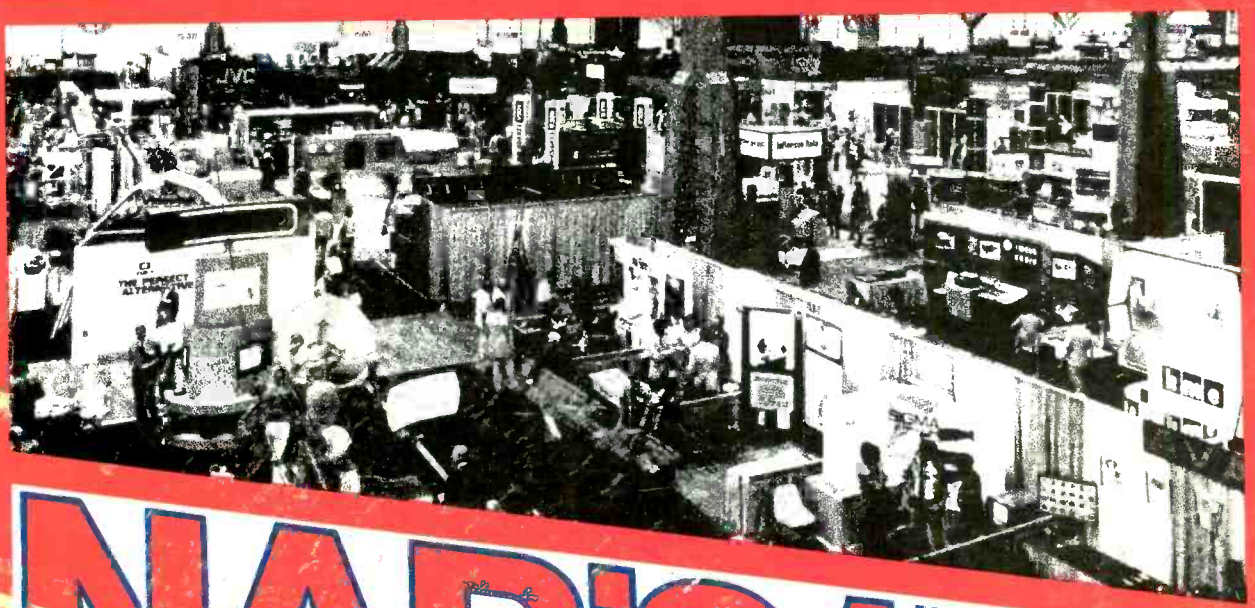
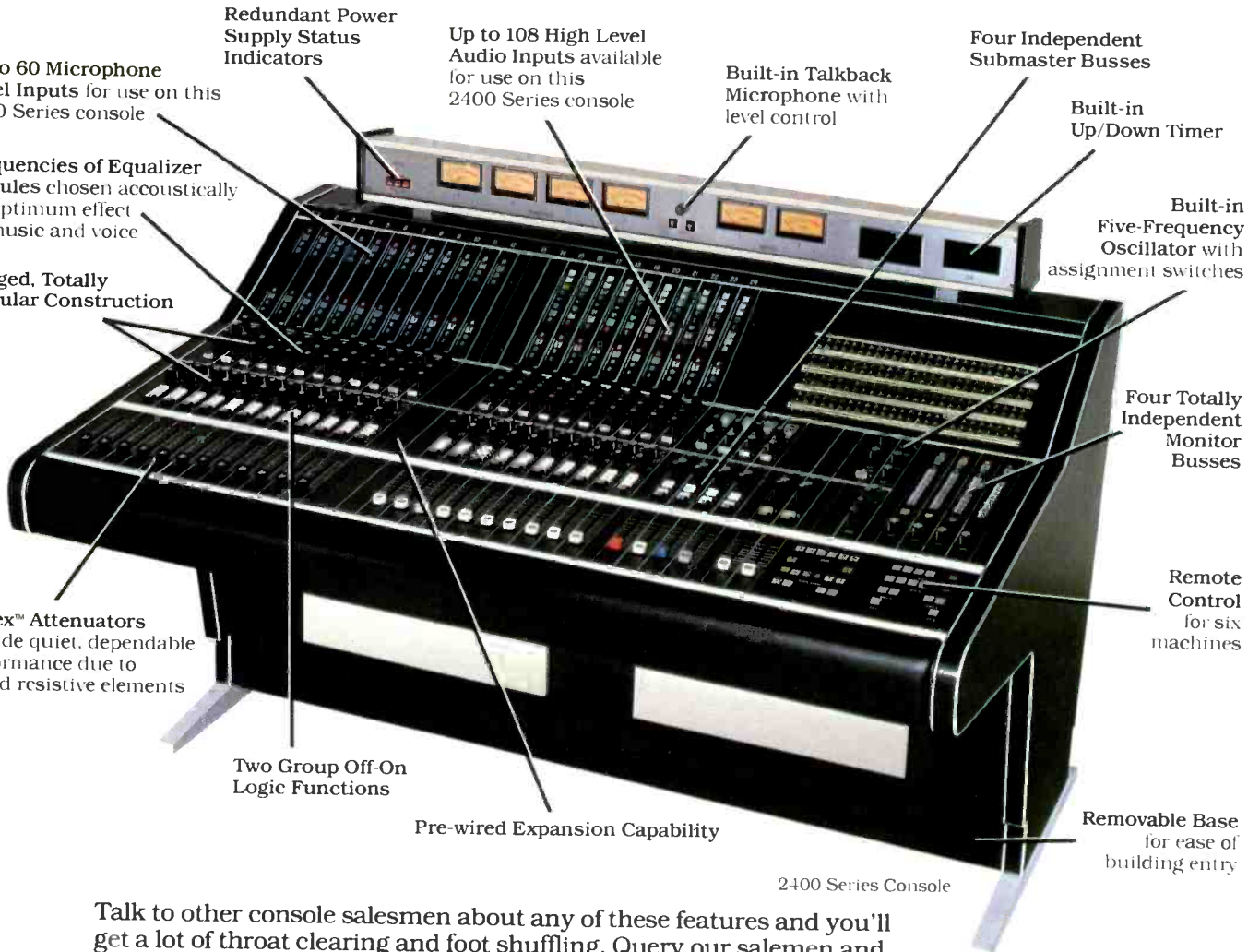


NAB'81

NEW TECHNICAL STRUCTURE TO MEET DECADE'S CHALLENGE

It makes our competitors nervous to discuss these standard ADM benefits



2400 Series Console

Talk to other console salesmen about any of these features and you'll get a lot of throat clearing and foot shuffling. Query our salemen and you'll get a lot of facts about ADM features that help you do a better job and he'll tell you about our exclusive 5-year warranty. (Yes, we *have* to build them better, and we do!)

Learn more about our Series 3200, 2400, 1600 or 800 ADM Audio Consoles. Contact ADM Technology, Inc., 16005 Sturgeon, Roseville, Michigan 48066. Phone (313) 778-8400. TLX 23-1114. West Central Sales Representative, Gordon Peters, (817) 467-2990.

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TOSHIBA'S PK-60 MAKES NEWS... THE SMALLEST, LIGHTEST NEWS/PRODUCTION BROADCAST CAMERA ON THE AIR. WITH A DIGITAL MEMORY THAT WON'T FORGET.

Here's the newest ENG/EFP camera from Toshiba. Just right and so light for broadcast news. It's this combination of features that make the PK-60 a small standout.

- ☑ 9.4 lbs.
- ☑ Small Size
- ☑ Reduced Power — 20.6 watts
- ☑ Outstanding Stability
- ☑ Digital Data Loc
- ☑ Microprocessor-based Auto Setup Unit
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Digital Data Loc is Toshiba's digital memory that can be preset by the engineer and travel to the action scene.

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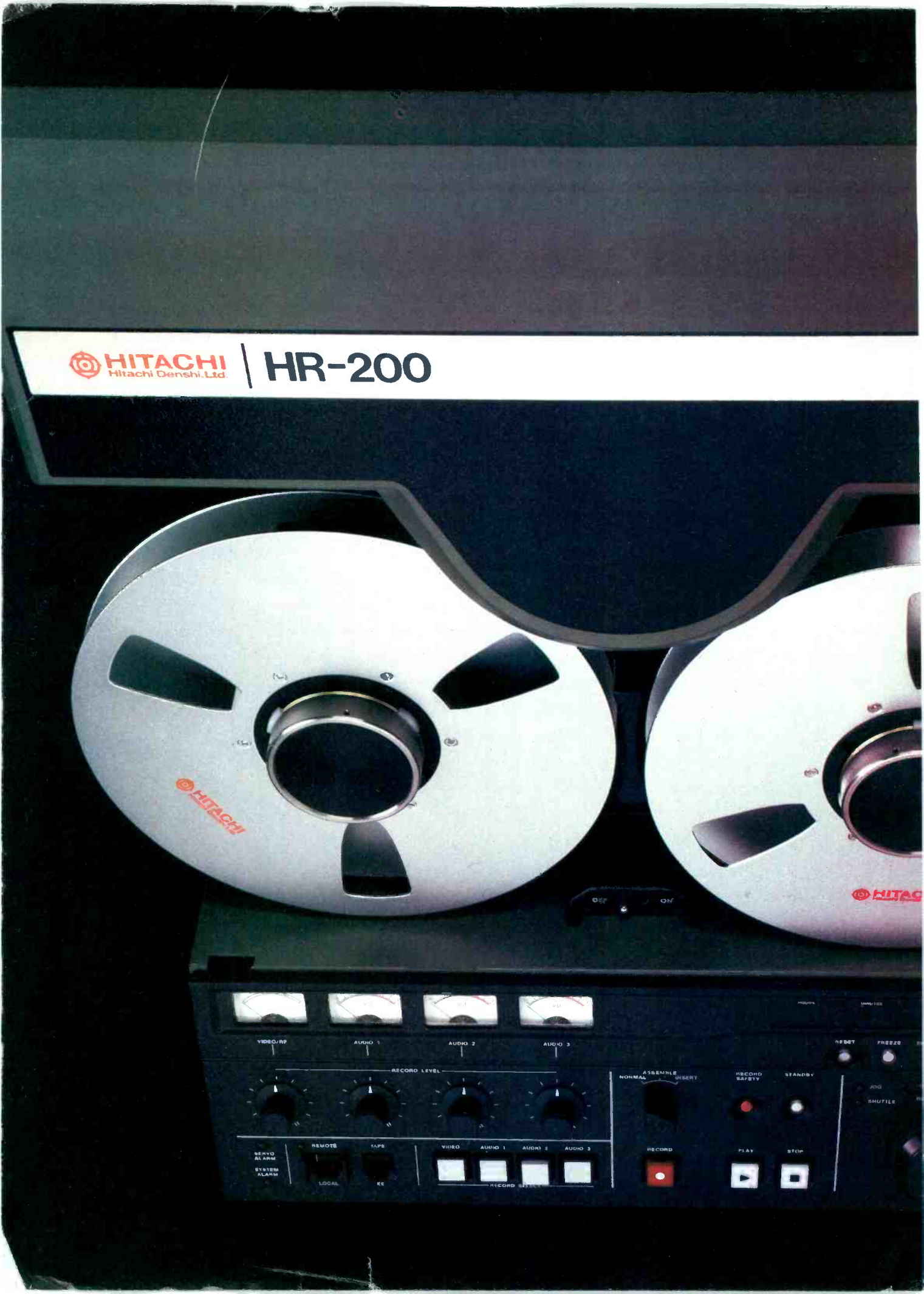
HR-200



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That's the score in one-inch VTR technology.

We've gone the first generation of TYPE C machines *five* better ...to help you get all the potential of one-inch out of your video installation. Here's what the competition *doesn't* give you.

1. Retracting Tape Guide
Retracts for unequalled ease of threading; repositions with one micron accuracy for up to two million threadings. Provides the reliability of a quad thread system in a one-inch format.

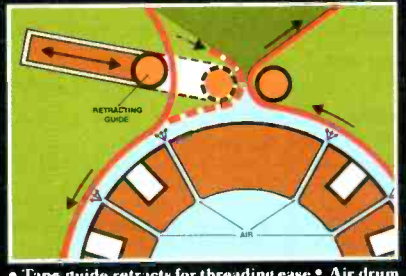
2. "PRO" Tape Path
The protective reverse oxide ("PRO") configuration of the tape path means *only* the video and audio heads touch the oxide surface. All other transport mechanisms guide the tape by its reverse side. Result: noticeably reduced dropouts; longer tape life.

3. Instant Head Replacement
Pre-aligned head design permits easy replacement of video heads in three minutes. No adaptors or jigs; no adjustments required.

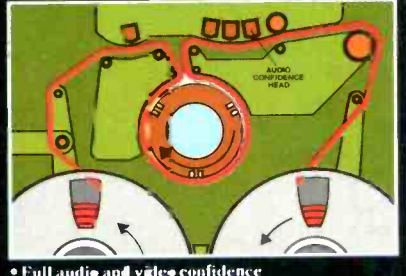
4. Audio and Video Confidence
The others only let you *see* what you're taping. We let you *see* and *hear* everything being recorded...simultaneously.

5. Non-contact Tape Shuttle System
In shuttle and standby modes, tape rides on a cushion of air. Increases head and tape life immeasurably. Cuts frictional resistance, yielding shuttle times of only 80 seconds end to end.

We could go on. With impressive features like microprocessor control; broadcastable slow motion; one-touch shuttle and jog; front access circuit boards; audio spot erase; and on and on. But why run up the score, when it's already no contest? See the Hitachi HR-200, it's equally impressive portable HR-100 model, and companion TC-200 Time Base Corrector.



• Tape guide retracts for threading ease • Air drum eliminates head contact in shuttle/standby modes



• Full audio and video confidence • "PRO" tape path reduces dropouts

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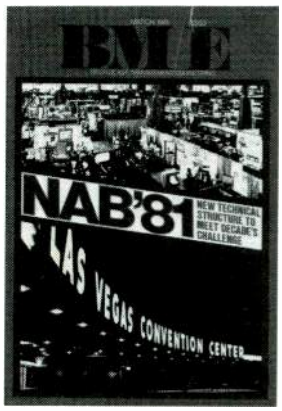
MARCH 1981/VOLUME 17/NUMBER 3



As broadcasters prepare to go to the 59th Annual Convention of the National Association of Broadcasters, the lineup of new products and services to be seen in Las Vegas seems more than ready to meet their needs in 1981 and the years ahead. This month, we provide a preview of the products and trends likely to capture the attention of NAB delegates

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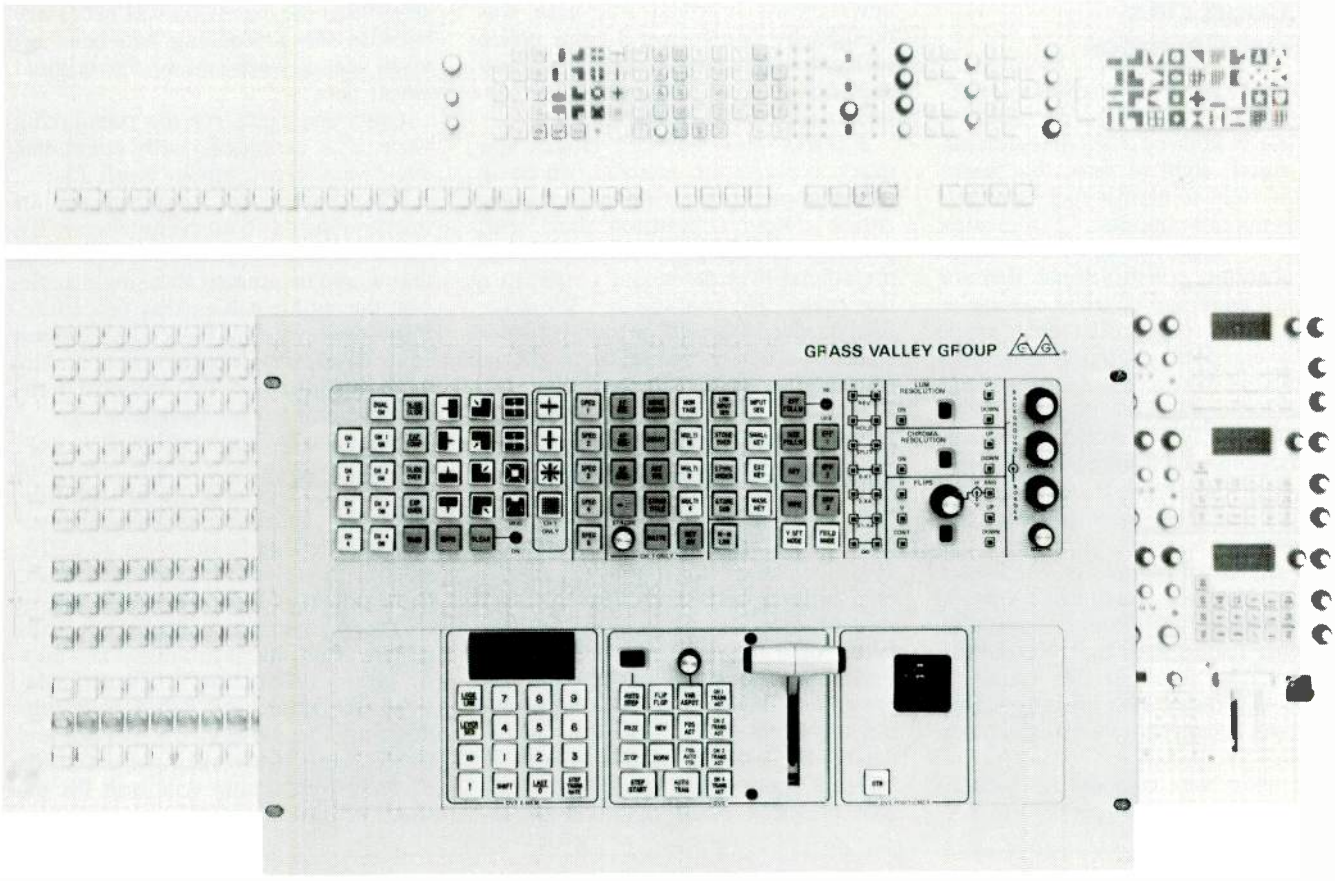
All-in-One Digital Video Effects



The MkII Digital Video Effects (DVE) is a second generation digital video manipulation system providing an almost endless variety of live and post production effects, many previously available only from separate digital systems or through costly optical techniques.

The MkII DVE was designed for the highest picture quality both in terms of video performance and subjective factors such as smoothness of motion. Among its standard effects are: continuous *picture zoom* from zero size to infinite expansion, rate control *picture positioning*, variable *aspect ratio*, picture *slide* and *split* patterns, programmable *multi-freeze* and *montage* effects, programmable picture *flips*, picture *decay* modes, luminance/chrominance *resolution* control and *Video Mosaic*.

What's more, every MkII DVE has several unique standard features: a complete *E-MEM* effects memory system, *strobe title* effects with decay modes, *digital noise reduction* and *ACTION-TRAK**, a motion freeze effect.

Options to the system consist of extra input channels (up to four total) and control panel mounting alternatives.

The MkII DVE system, consisting of the NEC DVP-16(26) Digital Video Processor and Grass Valley Group MkII Control System, is available in both NTSC and PAL models.

*ACTIONTRAK is a trademark of CBS, Inc.

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BROADCAST INDUSTRY NEWS

Top Court OKs TV Trial Coverage

The move to get TV cameras into courtrooms across the country got a major boost late in January when the Supreme Court ruled, eight to zero, that states have the right to permit such access.

In his majority opinion, Chief Justice Warren E. Burger put his case strongly: "An absolute constitutional ban on broadcast coverage of trials cannot be justified" simply because there is a risk that coverage may prejudice jurors. Burger went on to say that just as "The risk of juror prejudice in some cases does not justify an absolute ban on news coverage of trials by the printed media," a similar risk is not sufficient to render TV coverage of trials unconstitutional.

The decision in *Chandler v. Florida* does not, however, guarantee TV news departments the right to televise trials, but rather leaves that decision to individual states. Even so, the ruling is viewed as a major step toward greater courtroom access for television camera crews.

The court was considering a challenge to Florida's rule permitting TV news crews at trials. The case was brought by two former Miami police officers who charged that broadcast presence at their burglary trial had violated their constitutional rights.

RTNDA president Jack Hogan was quick to praise the decision, which he called ample justification of his organization's long contention that "full coverage of judicial proceedings is not prejudicial to a defendant's right to a fair trial." He continued, "We hope today's decision will encourage other states to follow Florida's lead" in adopting similar legislation.

Low Power Proposal Sparks Filings, Protests

Last fall's FCC rulemaking on low power TV stations (*BM/E*, November, 1980) continues to make news. Acting on a petition from the NAB, the Commission extended the original January cutoff date for applications into mid-February. The Broadcast Bureau had previously denied a similar extension, but the Commission said that misunderstandings of the earlier notices of interim processing procedures may have occurred. NAB's petition had asserted that the extension was necessary because the proceeding had been revised just a week before the original cutoff date.

Comment dates for the rulemaking were also extended, with comments due March 2 and replies April 13.

The procedural revision set an interim limit of 15 on the number of TV translator and low power authorizations that would be granted to a single applicant during the rulemaking procedure. It followed petitions for reconsideration from NAB, the Corporation for Public Broadcasting, and the National Citizens Committee for Broadcasting.

Meanwhile, applications for low-power networks have continued to pour into the FCC. Turner Television Systems, Inc., subsidiary of Turner Broadcasting, filed applications for 25 LPTV stations in various cities coast to coast. Programming for the net would consist of free, advertising-supported, full-service, full-time information and public affairs originating at Turner's Atlanta facilities and other locations utilizing the services of WTBS and Cable News Network; final definition of the programming will wait for the result of the rulemaking.

NYC Production House Renting Modular Mobiles

Unitel VP of technical operations Ed Levine (left) discusses HL 79 with Ikegami's John Chow (center) and Herman Schloss at open house to introduce the modular fleet

A New York City production facility has come up with an unusual solution to the problem of meeting the widely varying needs of its customers.

Unitel Production Services' new fleet of mobile units is designed around a modular concept that lets users rent just what they need — from a small "mini-mobile" roll-around cart with a single camera and portable VTR to two trucks outfitted with six cameras and related gear.

Unitel's Garth Gentilin told *BM/E* that the units have already produced commercials, corporate communications, and broadcast programming at locations ranging from Carnegie Hall to Bloomingdale's to Fordham University. The cart-mounted mini-mobiles can be taken into almost any indoor situation, Gentilin said, since all their equipment plugs into standard ac wall outlets. Equipment in the big vans includes six Ikegami cameras — four HK 312E studio models and two HL 79 portables — plus portable and studio one-inch Type C recorders from Sony and Ampex.

Announcing new AM/FM Stereo Consoles from ADM

THEY DO EVERYTHING BUT THE HELICOPTER REPORT

ADM® is proud to announce the ST Series, newest addition to our line of quality professional broadcast consoles. Compact as they are, they're big on capability and flexibility. They feature the same performance excellence, operational simplicity and reliability you'll find in any product from ADM.

The new ST consoles offer a series of modular frames that we will equip to your particular needs. A variety of input, output and signal processing modules are also available to satisfy your present requirements as well as future expansion. Each ST frame offers up to three separate stereo and one monaural output. All modules are front panel plug-ins. Electrical specifications set a new level of excellence for the industry.

So confident is ADM of the excellence of the ST Series, that they're backed with an exclusive 5-year warranty.

To find out more about how the new ST Series can make Audio Broadcasting easier for you, write or telephone us today. ADM Technology, Inc., 16005 Sturgeon, Roseville, Michigan 48066. Phone 313/778-8400. TLX 23-1114. West Central Sales Representative, Gordon Peters. Phone (817) 467-2990.

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Also filing for LPTV nets were ABC-TV and Boston Broadcasters, Inc., each asking for five stations. The ABC low-power outlets would be in the markets of the net's O&O stations and would broadcast advertiser-supported programs most of the day and subscription television during prime time. BBI envisions a New England regional low-power network with stations in Springfield, Mass., New Haven, Conn., and Portland, Auburn/Lewiston, and Augusta, Me. BBI president Robert M. Bennett said that programming for the net would not "attempt to duplicate any of the local programming" of New England's television stations, but would "deliver programs that address the region as a whole." BBI is licensee of WCVB-TV, Boston.

AM Stereo Review Denied

The FCC early last month denied a request by Kahn Communications and Hazeltine Corp. for review of its AM stereo proceeding. The companies were asking the Commission to settle the question of marketplace involvement before making a final technical judgement on which of the five competing systems should be adopted.

In denying the request, the FCC said it would wait for all technical information to be filed before taking any action. (The deadline for reply comments is March 9.) The Commission is still standing by its decision to select one system, but says it is remaining open on the question of marketplace selection. Any decision, it says, must wait until all data has been evaluated.

AM Stations To Switch To Standard Patterns

All AM directional antenna stations will be required to switch to standard patterns, according to a recent amendation of the FCC's rules.

The Commission will accomplish the conversions which, it says, will permit the computerization of the antenna patterns, facilitating the processing of applications. Stations built in 1971 or later, or those making major changes since then, already use the standard patterns. The decision affects stations using MEOV (maximum expected operating values) which were grandfathered when the new regulations were adopted in 1971.

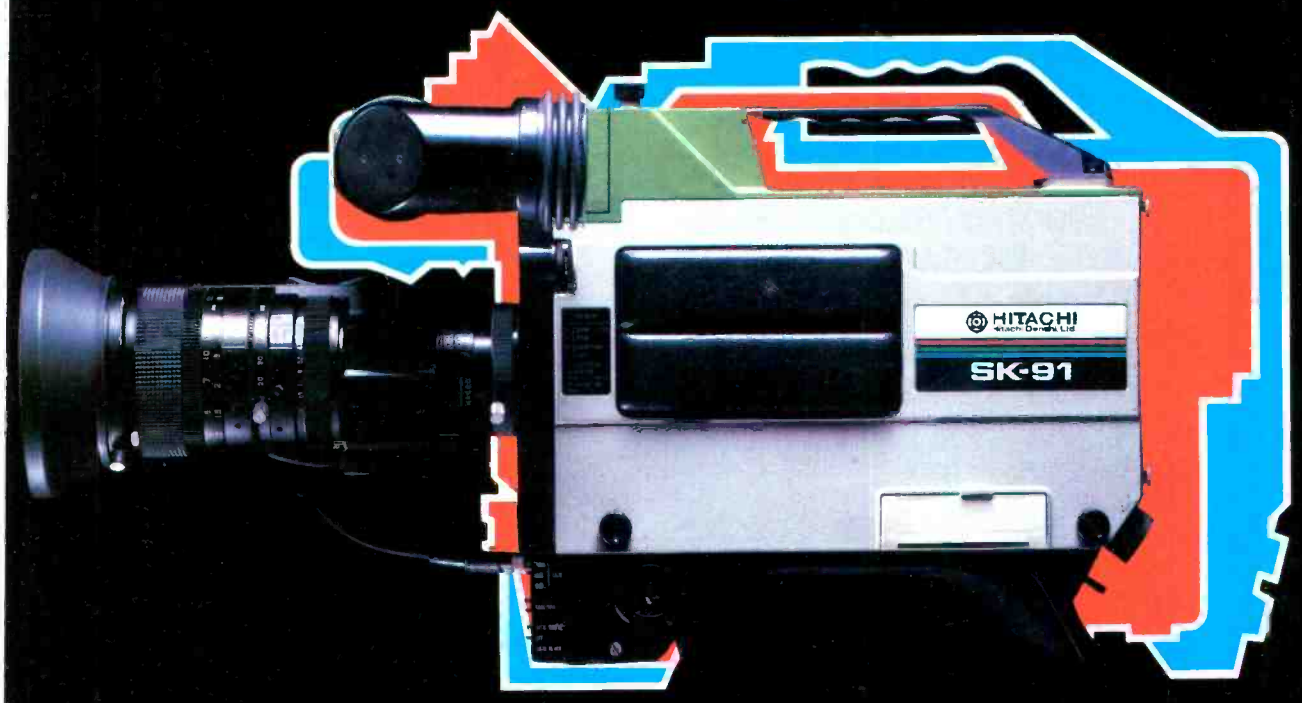
Cox Buys Interest In Wold Company

Robert Wold Co., Inc., preeminent arranger of ad hoc satellite networks for the radio and television industries, has agreed to sell a 20 percent interest in the company to Cox Broadcasting Corp. The $2 million deal includes an option for Cox to gradually increase its Wold holdings to as much as 80 percent by 1989.

According to Wold, Cox won out over several other contenders, all of whom were insistent upon getting a 51 percent share from the outset. The proceeds from the deal will enable Wold to expand its operations, which already include transponder space on five satellites. Besides its earth stations in Honolulu and Los Angeles (with four more under construction in D.C., L.A., and New York City), Wold has three transportable earth stations that recently saw duty at the Presidential inauguration and the return of the Iranian embassy employees.

Cox president Clifford M. Kirtland called the Wold investment "a logical extension" of his company's activities. "Wold's services in software production for broadcasting and cable TV operations and Wold's ability to provide live news feeds from around the country are particularly compatible with

A Broadcast Breakthrough of Minor Proportions.



Hitachi SK-91... Critical inches shorter and precious pounds lighter.

Creating the world's smallest, lightest ENG/EFP broadcast camera was no small accomplishment. But making it so without sacrificing a single spec or capability qualified as a genuine breakthrough.

Of course, the beneficiary of our advanced engineering is you. You get all the performance that high technology has to offer in a more compact, efficient package. (Cameramen are amazed at the SK-91's responsive, featherlight handling.)

Image quality naturally adheres to the highest broadcast standards, with your choice of Saticons, Plumbicons®, or diode guns®, attaining up to 57dB and 600-line resolution. Why not call your local Hitachi regional office and schedule a thorough in-person evaluation of the SK-91? We think you'll agree that a breakthrough of minor proportions can be of major advantage to you.

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- Weight: 9-1/2 lbs.
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- Auto digital white and black balance
- True ABO
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- Extremely quiet +9/+18dB gain
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- Studio accessories for added versatility

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Cox's interests," Kirkland explained. Cox is a major group broadcaster and owns the fourth largest CATV company in the U.S.

Cetec Buys Automated, Sells Transmitter Business

In a pair of actions described as aimed toward solidifying its position as a broadcast systems company, Cetec Corporation's Cetec Broadcast Group has acquired Automated Business Concepts and sold its radio transmitter manufacturing operation.

Automated Business Concepts, which has been doing business as Broadcast Management Concepts, markets a computer-based business automation system known as MAPS. Cetec says that the MAPS system is fully compatible with its System 7000 radio program automation system. Tom Haag, Automated's president, will stay on as general manager of the operation, which will remain at its San Diego headquarters. Marketing manager Frank Crane will also continue in his post.

The transmitter operation was sold to Elcom Specialty Products of Sacramento, Calif. for an undisclosed amount about a month before Cetec's purchase of Automated. The transactions were disclosed simultaneously.

Combo Ad Rates Require Common Control, FCC Rules

Radio stations seeking to offer combined ad rates must be commonly controlled, not just commonly owned, the FCC has ruled.

The action resulted from a complaint brought by KSOP, Salt Lake City, against two other stations in its service area. KRGO, Granger, Utah, was offering combo ad rates with KZAN-FM of Ogden, which serves substantially the same area. KRGO is 20 percent owned by KRGO's licensee, Group Communications Inc., but 80 percent owned by United Broadcasting Co.

The Commission ruled that the relatively small degree of common ownership was not sufficient to waive its rules prohibiting combination advertising rates, promulgated in 1963 to encourage competition. "Commonly owned" AM and FM stations serving substantially the same areas are exempted from the rule, but this exception is aimed at stations controlled by a single owner, the Commission said.

Ampex's Anderson To Head SMPTE

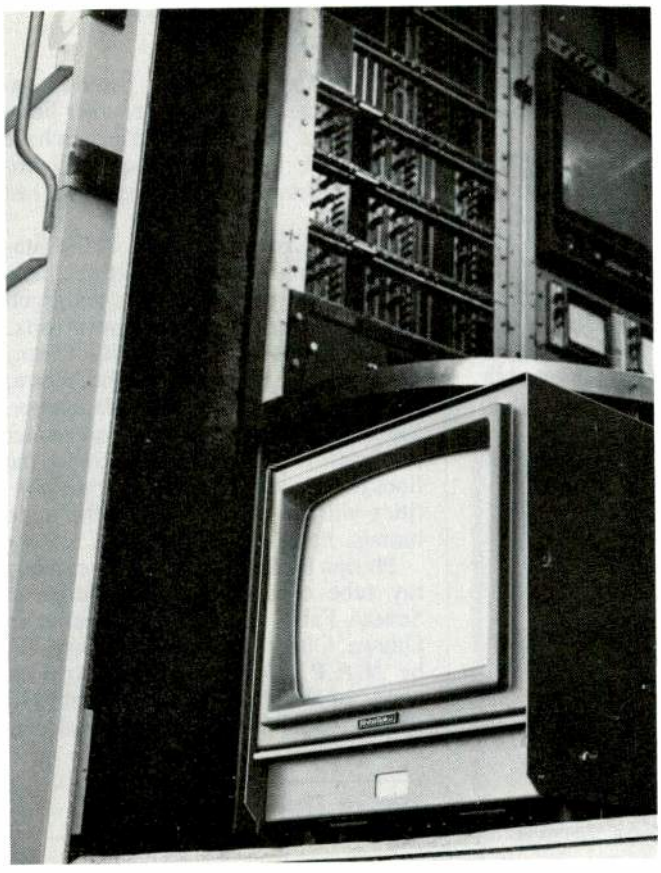
Video pioneer Charles E. Anderson of Ampex Corporation has been elected to a two-year term as president of SMPTE. Anderson's involvement with the society goes back to 1957. His most recent post was executive vice president; in the past he has served four terms as governor and headed the society's standards committee for four years.

The new president numbers among his laurels membership on the original Ampex design team that developed the first practical videotape recording system. He currently serves as product planner in Ampex's Audio-Video Systems Division.

Chicago Station Tests Pay Teletext

Field Communications outlet WFLD, Ch. 32 in Chicago, has been authorized by the FCC to conduct a one-year over-the-air test of a British teletext system, Polyglot C. The 100 subscribers will be charged for the service, which will consist of news, information, and some advertising.

FCC rules normally forbid a licensee



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Asaca/ShibaSoku's 10-inch CMM 10-1 Color Monitor is one small way to be sure you have the best possible pictures you can get while on remotes. It's AC/DC, lightweight, and ready to travel. With its special high resolution in-line tube you'll be looking at pictures that match your studio's best monitor. Team it up with our ASW-100 Field Production System and you have a complete mobile broadcast studio with you. Just add the cameras.

The CMM 10-1 likes to travel. But it's still at home in your studio. Wherever it is, it's simply the best 10-inch monitor anywhere.

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to charge for a service provided in connection with an experiment, such as a teletext test. A special waiver was obtained from the Commission to permit the fee, which Field claims will help assess teletext's marketability but will not cover expenses. Decoders will be placed in four private homes, with the remainder divided between private businesses and public places such as hospitals, schools, shopping centers, and government buildings.

After a three-month technical phase, the project will move into a second phase for broad evaluation of the technical operation and public response. Teletext information will be transmitted in the vertical interval.

More teletext action is coming from the British Teletext Industry Group, which is preparing a detailed submission to the FCC describing a 525-line, 60-field teletext system based on the UK model. Displays of the system, including material from the BBC and Independent Television teletext services, will be on display at NAB next month.

Philips Buys GTE's TV Set Business

North American Philips, parent company of the Magnavox Consumer Electronics Co., has completed its purchase of GTE's U.S. television set and component business, first announced last fall.

In the wake of the move, Philips announced the formation of three new subsidiaries to conduct its enlarged consumer electronics operations. N.A.P. Consumer Electronics Corp., in Knoxville, Tenn., will manufacture, market, and administer the Magnavox, Sylvania, and Philco lines of consumer products. (Sylvania and Philco are the lines produced by GTE.) Separate identities will be maintained for the three brands, however.

Philips ECG, Inc., will be a cathode ray tube operation headquartered in Seneca Falls, N.Y. with an outlet in Ottawa, Ohio. The third subsidiary will be N.A.P. Commercial Electronics Corp. of Waltham, Mass., which will conduct hotel/motel and hospital services.

News Briefs

Three broadcasting companies have appealed the FCC's designation of 13 of **RKO General's licenses** for hearing. Future Broadcasting, Inc., is seeking to acquire KHJ-AM and KRTH-FM, Los Angeles; Gold Coast Broadcasting, Inc., is looking at KFRC-AM, San Francisco; and New South Media Corporation has its eyes on WHBQ-TV, Memphis . . . . The FCC has **extended Cable News Network's temporary access** to its Satcom 1 transponder for another six months . . . . Group W and Teleprompter have received a temporary **waiver of the CATV/broadcast crossownership rules** to permit their merger *(BM/E,* December, 1980) . . . . The United Church of Christ has appealed the FCC's recent **radio deregulation** decision.

WRBT-TV, NBC affiliate in Baton Rouge, La., has been sold to Twentieth Century Fox . . . . Orion Broadcasting stations **WFRV-TV,** Green Bay, Wisc. and **WJMN-TV,** Escanaba, Mich., will be sold to Midwest Radio-Television, Inc. of Minneapolis as required by the FCC for the acquisition of Orion by Cosmos Broadcasting Corp. Two other Orion stations, **WMT-TV,** Cedar Rapids, Iowa and **WAVE-AM,** Louisville, Ken., are also expected to be sold . . . . GAF Corp. has announced its intention to sell **WNCN-FM,** the New York City classical music station . . . . Satellite Television & Associated Resources, Inc., will buy **Universal Subscription Television franchises** in Detroit and San Jose.

Picture shows Model 5462/16 TV Audio Console.

Price Surprise!

From 6 in/2 bus to 36 in/16 bus, Neve TV audio consoles are surprisingly price competitive and often available on short delivery. In addition to attractive pricing, Neve can offer you the best selection of purpose designed TV audio consoles to suit your application. We pride ourselves on building the finest products in the world, which are simple to operate with unequaled technical performance and reliability. And we are the only console supplier with factory sales and service offices coast-to-coast, in New York (Connecticut), Nashville, Los Angles and Toronto. Please write or call for our comprehensive TV audio console information package, so you can put Neve in your budget now. You'll be joining the Neve world of excellence!

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News Briefs

KOMO-TV, Seattle ABC affiliate, has won first place in the National Odyssey Institute's fourth annual Media Awards competition for children's programming . . . . **WHA-TV,** Madison, Wisc., has won three Corporation for Public Broadcasting Awards for information programming, public affairs, and news/public affairs documentaries . . . . **KRMA-TV,** Denver, recently won two "Awards of Excellence" from the Colorado Broadcasters Association.

The Eighth Decade Consortium, made up of **WRAL-TV,** Raleigh, N.C., **WJLA-TV,** Washington, D.C., **WCVB-TV,** Boston, **KOMO-TV,** Seattle, and **KSTP-TV,** Minneapolis-St. Paul, has won an honorable mention award in the second annual Women at Work Broadcast Awards, sponsored by the National Commission on Working Women. The show that won the honor, "What Does Your Mom Do?", was featured by *BM/E* in the July, 1980 issue . . . . **WNAC-TV,** Boston, garnered nine Emmys at the recent awards sponsored by the Boston/New England chapter of NATAS. Other winners included **WGBH, WCVB,** and **WBZ** . . . . Eric Rosenthal, audio/video systems engineer with ABC-TV, won an **Emmy for outstanding individual achievement** in engineering supervision of TV coverage of the 1980 Winter Olympics (see *BM/E*, April, 1980, for the full story on ABC's Olympic coverage).

Two New York video artists captured the grand prize in **JVC's Tokyo Video Festival.** The prize went to Keiko Tsuno and Jon Alpert for their tape, "Third Avenue . . . Only the Strong Survive" . . . . CBS Radio president **Sam Cook Digges** has received the International Radio and Television Society's Gold Medal for 1981.

FOC '81 East will take place March 24 through 26 at the Hyatt Regency in Boston. The fiber optics conference is sponsored by Information Gatekeepers, who may be contacted at 167 Corey Rd., Brookline, Mass. 02146, (617) 739-2022 . . . . NCTA and CTAM will co-sponsor the Cable Operators Programming Seminar (**COPS/EXPO**) in New Orleans, October 4 through 6 . . . . A two-day invitational symposium on **"Communications in the Twenty-first Century"** will convene at the Philip Morris Operations Center in Richmond, Va., April 1 and 2.

The American Film Institute and Sony Video Products Co. have announced plans for a **National Video Festival** and Student Competition to be held June 3 through 7 at the Kennedy Center in Washington . . . . March 13 is the deadline for the **1981 RTNDA awards,** with new rules in effect this year . . . . The forty-fifth annual **Ohio State Awards,** the oldest program competition in broadcasting, will be presented at the National Press Club in Washington March 18.

NRBA gained **412 new members** in 1980, boosting total membership to over 1500 . . . . The spring 1981 **certification exams** of the Society of Broadcast Engineers will be given June 6 to June 10. Applications must be received by April 20; write SBE Certification Secretary, P.O. Box 50844, Indianapolis, Ind. 46250 . . . . "Country Radio — Nobody Does It Better" will be the theme of the twelfth annual **Country Radio Seminar,** March 13 and 14 at Nashville's Hyatt Regency Hotel . . . . The 1981 annual conference of the **National Association of Educational Broadcasters** will convene November 1 through 4 at the Hyatt Regency in New Orleans. For details contact NAEB, 1346 Connecticut Ave. NW, Washington, D.C. 20036, (202) 785-1100.

No other recorder stacks up to Scully.

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When it comes to quality and enduring performance, nothing beats a Scully ...the original workhorse. For over 20 years, Scully recorders have been the standard of excellence. Their exceptional durability and engineering flexibility allow them to serve engineers today as well as they did in 1960. With our economical refurbishing service, you can update your studio without having to buy a new Scully to do it. Call us for an estimate.

Our fully stocked parts department, technical update bulletins and continuing service combine to give you a recorder that will perform long after others have to be replaced. *No* other manufacturer stacks up to Scully!

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NAB BOOTH #102

THE • GREAT AMERICAN • PIONEER

Circle 110 on Reader Service Card

Business Briefs

Coverage of President Reagan's inauguration was enhanced by the participation of several broadcast industry companies. **Imero Fiorentino Associates** designed a special structural complex for CBS to house radio, TV and other media press at the event. In addition, Fiorentino designed the tower that held the pool camera and coordinated the necessary power requirements. Mobile units from **Compact Video Sales** were leased by ESPN, and Satellite Communications Network's recently purchased Compact 42 mobile earth station beamed the show worldwide via satellite. All three **Wold Communications** transportable earth stations were in Washington for the inauguration for users that included CBS-TV, Post-Newsweek Stations, UPITN, and others. The Woldcom transportables were also on hand to welcome the former hostages home.

CSI Electronics, Inc., manufacturer of AM and FM transmitters, has been purchased by original founder Bernard Gelman and Ft. Lauderdale-based broadcast equipment suppliers Ken and Betsy Ebert Cameron. The company moved into new quarters in Palm Beach County, Fla. late last month . . . . Controlling interest in **International Microwave Corporation** stock has been purchased by **NR Technology, Inc.** of Brookline, Mass. The corporation will continue to operate as an independent company.

Xedit Corp. has purchased **Editel Corp.** of Washington, D.C. and will be marketing all Xedit and Editel products under the Editel trademark from Xedit's Mt. Vernon, N.Y. headquarters. The product line includes splicing blocks, splicing tape systems, and a compact drift and flutter meter . . . . Bob Harris's **Center for Radio Sales,** Tallahassee, Fla., has been acquired by Louisiana broadcaster and politician Dick Eglé . . . . **RCA Corp.** has sold its Avionics Systems business to **Sperry Corp.** for $44.6 million. The business will remain at its Van Nuys, Calif. location.

Team Electronics of New York City has been appointed the nation's only stocking master distributor for **Javelin Electronics** . . . . **Cablewave Systems** of North Haven, Conn., is representing the **Spinner Co.** of Munich, W. Germany, manufacturer of a broad range of RF components.

Graham-Patten Systems is a newly formed company for the design and manufacture of television line and terminal equipment. The company's mailing address is P.O. Box 1960, Grass Valley, Calif. 95945; its first offering is a line of distribution amps . . . . **Acrodyne Industries,** manufacturer of low power TV translators and transmitters, has relocated to expand facilities on Township Line Road, Blue Bell, Penn. 19422 . . . . **The Media Associates,** Dallas, has formed **Audience Analysts, Inc.** to offer research and consultation services to radio stations. Both companies are located at 8220 Elmbrook Dr., Dallas, Texas 75247 . . . . **Phase Two Video, Inc.,** is a new New York City company offering scene-by-scene color correction and transfer services to filmmakers. Phone is (212) 246-5940.

Capitol Broadcasting Co. is upgrading its TV stations in Jackson, Miss. and Colorado Springs, Colo. with **RCA** transmitting systems worth about $1 million. WDCA-TV, Washington, D.C. has ordered three TK-47 studio cameras, two TK-29B telecine systems, and two TH-200 one-inch VTRs from RCA for its new teleproduction studio, while Video Production Services of Kansas City, Mo., has purchased two TH-200s, three TR-600A quad VTRs, and one TH-50 portable one-inch model. The company has also reported sales to Romanian TV (two mobile production vehicles), the Cana-

Introducing the Series 1500-L four-channel logger

...and it's a Scully!

Scully did it again. This time with the most advanced multi-track logger on the market. Not only is it built in the great tradition of Scully as a workhorse, it features the unique servo motor drive... a feature not found in any other logger. This offers you constant speed and increased reliability, eliminating breakdown and failure common to belt and pulley systems. Complete modular construction allows ease of maintenance.

For 20 years we've built the best in recorders. Now we've built the best in loggers. For the first time ever, see the Series 1500-L at the NAB Show, Booth #102.

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Business Briefs

dian Broadcasting Corp., and CFCN-TV of Calgary, Canada (cameras). RCA announced price increases averaging 8.1 percent on its radio and television broadcast equipment, effective February 9 . . . . **Calvert Electronics** of E. Rutherford, N.J. has been appointed distributor for RCA's broadcast camera tubes.

WLNE-TV, New Bedford, Mass., has purchased over $1 million of videotape recording equipment from **Sony Broadcast,** including Type C recorders, cameras, and editing systems. Also completing a conversion from film to tape was WPEC-TV of West Palm Beach, which bought six cameras and U-Matic VTR gear from Sony . . . . Gaylord Broadcasting Co. has purchased 12 **Ampex** VPR-2B helical VTRs and two SMC-100 slow motion controllers for five of its stations; Home Box Office Studio Productions has also ordered 12 VPR-2Bs. Best Audio has bought three Ampex MM-1200 multichannel recorders and three ATR-100 Series recorders for installation in its television audio mobile van.

Fast action from **Harris Corp.** put KCFW-TV, Kalispell, Mont. back on the air just two and a half days after its transmitter was destroyed by fire. The company shipped the 1.3 kW replacement transmitter early in January; later in the month the station took delivery of a new Harris 10 kW model. WHJE-FM, operated by an Indiana high school, has installed a Harris automation system to help train students for radio broadcasting careers . . . . **Editel (Los Angeles)** has put into operation the only **Quantel/MCI** Autoflex unit in the U.S. The machine compresses a video signal into many different shapes and forms without loss of video information.

Scientific-Atlanta has received a $10 million order from Cox Cable Communications of Atlanta for CATV products. The corporation has also sold two 10-meter receive/transmit earth stations to MetroSat, an affiliate of Communications Technology Management, Inc. of Washington, D.C. . . . A two-year joint effort by Manhattan Cable Co. and **3M's Mincom Division** has reached the final installation phase of what 3M believes to be the first fully automated programming control system for a cable facility. Also in New York, Scharff Communications, Inc. has added 3M 32-track and four-track digital recorders to its rental inventory.

Three video broadcast production companies have purchased the **Aphex** Aural Exciter, including Compact Video of Burbank, Calif., ITV Ltd. of Edmonton, Canada, and Rodel Audio of Washington, D.C. . . . One Pass Video, San Francisco, has installed the DME-1 post-production effects system, developed by **NEC.**

Two key appointments have been announced by **ADDA Corp.** Jesse Blount, Jr. becomes vice president and general manager, while William H. Borman rises to director of marketing . . . . William H. Butler has been named president of **Fernseh, Inc.** The company has also appointed Douglas Harrison product manager for digital products . . . . Vern Bushway has been promoted to senior vice president/operations for **Cinema Products Corp.** . . . . Patric Donaghy is the new national marketing coordinator for **AKG Acoustics, Inc.**

John J. Myers has been elected vice president, corporate development for **Harris Corp** . . . . James McLane has been named manager, marketing services of **GTE Lenkurt Inc.,** succeeding John E. Ryan, who is retiring . . . . David Clissold has been appointed general manager of **EEV Canada** . . . . Donald "Sandy" Schroeder has been named to the newly created position of marketing manager, loudspeakers at **Shure Bros.**

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- Complete range of television transmitters and transposers using advanced technology for all transmission standards (many ideas carrying LGT patents).
  program Power: 100 mW to 1 kW.
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- Design studies and development of low power television stations using solar power and wind/solar power energy sources.
- Remote control systems, telemetry, aerials, programmes multiplexers, accessories, etc.
- More than 8,000 equipments are in service throughout the world.
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- Young and dynamic groups of engineers are at your service for the installation, commissioning, training of your technicians and after sales services.

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Thanks To You, Ampex Looks Back on 25 Great Years.

As we celebrate our VTR Silver Jubilee, we reflect back on the growth of an industry.

The past 25 years have been exciting! Ampex innovation and the talents of the men and women in broadcasting have made the past quarter century one of significant achievement.

You made it happen like this.

1956. Ampex introduces the VR-1000, the first commercial videotape recorder. Later that year, history is made with the first videotape delayed coast-to-coast broadcast of Douglas Edwards and the CBS News.

1957. One of the first videotaped commercials featured Dennis James presenting Kellogg's Corn Flakes.

1959. Richard Nixon and Nikita Khrushchev were videotaped in Moscow during their celebrated "Kitchen Debate."

1960. Broadcasters began an Ampex tradition by capturing the 1960 Rome Olympics on videotape.

1962. Ampex introduces the first electronic editor
1964. Ampex introduces a major breakthrough, high-band color videotape recording.
1967. Ampex introduces instant replay.
1972. Ampex introduces an automatic video cassette recorder.
1976. Ampex introduces an automatic tracking system.
1980. The VPR-2B becomes the world's best selling videotape recorder when Datacommunications takes delivery of number 2,000, in Paris.
1981. Delivery to McDonnell Douglas of the 3,000th VPR-2B continues the legacy. The VPR-2B remains the world's most widely used videotape recorder.

We'll share the future.

Our dedication is as firm today as it was 25 years ago. Count on Ampex tomorrow for better ideas in video and audio technology.

AMPEX

VTR SILVER JUBILEE

Visit Ampex at NAB, Booth 702.

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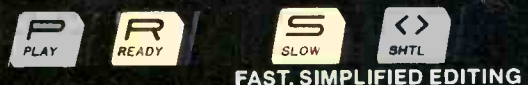
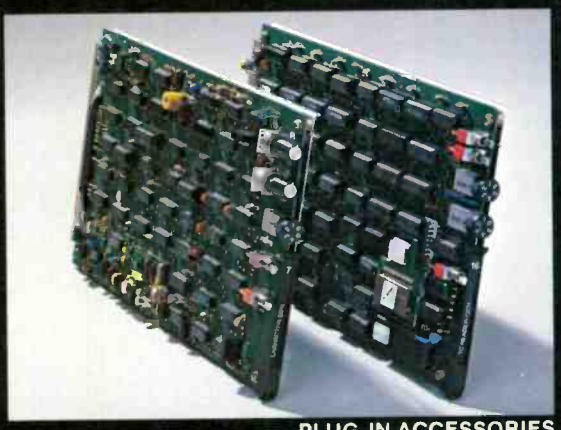
AMPEX

The VPR-2B Edge. Creative Editing Made Simple.



FAST, SIMPLIFIED EDITING



PLUG-IN ACCESSORIES

HPE-1 EDITOR

The intelligent design of the VPR series recorders continues. When it comes to editing capabilities made simple, the VPR-2B excels.

Editing is frame accurate, and it's as easy and convenient as pushing one of five fingertip controls. The internal editor can be programmed for easy entrance and exit points by use of the tape-timer system.

Ampex design innovation makes operational simplicity a reality. Even if complex time code isn't used, our patented tape-timer control track update system plus tape speed override assure accurate editing.

And once an edit is selected, the VPR-2B will search to the pre-roll point with the push of a button.

Film-Like Editing the Ampex Way.

Ampex technology has made possible frame-by-frame viewing including stop motion for film-like frame selection. Using our TBC-2B digital time base corrector, you'll get high-speed viewing in both forward and reverse.

And don't forget rehearsal. With the VPR-2B, entrance and exit points can be rehearsed. We've included full video confidence during edit record so you can see what's being recorded while actually recording.

Timed Edits. And More.

The VPR-2B gives you more. Edit points selected at any tape speed while using the tape timer or the time code reader/generator are frame accurate.

In addition, the VPR-2B offers standup editing using our multi-VTR 4 wire interconnect system. And when you add our family of editors, RES-1 and HPE-1, you'll have proven performance.

The Ampex Edge. It's experience. It's design excellence. It's performance when and where you need it.

And there's only one place to get it. Call your Ampex representative today.

Get the Ampex Edge.

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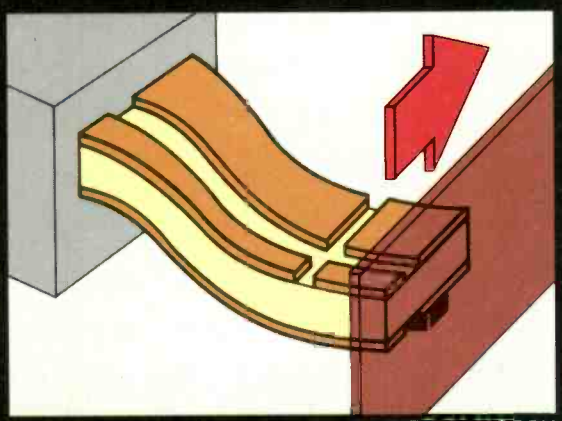
AMPEX ON SLOW MOTION

The VPR-2B Edge. Smooth as Silk Slow Motion.



RE-CURVED BI-MORPH

SMC-100 SLOW MOTION CONTROLLER

STC-100 MULTIPOINT SEARCH TO CUE

The VPR-2B. Its intelligent design and creative editing give you the edge. But we didn't stop there.

The Ampex edge really comes through with our smooth as silk slow motion! The VPR-2B's special effects—forward and reverse slow motion as well as still pictures—are as smooth and free of distortion as anything you'll find in videotape production.

This flawless performance comes from our AST™ tracking system option. After all, we invented the AST using a flexible bi-morph strip to optimize head-to-tape contact over the entire deflection range.

Include Our Slow Motion Controller and Cue Locator for the Ultimate in Special Effects. All From Ampex.

Two accessories from Ampex can really make a difference in your total production capabilities. And each are top performers in the Ampex tradition.

Take our STC-100 Multipoint Search To Cue. Its memory can store up to 99 auto cue points or 99 still recordings for quick recall. In addition, the STC-100 can store its memory on tape for recall by another STC-100 in another location.

Now add our SMC-100 Slow Motion Controller and you've got remote speed control for operations like normal speed playback, variable slow motion in forward and reverse, freeze frame, variable speed shuttling, and automatic cue point.

The Ampex Edge. It's experience. It's design excellence. It's performance when and where you need it.

And there's only one place to get it. Call your Ampex representative today.

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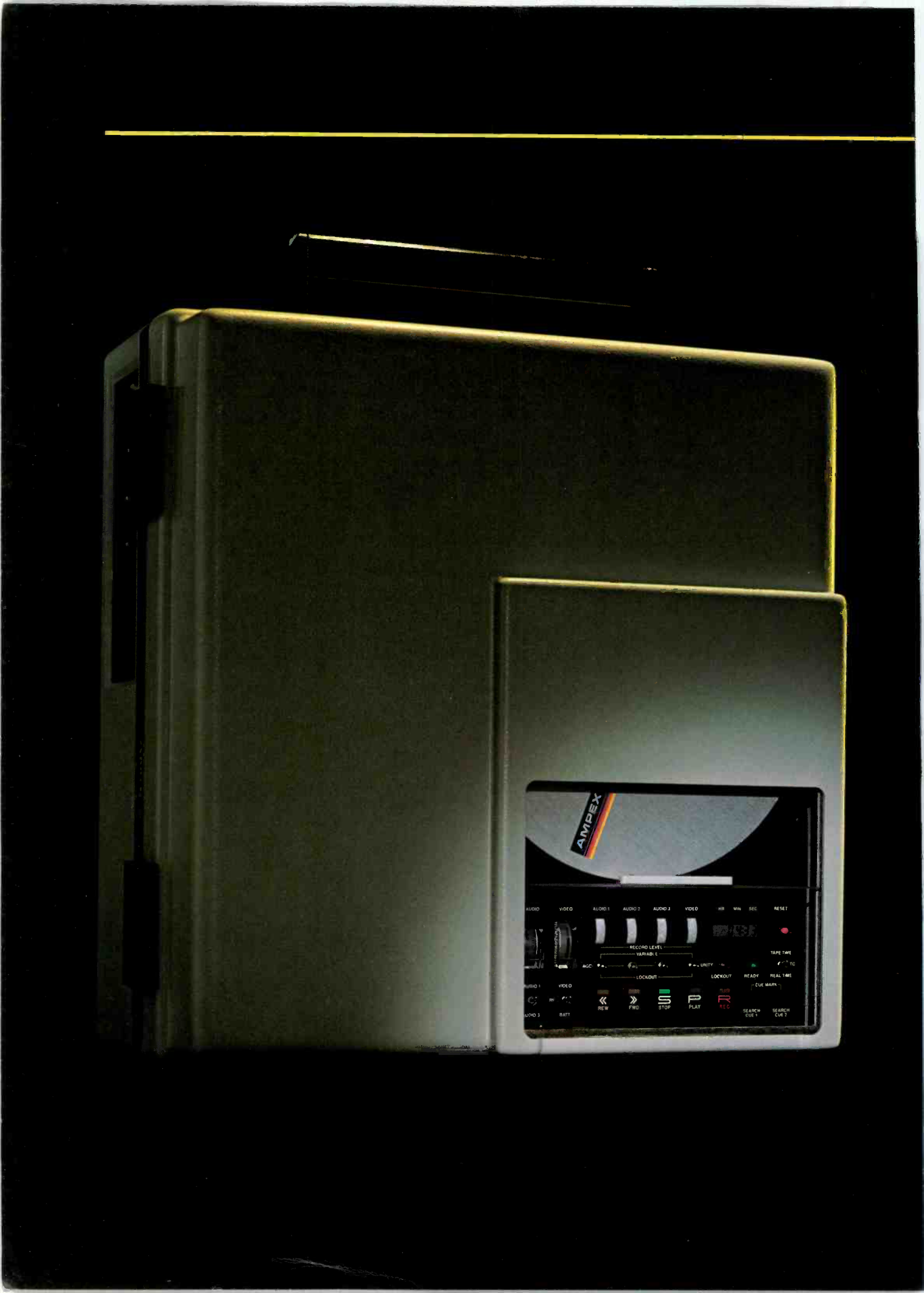
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VIDEO
AUDIO 1
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AUDIO 3
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HR
MIN
SEC
RESET
RECORD LEVEL
VARIABLE
AGC
UNITY
LOCKOUT
LOCKOUT
READY
TAPE TIME
TC
REAL TIME
CUE MARK
REW
FWD
STOP
PLAY
REC
SEARCH CUE 1
SEARCH CUE 2
BATT

AMPEX ON PORTABLES

The VPR-20 Edge. Total Performance in the Field.

Post-production in the field becomes an option when you take the VPR-20 on assignment. Its capabilities are so complete that you can return with a finished production.

Advanced Editing Technology. From Ampex, Of Course.

The intelligent design that went into our VPR-2B videotape recorder was also applied to our smart, rugged 1" portable.

For example, our exclusive dual-cue editing gives you studio-type control. Four edit-related functions give you the edge: From "let's see it" reviews, and precise returns to the next edit point, to total control when replacing undesired material, and even mid-segment edits to new material. All in one, easy to use portable.

The VPR-20 remembers through its exclusive tape timer and servo system, so your "cue-ups" are accurate and fast, and your edits are clean and color-frame accurate.

The VPR-20's performance continues with a video confidence feature that plays the picture back from the tape into the camera viewfinder during recording. You can use any color television receiver for playback. And thanks to our exclusive built-in color stabilizer, you can leave the time base corrector behind and still show full color in the field.

A Portable Should Be Portable.

The VPR-20 is. Even with non-battery use you'll be free of the burden of cumbersome additional equipment.

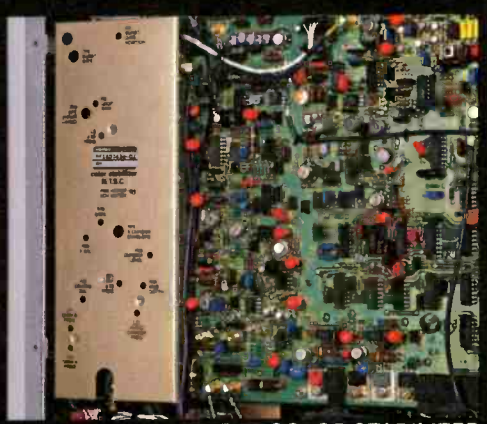
Unlike other portable recorders, the VPR-20 has a simple-to-use, plug-in AC power pack. It replaces the battery in our portable and allows you to forget the bulky external power supplies necessary with other portables.

The VPR-20 from Ampex. Total performance in a 1" portable videotape recorder.

Call your Ampex representative today. Tell him you're ready for the VPR-20 edge.

Get the Ampex Edge.

EXCLUSIVE DUAL-CUE EDITING



BUILT-IN COLOR STABILIZER

PLUG-IN AC POWER PACK

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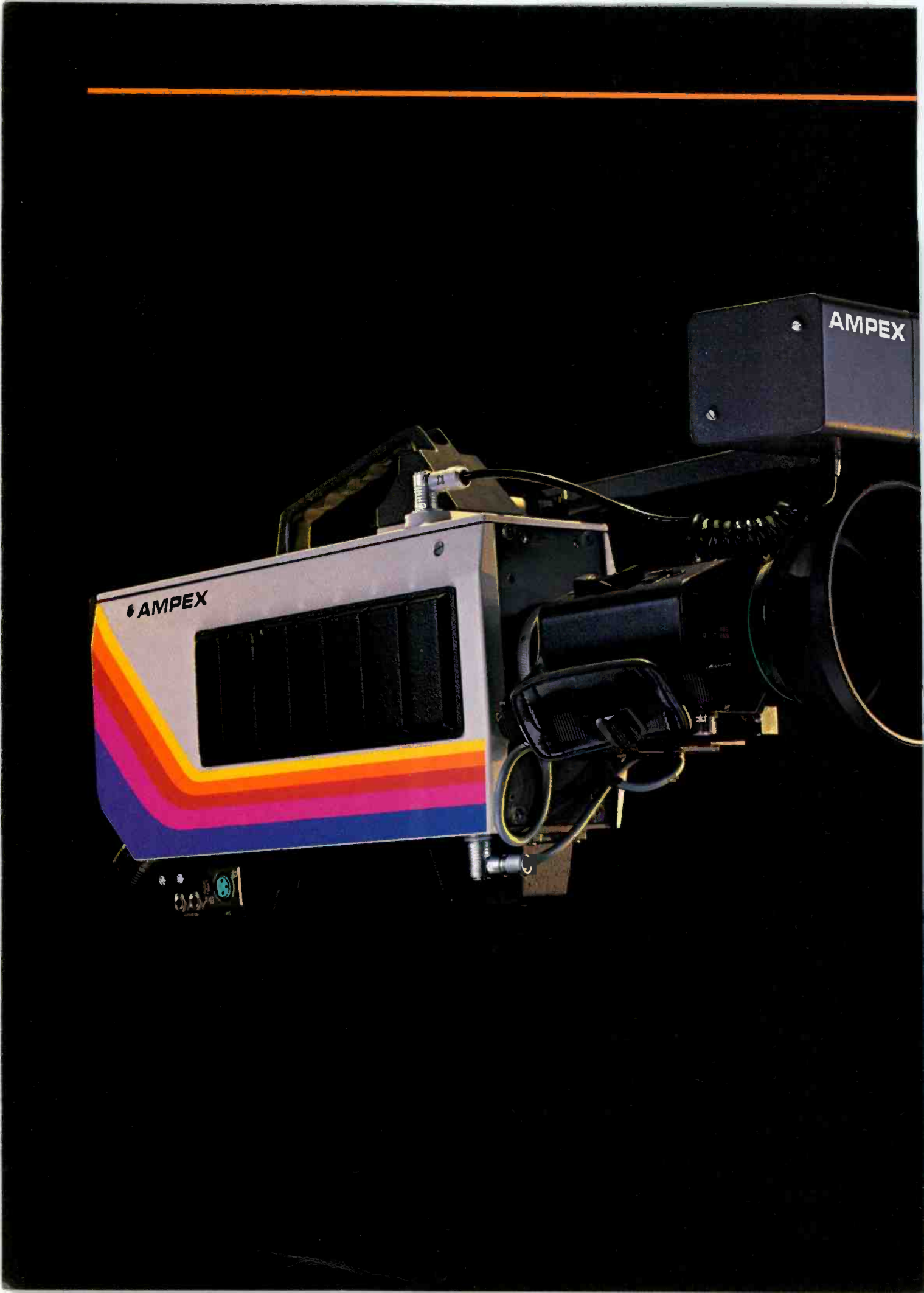
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Why the BCC-20 Is a Camera for the 80s.

Full-time digital control makes the BCC-20 Digicam a better camera for the 80s.

Automatic performance. Essentially perfect registration. And a picture quality that comes through in the field or in the studio make Digicam the breakthrough camera you've been waiting for.

Automatic Set-Up You Can Depend On.

The BCC-20 delivers superior registration and picture quality. Time after time after time.

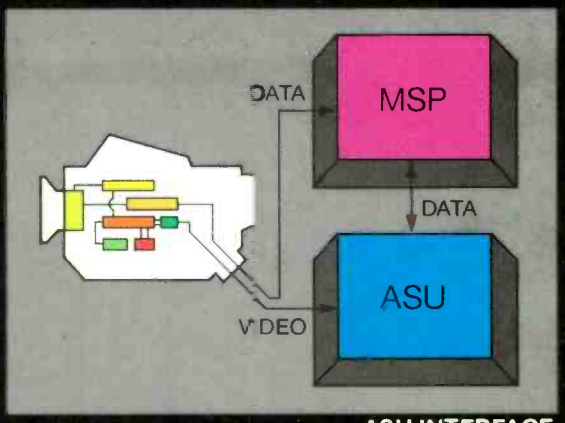
Using unique digital measurement techniques, Digicam's ASU (automatic set-up unit) converts video signals from the diascope pattern to digital signals. It then electronically compares these signals to its electronic pattern test chart.

This allows the ASU operating with digital commands from the MSP (master set-up panel) to measure all important adjustments.

Like tube alignment. Geometry. Registration. Shading. Black balance. And white balance. All automatically!

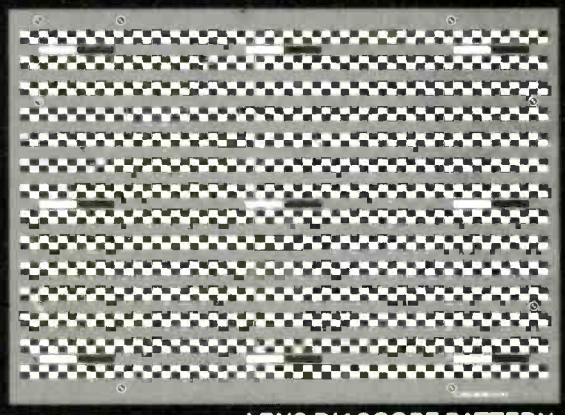
The ASU then sends corrective digital commands to the camera head microprocessor. There the camera's revolutionary SECS (spatial error correction system) makes critical adjustments. To geometry. To shading. And, in the case of registration, incredible adjustments in 210 zones to .05%!

This advanced technology is unique to the BCC-20 Digicam. It means you can count on a superior picture with total automatic set-up. Repeatedly!



ASU INTERFACE

MASTER SET-UP PANEL



LENS DIASCOPE PATTERN

Quality You Can Depend On.

We didn't overlook the smallest detail to ensure Digicam's quality.

For example, the camera's detail processing electronics and very special coring selectively discriminate against noise to give startling detail in all three channels.

This unique Ampex approach results in low light details with brilliant clarity. You'll get a sharp, crisp picture without bothersome edge effects.

Are You Ready For The 80s?

Digicam is the most advanced camera for the 80s. It's not only the ideal EFP camera. It's also ideal for the studio with the kind of performance and quality you'd expect in a great camera.

Find out soon. Discover the BCC-20 Digicam by calling your Ampex representative today.

Get The Ampex Edge.

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BROADCAST EXPERTISE...

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Since 1970, TFT, Inc. has been a pioneer in state-of-the-art broadcast technology. As such, we have been able to always keep one move ahead in cost-effective design to provide reliable, versatile and innovative products to the broadcast industry.

TFT was the first to use frequency synthesized circuits in its full line of AM, FM, TV, stereo and SCA **Modulation Monitors.** TFT concepts in **Remote Control Systems** now allow expansion all the way to microprocessor based data logging, display and alarm systems. In the relatively new field of **Studio Transmitter Links,** TFT has made major contributions through the use of IF modulation transmitters and pulse counting discriminators to improve both S/N ratio and stereo performance.

Even in the **Emergency Broadcast System (EBS),** TFT has taken a leadership role in the development of both EBS generators and receivers.

Now, it's your move! Call or write TFT today for full facts on their winning product lines.

(TIME & FREQUENCY TECHNOLOGY)

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RADIO

PROGRAMMING & PRODUCTION FOR PROFIT

Some Old Music, Some New Music

THE "OLD" MUSIC is not so very old (at least to middle-aged radio fans) and has a famous name besides: it is none other than a recreation of *Your Hit Parade*, the pop-music program with the largest radio following for nearly 25 years.

That program is being revived as a one-hour weekly syndicated radio program from Radio Arts, California syndicator — with the original host, Andre Baruch, back in person as guide and commentator! But this is neither a history lesson nor a nostalgia bath. The big-band music of the '30s, '40s, and '50s and the vocal stars who helped create it have hung on here and there — a few radio stations surveyed by this magazine in recent years are using such sessions with fine audience response. WHO in Des Moines, Iowa, for example, has a painstakingly preserved collection of recordings made in the station and still active in the programming.

There is now a widespread realization that a sizeable fraction of the "mature" audience, the age group very much back in the radio programmer's sights, finds permanent listening satisfaction in this music. The enormous success of Al Ham's *The Music Of Your Life* (*BM/E*, January, 1980), in part made up of the older music, is a current example. Strong evidence is also seen in William O'Shaughnessy's WRTN in New Rochelle, N.Y. Several years ago O'Shaughnessy initiated a personal crusade for what he pleasantly calls "old smoothie music — no disco, no rock, no sobbing strings," and he has been abundantly rewarded, as described in earlier issues.

Larry Vanderveen, president of Radio Arts, confirmed to *BM/E* that he is bringing back *Your Hit Parade* because he knows there are a lot of people who want to hear it. This does not mean that Radio Arts is taking pressure off the full-program contemporary music formats that have been so successful. *Your Hit Parade* is a weekly hour-long change of pace, and as such seems a good prescription for the programming of many radio stations.

Baruch will have with him on the Radio Arts tapes Bea Wain, who has been a successful pop singer throughout this period, has been with him on many radio programs, and is moreover married to him. The hits of the period will be presented by the vocal artists who originally made them famous. That is all fine news for a lot of grown-up listeners. Now if only Fred Allen were still alive . . . Incidentally, why doesn't some radio programmer stir us "older" listeners to our depths and bring a trainload of laughs to the whole 12 to 90 demographic by playing recordings of the Allen programs?

Your Hit Parade will have 12 commercial minutes per hour plus five minutes for news. Programmers who want more information should call Radio Arts at (800) 423-2840 (in California, call collect, (213) 841-0225).

Finding the newest music

An attempt to uncover and promote talented composers, singers, and groups across the country who are unknown to the industry, and to give radio broadcasters a community promotion that may enhance the station's image locally, is the "Big Music America Contest," originated by the Big Music America Corp. of Houston. The plan, in brief, is for the local musical talent to send tapes of the songs or group numbers to the local station joining in the contest. The best 10 or 12 then go to Nova Records (a subsidiary of the Big Music America Corp.) and a record is issued by Nova for sale in the community. Every local buyer votes, on the ballot supplied, for the three best —

Bea Wain and Andre Baruch are at work on a recreation of Your Hit Parade

Radio Programming

these are the local winners. The contest progresses through regional winners to a national winner, with increasing prizes — "cash or merchandise" — along the line, ending with a $25,000 national prize.

The intended benefits to the radio station come in community identification through a logo on the record album and notice in the retailer promotion for the record, as well as the station's own on-air, newspaper, and billboard promotion for the contest. Big Music America says that recording contracts "may" eventuate for winners anywhere along the line; obviously there can be no guarantee of this.

Big Music America points out that when the Nova records are delivered locally, some "financially responsible party" must assume responsibility for payment for the records delivered. Radio programmers who are attracted by the local promotion opportunities should explore all financial aspects of the plan carefully. Call Big Music America Contest, (713) 961-1975, or write to 4801 Woodway, Suite 301W, Houston, Texas 77056. **BM/E**

BM/E's Program Marketplace

Syndicators: Where They Are Now

Peters Productions, Inc.
9590 Chesapeake Drive
San Diego, Calif. 92123
Tel: (714) 565-8511

THE SYNDICATORS revisited in this column after three years have in nearly every case shown vividly, in their own histories, the main trends in radio broadcasting today. It has been a period of great expansion, with radio's take-home revenues increasing every year. And it has seen the start of a broad-scale move toward audience specialization, with advertisers more and more interested in specific audiences and radio programming more and more devised to reach those audiences.

Peters Productions is a particularly good example. Our first story on Peters, in September, 1977, reported a syndication success built initially on Ed Peters's skill in putting together music with a strong romantic effect that pulled audiences extremely well. The first format was *Music Just For The Two of Us*, using mostly male vocals for a predominantly "one-to-one" quality that many listeners adopted with enthusiasm. Then came *Country Lovin'*, *The Love Rock*, and MOR assemblage *The Great Ones*, all showing audience strength in nearly every exposure.

But Ed Peters soon showed creativity in broadcast planning that went beyond putting attractive music together. He began supplying individual stations with complete marketing plans involving every aspect of sales, promotion, and community activities. This branch of the operation was also taking off well at that time.

Three and a half years later, Peters Productions has moved ahead strongly on all the fronts Peters opened at the beginning, and is starting new operations that reflect the new basic trends running in broadcasting today. Nearly 200 stations now take one or another of the Peters formats — *Music Just For The Two of Us* is still a central product, as are *Country Lovin'* and *The Love Rock*. Peters has since added *Cross Country*, a mixture of Country and MOR, *Contemporary Country*, *Adult Contemporary*, *Traditional MOR*, and other versions of Beautiful Music in addition to *Music Just For The Two of Us*.

The newest format, which will be announced and demonstrated at the forthcoming NAB convention in Las Vegas, is *All-Star Country*, a blend of Country with Contemporary music aimed specifically at the 18-to-40 group. This blend, like the others on the Peters shelf, comes from close observation of radio markets around the country and imagination in assembling the most relevant music.

Redd Gardner, regional manager for Peters, told *BM/E* that the *All-Star Country* format responds to a change in Country that has taken place recently. The older Country, still very strong with older audiences, tended to emphasize the problems and trials of life, which older listeners identify with because maturity generally means at least some experience of life's trials. But there is a large body of Country now which is more a lyric folk music, much more cheerful: younger audiences, still in general untouched by adult problems, like it especially.

The marketing service has also grown tremendously, and its character has come together into a highly successful plan that Peters calls "The Total Image Concept." For each station subscribing to the marketing ser-

The First Family Of Audio Processing

111B Dual Spring Reverb
The most cost-effective spring reverb on the market

245E Stereo Synthesizer
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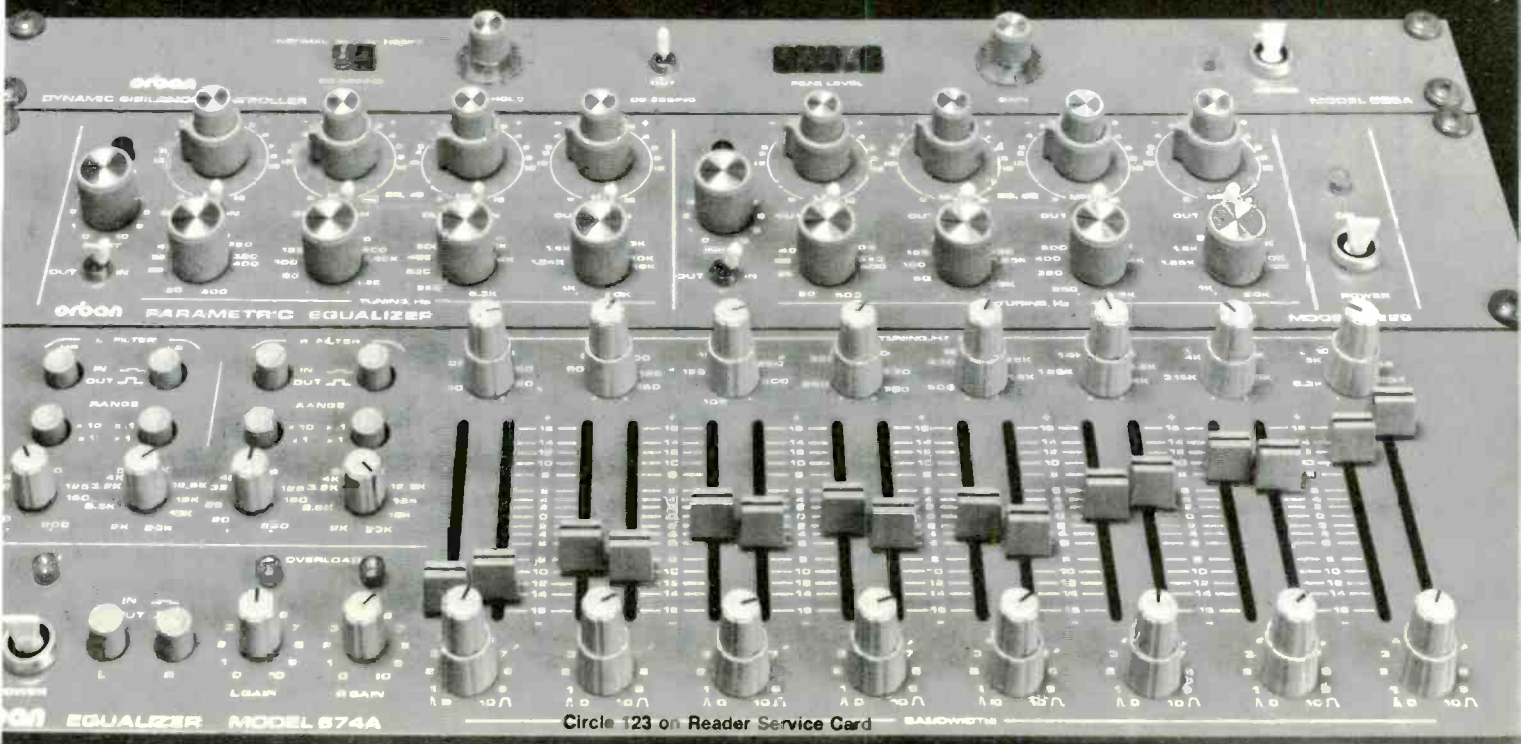

vice, Peters develops a "total image" that is based on specific promo language and slogans, specific advertising on TV and in newspapers bought on a schedule developed by Peters, and a detailed schedule of community activities.

Some other syndicators covered here develop marketing services for subscribers; the proof of the quality of the Peters effort lies in the large number of stations, both radio and television, that have adopted it. Peters has done the work for at least one station in virtually every large city (in New York, for example, TV Channel 11, the *New York Daily News* station, has been addressing New Yorkers under the slogan "Eleven Alive!" a Peters creation). About 60 TV stations have been subscribers.

These services are accomplished by a staff of in-house artists and animators who, with their production equipment, occupy a new 25,000-square foot building. Equipment for mastering and duplicating the program tapes, including 24-track recording equipment, is also housed here. The permanent staff numbers more than 30.

Peters is now moving into a brand-new field: developing the "Total Image Concept" for cable operators. Already several cable systems have signed up. The rationale here is in part the result of the broad trend toward "narrowcasting," the acceptance of audience fractionation and development of programming aimed at a specific fraction. As Redd Gardner pointed out to *BM/E*, the cable operator with 20 to 30 channels operates the ultimate in narrowcasting: each channel has a particular character. Although many cable viewers will watch a number of different channels from time to time, each channel in a sense stands on its own as a program offering.

The campaign to promote a cable system must be particularized to what the operator has on each channel separately. The channel needs an identity established through proper slogans and logos.

Peters has begun to develop such campaigns to aid cable operators in selling their programming to subscribers, either as separate pay cable deals or as part of the original subscription to the service. This operation, too, appears to be headed toward success.

The move toward narrowcasting, of course, is one main reason for the ascendancy of the syndicator in radio broadcasting. Once a particular audience segment has been identified, the radio broadcaster needs high skills in assembling programming to reach that segment. The syndicator can supply those skills, whereas the broadcaster alone would find it prohibitively expensive or completely impossible to get them together. Just keeping an inventory of the necessary music, which the syndicator is already doing, would be out of reach for many broadcasters.

With programming expertly taken care of, as Ed Peters noted to *BM/E*, the broadcaster can put major effort into the matters that really count in success in the community: local news, community affairs, local promotion, and public service activities.

Peters also said that he sees the expansion of radio, and of syndication, as part of the general expansion in the role played by electronic media of all kinds in our society. He noted that in recent studies of young people's acknowledged sources of life guidance, radio, television, and films have moved up close to the top right behind parents, displacing friends, churches, schools, and other traditional "guides" that were more important in similar studies made 20 years ago. The Age of Information is coming; radio, cable, and with them, the syndicator, are among the central forces in it. **BM/E**

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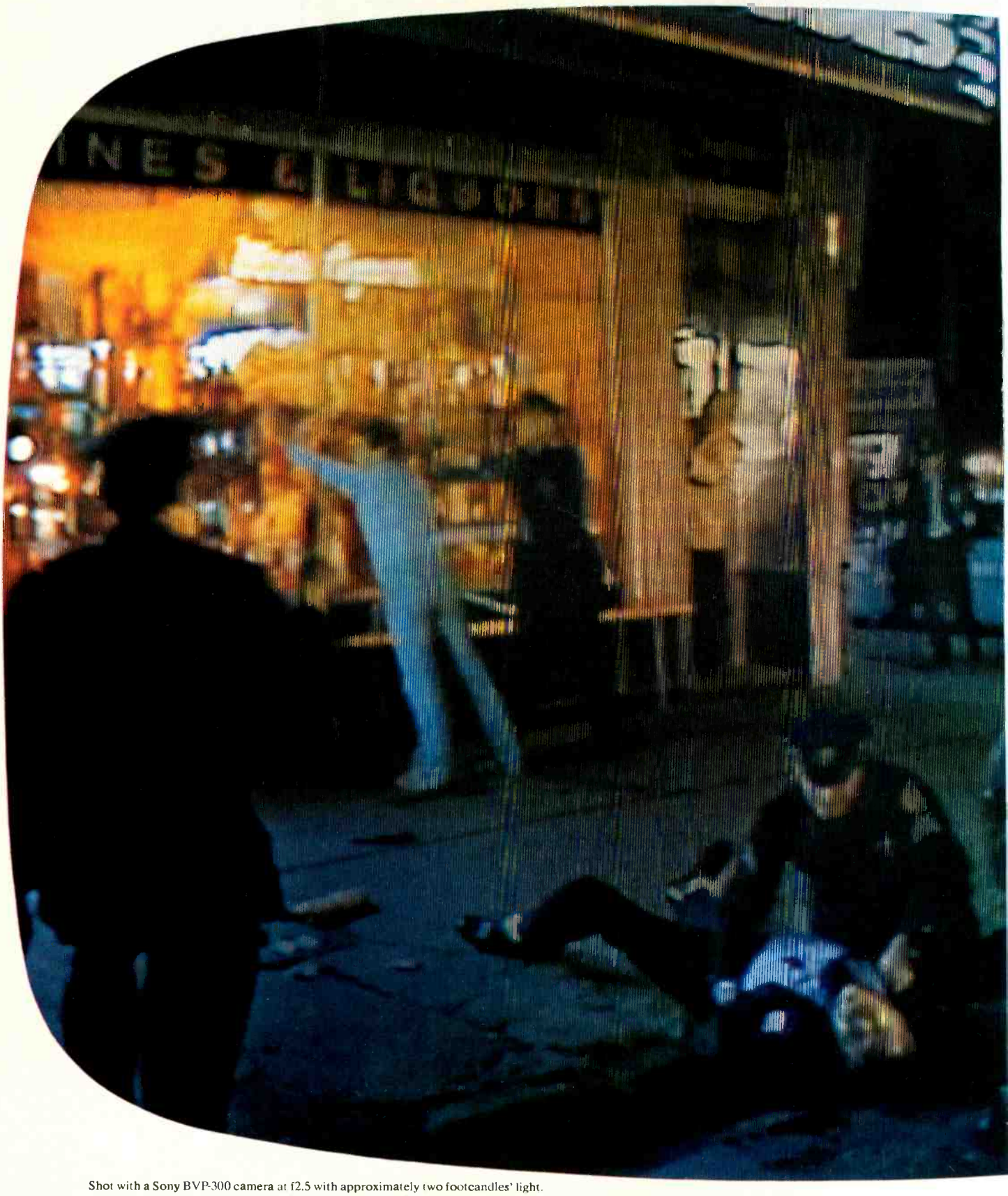
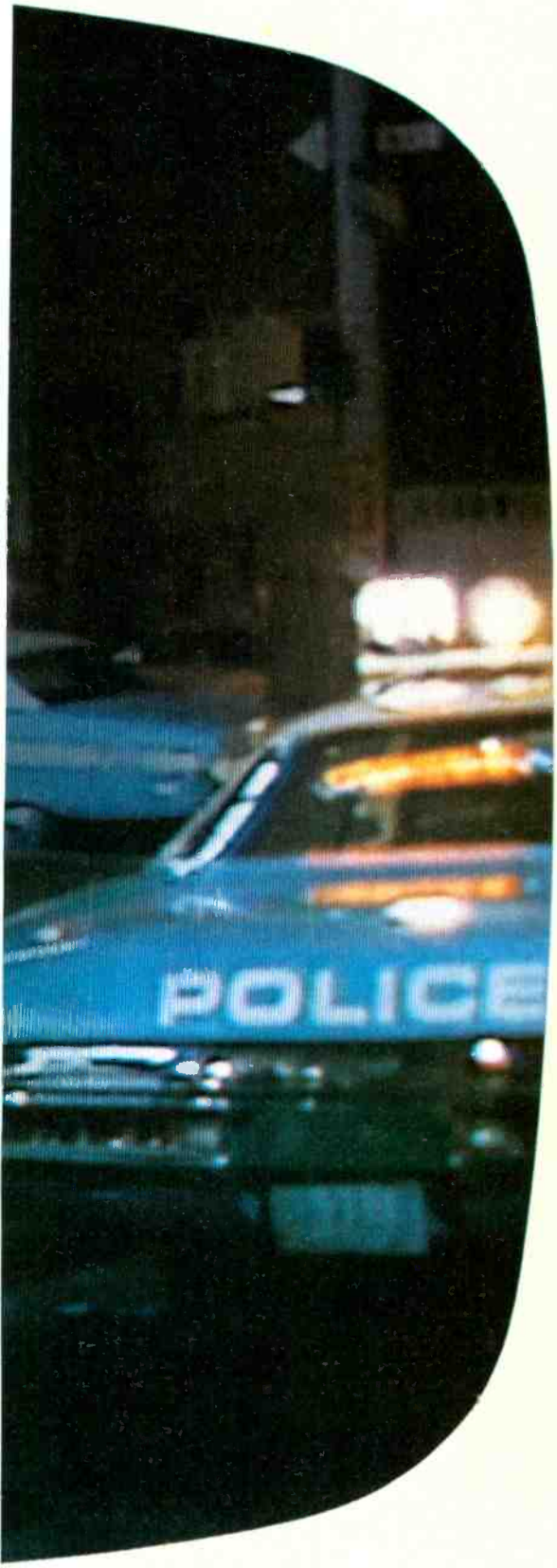


Shot with a Sony BVP-300 camera at f2.5 with approximately two footcandles' light.

DARK SIDE OF A CITY, YOU CAN'T WITH BRIGHT LIGHTS."

Henry Sheppard,
WCCO-TV, MINNEAPOLIS



"There are news-gathering and documentary situations where the use of artificial light is just too intrusive or difficult to achieve," says Henry Sheppard, Chief Engineer of WCCO-TV, the CBS affiliate in Minneapolis.

"That's why our Sony portable BVP-300 cameras are such a big plus. With them, we can shoot in low-light conditions and get a lot of detail other cameras might not pick up. We even get good pictures with as little as two footcandles of light."

WCCO-TV owns seven Sony BVP-300's, which the station's photographers use together with Sony BVU-50 recorders. The cameras are used to shoot public-affairs programs and segments of PM Magazine, as well as for ENG and documentaries.

"We're very particular about picture quality," says Sheppard. "And before we committed ourselves to Sony, we evaluated just about every portable color camera available.

"Sony's colorimetry is excellent, its signal-to-noise ratio is high, and it always turns out pictures that meet our standards. Many of our engineers find its quality comparable to studio cameras. And our photographers like the way Sony handles. For example, in a helicopter, they can cradle the camera on one shoulder to reduce vibrations and get a very steady picture.

"And with the Sony system, each photographer can operate independently, without a second person along to monitor sound."

When asked about Sony durability, Sheppard replied: "We don't coddle our cameras here. Each one gets handled by about 15 or 20 different photographers. They come in in the morning, grab their equipment, throw it into the back of the car, and they're off. Sony takes that kind of treatment remarkably well, and it's a good thing, because we can't afford to have our cameras down."

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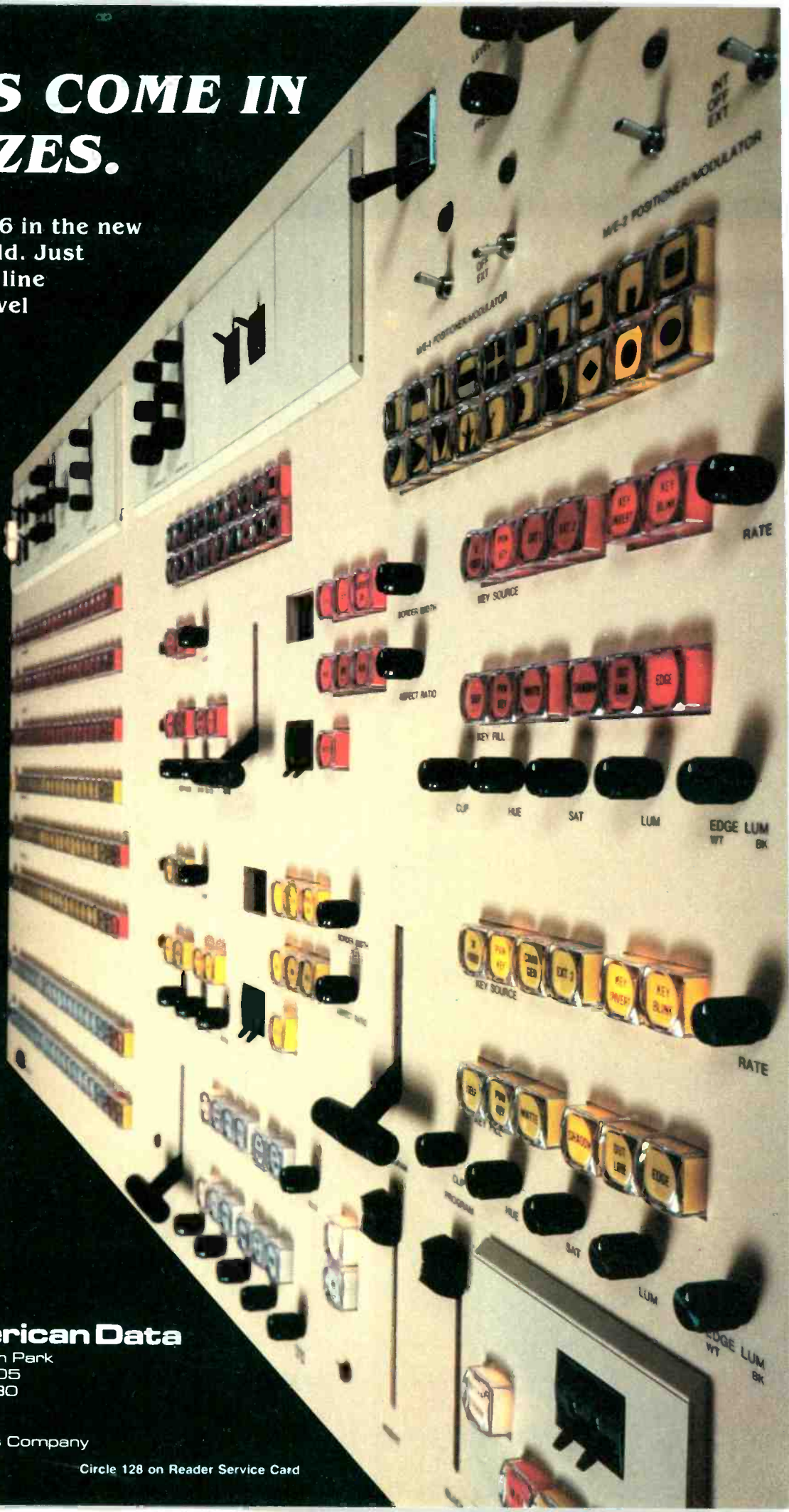

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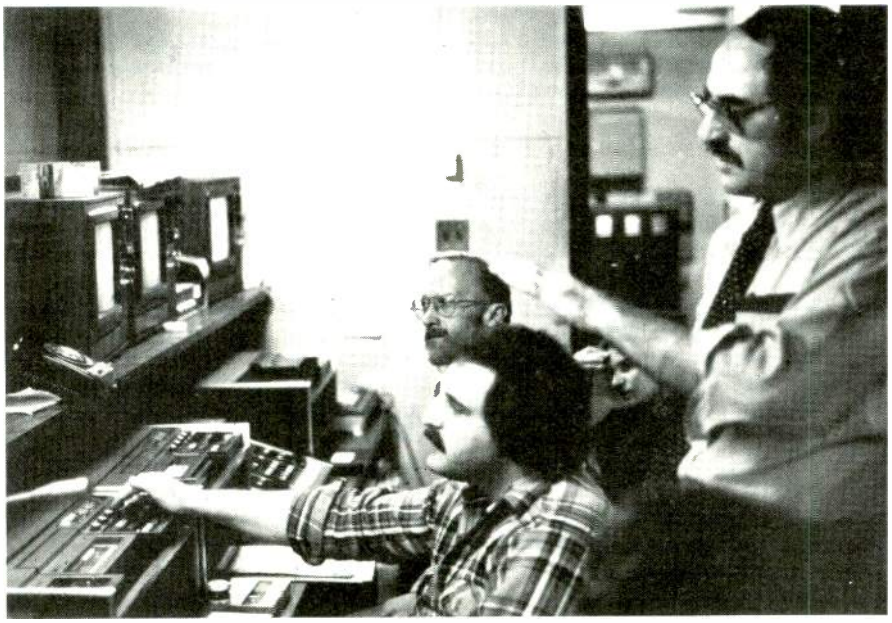
ITNA: A Cooperative Effort

LIKE THE PHOENIX, Independent Television News Association sprang from the ashes. The ashes were those of TVN, the defunct news service backed by the Coors beer people. Six years ago, TVN announced suddenly that it was going out of business in 30 days.

For the network affiliates that were buying the service, the loss of TVN was at most inconvenient. For the non-network independents it had the potential to be a disaster. TVN was the only way those stations could get national and international coverage. And for some of the larger independents like the Metromedia stations, losing that kind of coverage put them at a serious competitive disadvantage. Several of the independents had built solid reputations for local news and the TVN service allowed them to expand their scope. Something had to be done.

What was done was to form a cooperative service providing the same kind of material previously available from TVN. "It was clear," explained Mark Monsky, president of ITNA and news director at WNEW-TV, New York, "that in that period of time, anything other than a cooperative effort was not very likely to get going smoothly enough to behave as a replacement." Monsky felt that any commercial attempt to duplicate TVN's service would have cost entirely too much money to be financially profitable. A co-op was the only answer.

Ten stations took part in the original formation of ITNA: KPLR, St. Louis; KTLA, KHJ, and KTTV, all in Los Angeles; KTVU, Oakland; KTXL, Sacramento; WGN, Chicago; WNEW and WPIX, New York; and WTTG, Washington, D.C. Those founding stations are now down to seven. WGN and WPIX dropped out to form Independent Network News. KHJ dropped out for a time, but is back as a subscriber and not



Charles Novitz (standing), ITNA's managing director, oversees a recent feed from the control room at WNEW in New York

as a member of the group's controlling body. Member stations have the advantage of being able to vote on policy questions of how the co-op is run but they also bear the extra cost of unanticipated expenses. Stations that are subscribers pay an annual assessment.

There are now about 20 independent stations in the ITNA lineup. Each station acts as a bureau for ITNA's domestic coverage. Since the stations, for the most part, are in the top 20 or so markets, it gives ITNA access to just about every major domestic story. ITNA also has arrangements with some network affiliates who sell the service material.

As for coverage in the nation's capital, ITNA has set up its own bureau. Hal Levenson, who runs the Washington bureau, says, "The basic mission is to cover Washington, which means the White House, the State Department, the Capitol, the Pentagon, federal agencies, and other centers of national news in Washington." Levenson feels that his people do an excellent job given the size of the staff and the scope of the coverage responsibilities. There are only seven editorial people on the Washington staff. The three reporters, Barry Cunningham, Patricia Sagon, and Pat Clawson, have regular beats but obviously fill in on any hard news story that is outside their normal assignments. Cunningham covers the White House, Clawson covers Capitol Hill, and Sagon covers the State Department.

"I have felt," says Levenson, "that for the past couple of years what we put on the air in terms of assignments and material is competitive with the networks." There are some areas in which ITNA can't compete with the nets, however. "We do not have," explains Levenson, "the vast array of electronic graphics. We do not have a Quantel. We do not have an extensive character generator system. We do not have an extensive electronics graphics department. When they illustrate economic or legal stories, we can't do it as well."

But Levenson doesn't feel that puts ITNA behind very often. "We're where we belong," he says. "Our pieces are put together just as well as theirs are and they look just as good. We're in the same league as the networks."

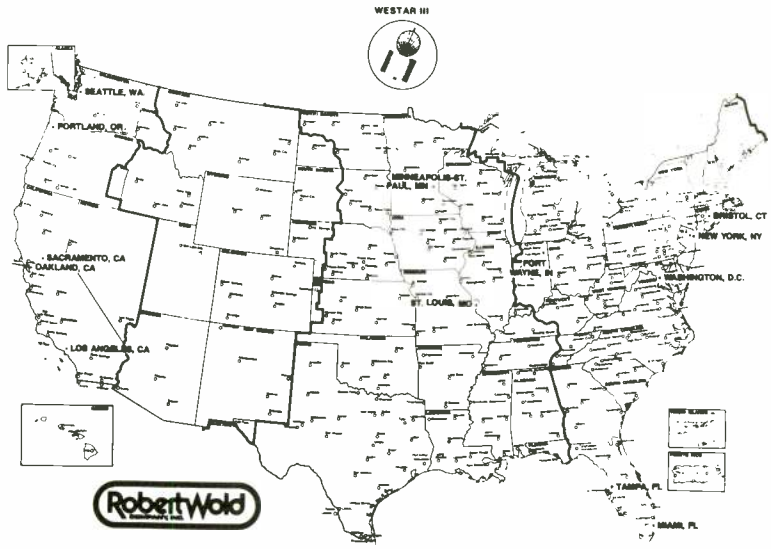
While any claims of quality are open to very subjective interpretations, ITNA is included in many of the network pool arrangements.

There are also seven technical people who work out of the ITNA Washington bureau. There are two staff crews equipped with Ikegami HL77s and Sony BVU 110s. There are two regular editing stations, both Sony-equipped. When the news gets a little heated (as with the recent inauguration and release of the hostages), Levenson has access to more crews and editing facilities.

Some of that comes from ITNA's Washington affiliate WTTG. When this article was prepared, ITNA fed its Washington material through the technical facilities of WTTG. ITNA is

Engineer Terry Woll checks the levels on an incoming feed, director Allen Robertson is timing the story, and engineer Margery Smith is coordinating with the technical crew in Washington

The ITNA Network



By Ruth Macy

The ITNA network comprises a total of 18 U.S. television broadcast stations plus the ESPN cable network and the Canadian Broadcasting Company (CBC) in Toronto.

The signal originates at WNEW New York. It is then transmitted via AT&T loop to the AT&T toll center in New York. At the toll center, the signal is split, with one feed going to WOR in New York and the other to the Western Union TOC in New York. Western Union sends the signal from its TOC to its uplink in Glenwood, N.J. via its own TCF (television connecting facility). The ITNA feed is transmitted via Westar 3.

The following stations receive the feed via their own downlink: WTTG, Washington, D.C.; WLTV, Miami; WCIX, Miami; KSTW, Tacoma; KPLR, St. Louis; KTXL, Sacramento; KMSP, Minneapolis; KPTV, Portland; WTOG, Tampa; WFFT, Ft. Wayne; KMEX, Los Angeles; KWEX, San Antonio. In addition, ESPN (Entertainment and Sports Programming Network) receives the ITNA signal via its own downlink in Bristol, Conn.

In Los Angeles, the signal is received at Western Union's own downlink and is then transmitted to the Western Union TOC in Los Angeles, which is colocated with KJOI-FM. The signal is then carried via Western Union TCF to the AT&T Los Angeles toll for connection to Los Angeles TV stations KTTV, KTLA, and KHJ.

The ITNA feed also is downlinked in San Francisco at Western Union's own earth station. Western Union transmits the signal to its San Francisco TOC and then to Oakland station KTVU via Western Union TCF.

Finally, CBC Toronto receives the ITNA feed via an SSU (Satellite Signals Unlimited) downlink in Buffalo, N.Y. CBC makes its own arrangements for landlines from Buffalo to Toronto.

Ruth Macy is manager of Information Services for Robert Wold Company, Inc.

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TV Programming

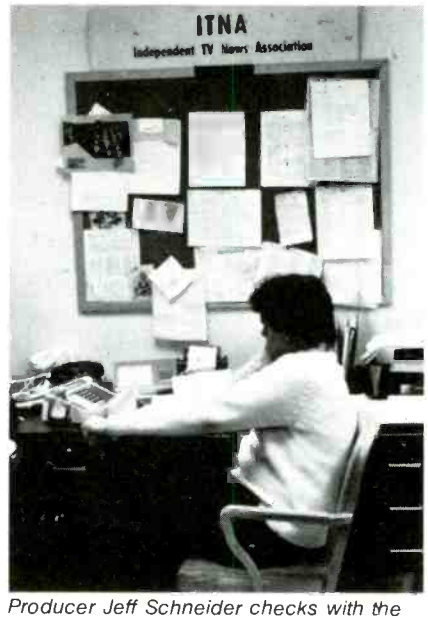
awaiting the delivery of equipment that will allow them to feed from their offices in downtown Washington. At that time ITNA will be able to put its Washington material on the feed at a time that would be more convenient for network affiliates. There is going to be a push to interest affiliates in the service. There are a couple of reasons for this.

The first reason is old-fashioned competition. ITNA, as with any growing institution, wants to prove that it can be as good as any other large news organization. In order to compete on a more equal footing with the networks ITNA needs to expand its financial base. There is no plan at this time to change ITNA's nonprofit status. This is viewed as a big plus in that any additional revenue is spent on news coverage and not on satisfying stockholders.

The other reason is an example of Craig's Corollary: "Hang on to something long enough and it becomes valuable." When ITNA was first formed, the only economically feasible way for the member stations to get the daily feed was via satellite. The cost of telco lines was prohibitive.

ITNA contracted with Wold Communications for regular access to the domestic satellites. When ITNA started the service there were few stations with their own ground stations. That situation has changed and in fact, according to *BM/E's* Survey of Broadcast Industry Needs (see *BM/E*, February, 1981) the number two item of interest to both managers and engineers is earth stations.

What this means for ITNA is that it doesn't have to make any elaborate new arrangements for setting up its network for new subscribers. If the subscriber has an earth station, all it needs to do is pay the fee and point the dish toward the right bird.



Producer Jeff Schneider checks with the various ITNA stations on possible stories that would be available for the nightly feeds

The ITNA service is much like that of the network affiliate feeds with this difference — none of what is called the "A" material is held back. The big complaint among network affiliates is that the networks routinely save the best of their coverage for their own newscasts. Since ITNA does not produce its own newscast, there is no reason to hold back anything. Monsky sees this as a big advantage for potential affiliate clients. It gives them access to the top stories of the day in advance of the nightly newscast on the network.

Once ITNA has the ability to feed directly to the bird from its Washington bureau, it is felt that the service will be able to feed the top national and international stories in time for inclusion in the early local news.

Aside from its own bureau in Washington, ITNA also has agreements with both Visnews and UPITN for international material.

"One of the successes of the service," explains Monsky, "is not just its ability to bring in a major story or major talking head before the network gives it to you, but also its ability to give you the material that backs that up and makes your national coverage more substantive."

The New York offices for ITNA (housed at WNEW-TV) coordinate all the material that comes in and determine what is on the nightly feed. Currently ITNA feeds from 25 to 40 pieces a night. About 75 percent are reporter packages. The rest is voice-over material and file tape. The feed normally lasts about an hour, but more time can be allotted if the news of the day warrants.

Charles Novitz is the managing director of ITNA and handles the day-to-day operation. "We are the only ones," says Novitz, "offering the hard news service that allows an independent to create a basic news program designed for the audience as they see it."

This is in contrast to the more specialized services like INN, which feeds a prepackaged news show in the same way as the major networks. While there is clearly a place for both kinds of services, ITNA sees its role as more flexible than either the other news services or the networks.

ITNA will be six years old this fall. When it began many predicted that it would follow the fate of its predecessor, TVN. Such has not been the case, and with the new emphasis on satellites it doesn't seem likely that it will diminish. If ITNA makes inroads into the network affiliates, it seems more likely that it will grow. **BM/E**

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TELEVISION "SPEAKS" TO VIEWERS WITH POOR HEARING

By Stan Gerendasy

Producers of television programs and commercials now can enhance their productions with "closed captioning," dialog captions visible only to viewers with special decoders. This way of improving television's communication with the 16,000,000 Americans who have poor hearing is a service of the nonprofit National Captioning Institute, set up by commercial and public agencies.

THE WORLD OF TELEVISION can be a silent movie without titles to a hearing-impaired viewer. Unlike the "silents," however, television, dependent upon the spoken word, has not made widespread use of written captions. Open captions, those seen on all television sets, have been utilized for years for emergency information and emphasis in commercial messages. In some instances, entire programs have been open-captioned for the benefit of hearing-impaired persons. This practice has been extremely limited, however, because of the reluctance on the part of broadcasters to distract the hearing audience. This reluctance became the impetus behind the development of the closed-captioning service.

In closed captioning, the audio portion of a television program is translated into captions which are then converted to digital codes and inserted in line 21 of the vertical blanking interval of the TV signal. The encoded caption material is transmitted as a part of the video portion of the program but becomes visible only when decoded by a special device either attached to or built into the viewer's home TV receiver.

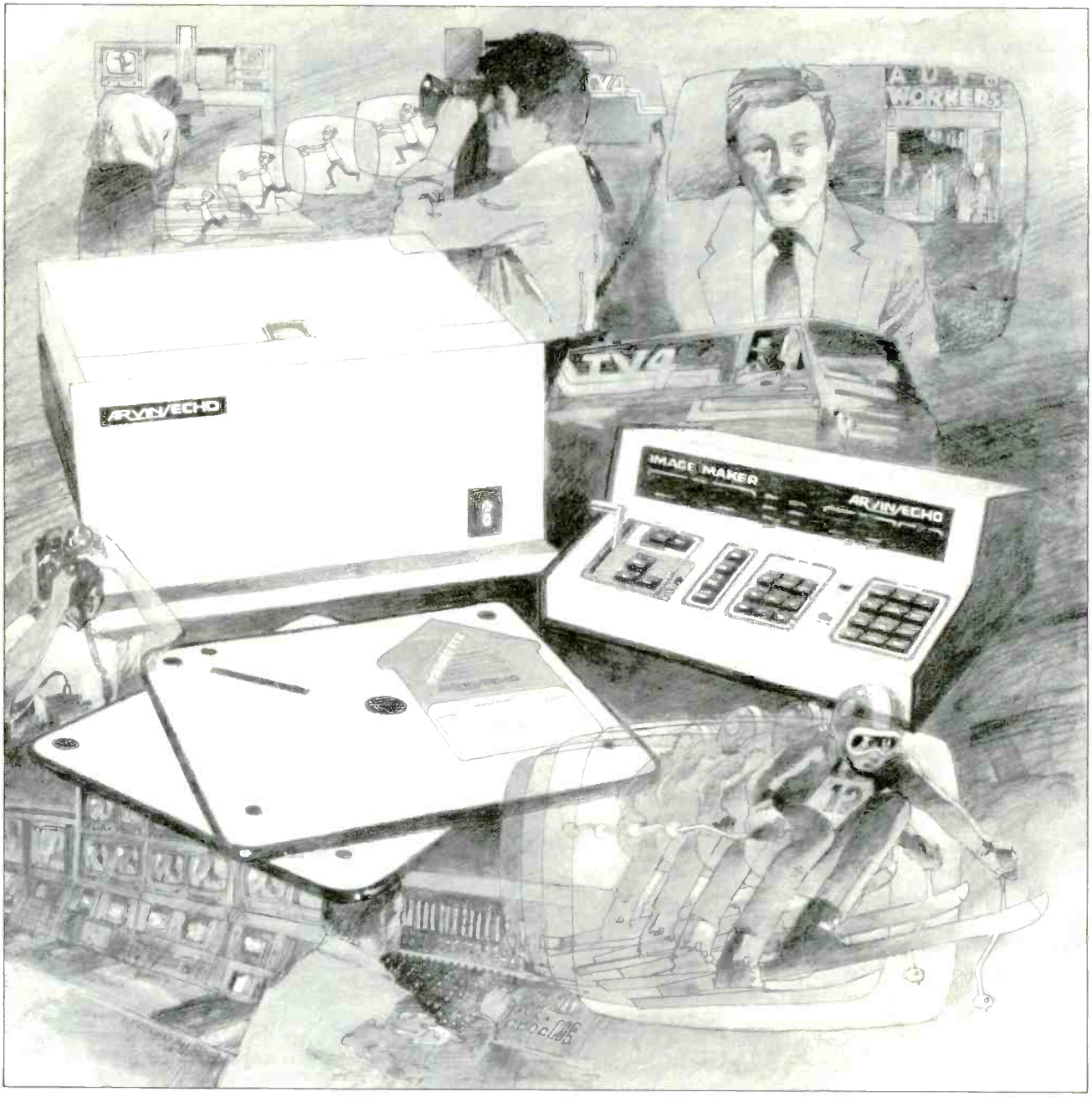
How it started

The closed captioning process evolved from an experimental concept pioneered by the National Bureau of Standards and the ABC Television Network and demonstrated at the first captioning conference in Knoxville, Tennessee in 1971. Developing the closed-captioning service became the responsibility of the Public Broadcasting Service in 1972. Over-the-air tests of the system were begun in 1974 under special temporary authority of the FCC. Using prototype decoders placed at selected public television stations nationwide, PBS transmitted programs with closed captions to an audience of hearing-impaired persons gathered at schools and institutions for the deaf.

The reactions of these viewers were collected and

Editing system developed for putting closed captions onto television programs includes an editing console with CRT readout, electronics system converting captions into digital form, and floppy disc to hold captions and SMPTE code, for application to program

Stan Gerendasy was formerly technical director of the National Captioning Institute.



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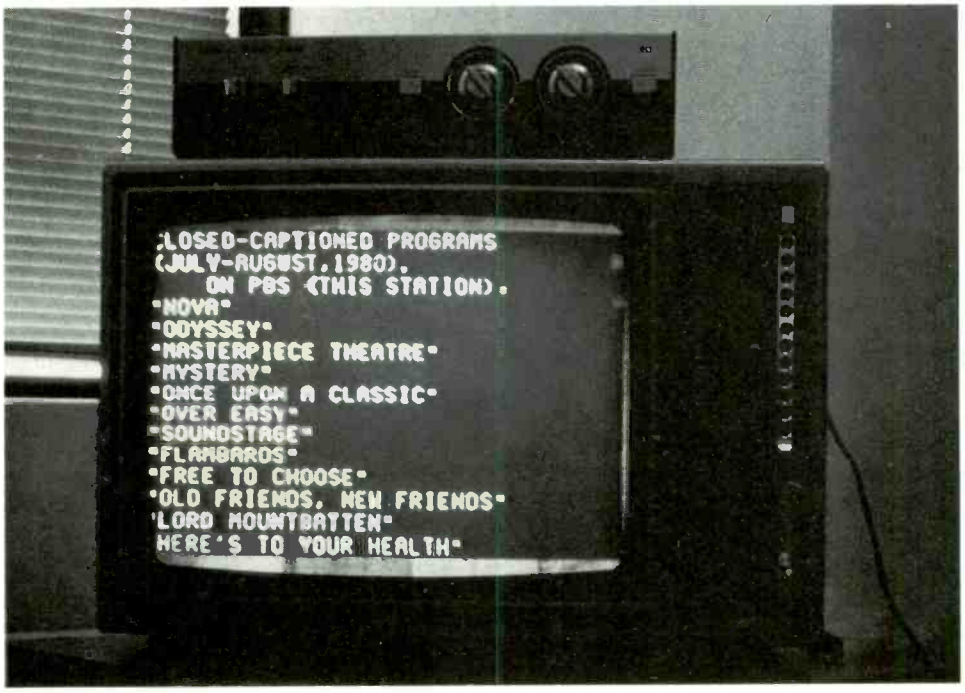
Television "Speaks"

Typical television scene with closed caption across foot of screen, produced by decoder on top of television receiver



System supplies full-screen "Infodata" display with same decoder, to inform viewer of upcoming captioned programs, or for other information

evaluated with the help of Gallaudet College in Washington, D.C., the nation's largest institution of higher learning for deaf and hearing-impaired students. The results of that study, along with technical information gained from field trials, formed the basis for a PBS petition to the FCC in November, 1975. The petition sought permanent authority to broadcast caption material on line 21. Approval was granted in December, 1976.

On March 23, 1979, the U.S. Department of Health, Education and Welfare, which had been funding PBS's closed-caption work since 1972, announced a unique partnership of various private and public groups. Specifically, three national television networks — PBS, ABC, and NBC — agreed to pay for and broadcast a total of approximately 20 hours of prime-time closed-captioned programs per week beginning in 1980, and Sears, Roebuck and Co. agreed to manufacture and market the decoding equipment necessary to receive the closed-captioned programs. HEW also announced that the National Captioning Institute, Inc., a nonprofit entity, would be created to caption programs, and that it would be partially funded by the department through 1982.

NCI opened its headquarters at 5203 Leesburg Pike, Falls Church, Va., and a branch captioning operations center at 1443 Beachwood Drive, Hollywood, Calif., in the fall of 1979. At the start of 1981 it had a staff of approximately 90 full-time employees and was producing 30 hours of captioned programs for broadcast each week.

In addition, NCI has undertaken captioning of TV commercials, with about 30 advertisers already using the

service for a total of 100 to 125 commercials per month. The advertisers mainly are national firms such as Bristol-Myers, General Electric, etc.

NCI is prepared to serve any network, independent station, or advertiser. A fee is charged for each program or commercial put through the process. Since federal support is being gradually reduced and is slated to end next year, the hope is that the volume of work will continue to rise, making the operation self-supporting sometime in the coming year. NCI has also been given some support from various foundations; this has also been regarded as "seed money."

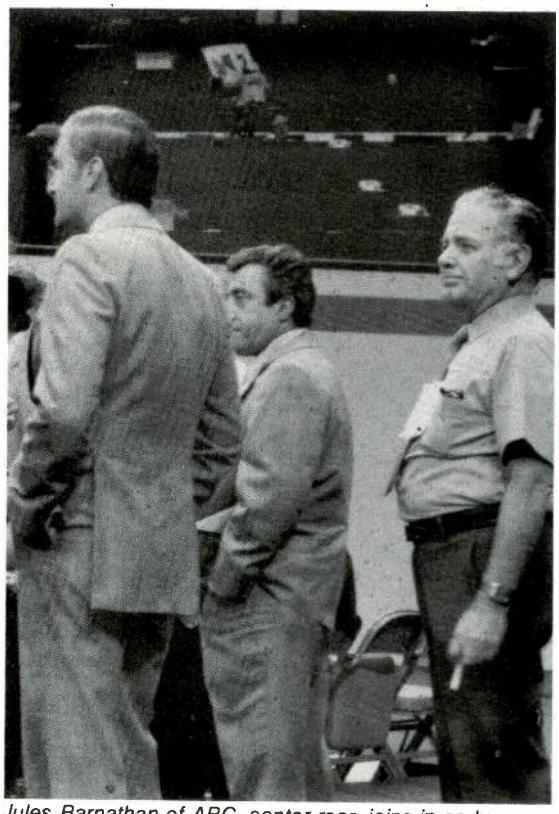
So far the network programs have come from ABC, NBC, and PBS. CBS has not yet come in because of its emphasis on teletext, but NCI naturally hopes that this situation will be clarified soon.

The decoders

The viewer can get the necessary "Telecaption" decoder in two forms, both available from Sears, Roebuck.

Julie Barnathan — The Man Behind Closed Captioning

By Bebe F. McClain



Jules Barnathan of ABC, center rear, joins in early captioning experiment

Anyone who is remotely connected with either the engineering or operation aspects of broadcasting in this country has heard of Julius Barnathan, president of broadcast operations and engineering at ABC. Barnathan is not only a competent manager, but also a very outspoken, often controversial figure. His "damn the torpedos — full speed ahead" attitude has paid off in many cases where hesitation would have ultimately resulted in missed opportunities. One outstanding example is closed captioning.

Closed captioning resulted from a series of seemingly unrelated events happening to one man who was quick enough to piece them together and farsighted enough to dream a dream. The following is an interview with that man — Julie Barnathan.

When did you first think that closed captioning was viable?
In 1971 we first saw it was feasible. It took a lot of work before it became possible. Finally after the Commission approved it, a way had to be found to get it financed. And now, thank God, it's off the ground and it's going to go well.

Where did you first see it was even possible?
The National Bureau of Standards came to ABC and they wanted to transmit time and frequency over the air because they thought it was very important that the home have accurate time, which is their mission in life. They wanted to put it on the TV screen where you could see it or not see it — in the vertical interval.

Well, at the same time Leonard Goldenson, chairman of ABC, had made a speech in Denver about making space-age technology help the handicapped. Someone wrote him a letter asking him why he couldn't use all this technology to get captioning for the hearing-impaired. They sent it to me at the time and I looked at it. At about that time my engineer said, "Come down and take a look at this Bureau of Standards thing." So I went down there and saw all these messages being sent. One of the bonuses I could see was that we would be able to send advisories to our stations in the vertical interval without anyone seeing them, which is always a problem for us.

So I thought, maybe it could do captioning. I talked to the people from the National Bureau of Standards, and they thought we could, so we actually did a simulation. That December we went down to Knoxville and we showed the hearing-impaired that it worked, and they had a headline in the newspaper, "Captioning here in two years!"

After that, we captioned our first program, *Mod Squad* — we did the full show — and we showed it at Gallaudet College. That was in February of 1972. Next we sat down, formed the committee at the NAB, and laid down the parameters and guidelines. In June, we gave the guidelines to the Commission and to the industry. PBS, through John Ball, volunteered to continue the work that had to be done, HEW said that they would finance the development, and from there it went on. Then of course there was the filing for it and so forth, and that's where we are today.

When did NBC kick in?
They supported it right before it became official.

What do you feel about the argument that the vertical interval is the last piece of real estate and you're using it?
Yes, we're using it to help viewers. What is our basic purpose except to help the viewers? And we're helping viewers here. There's nothing more important than that.

What about the arguments for teletext?
Teletext is five years away. It isn't going to be able to use a captioning decoder — you're going to have to buy new sets. At the rate people buy new sets, less than four to five percent a year, it may never be a viable medium. It may never get off the ground. It's not compatible with any current television set. All you buy for closed captioning is this device. Sears markets them for $250.

Do you think that closed captioning is your crowning achievement?
It's the thing I'm proudest of.

Bebe McClain is president of B.F. McClain Productions, Asheville, N.C. McClain produces and directs broadcast, industrial, educational, and commercial productions.

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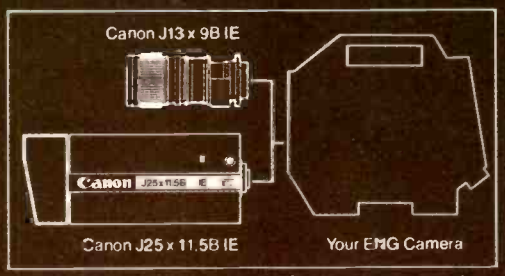

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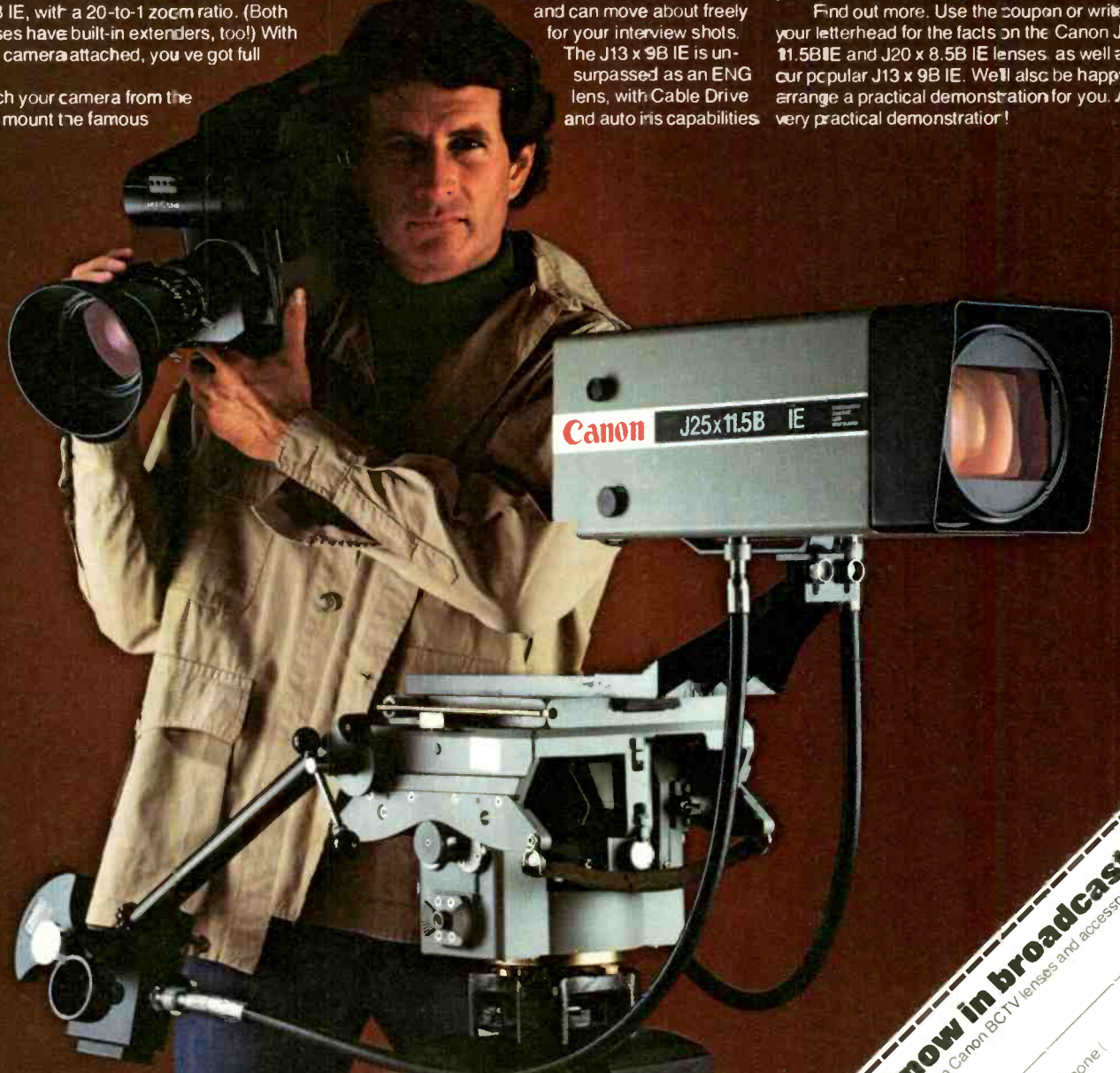

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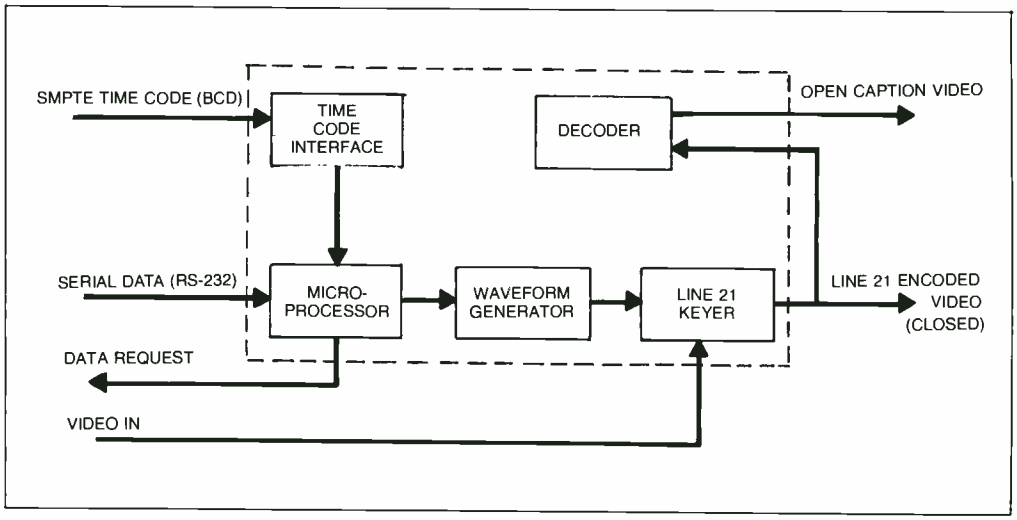
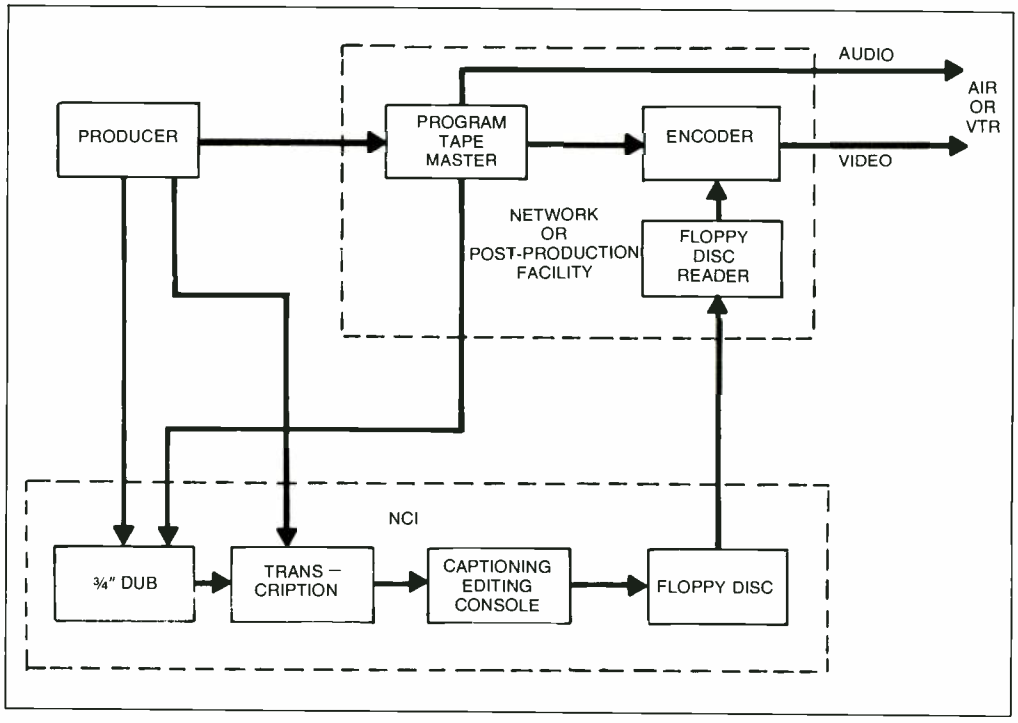


Simplified block diagram of captioning encoder shows flow of signal and time code



The entire captioning process is outlined in diagram at right

An adapter for attachment to any television receiver costs $249.95, and Sears says this is a "no profit" figure. A 19-inch color set with the decoder built in sells for $519.95; this figure does include a normal profit. Sears is paying a royalty to NCI on each adapter and receiver sold. At the beginning of 1981, about 32,000 decoders were in use; sales were rising steadily.

How viewers like it

NCI gets a large volume of mail from viewers who are using the service. The mail uniformly carries gratitude for the captions and urges NCI to continue and expand the service. To test viewer sentiment on various kinds of programs, NCI captioned as a public service the Inaugural Program in Washington and several football "Bowl" games. A subsequent telephone survey in a number of cities uncovered strong approval for the test programs. The NCI management believes that many additional types of program would draw strong response from persons with poor hearing if closed captions were added.

How it is done

To have a television program captioned, a producer or broadcaster must first provide NCI with a ¾-inch U-Matic cassette recording of the program with matching SMPTE time code recorded on both the master videotape and the cassette. The time code may be recorded on the master tape and the cassette simultaneously during dubbing; if it is already recorded on the master tape, it can be transferred to the cassette along with audio and video, using a time code reshaper or regenerator if necessary. In addition to the cassette it is helpful if a script of the program can be provided. If a script is not available, NCI operators can prepare a transcript from the cassette.

Working with the cassette and script, highly trained editors compose and time the captions using the SMPTE time code as reference. These operations are carried out on caption editing consoles, sophisticated text editing

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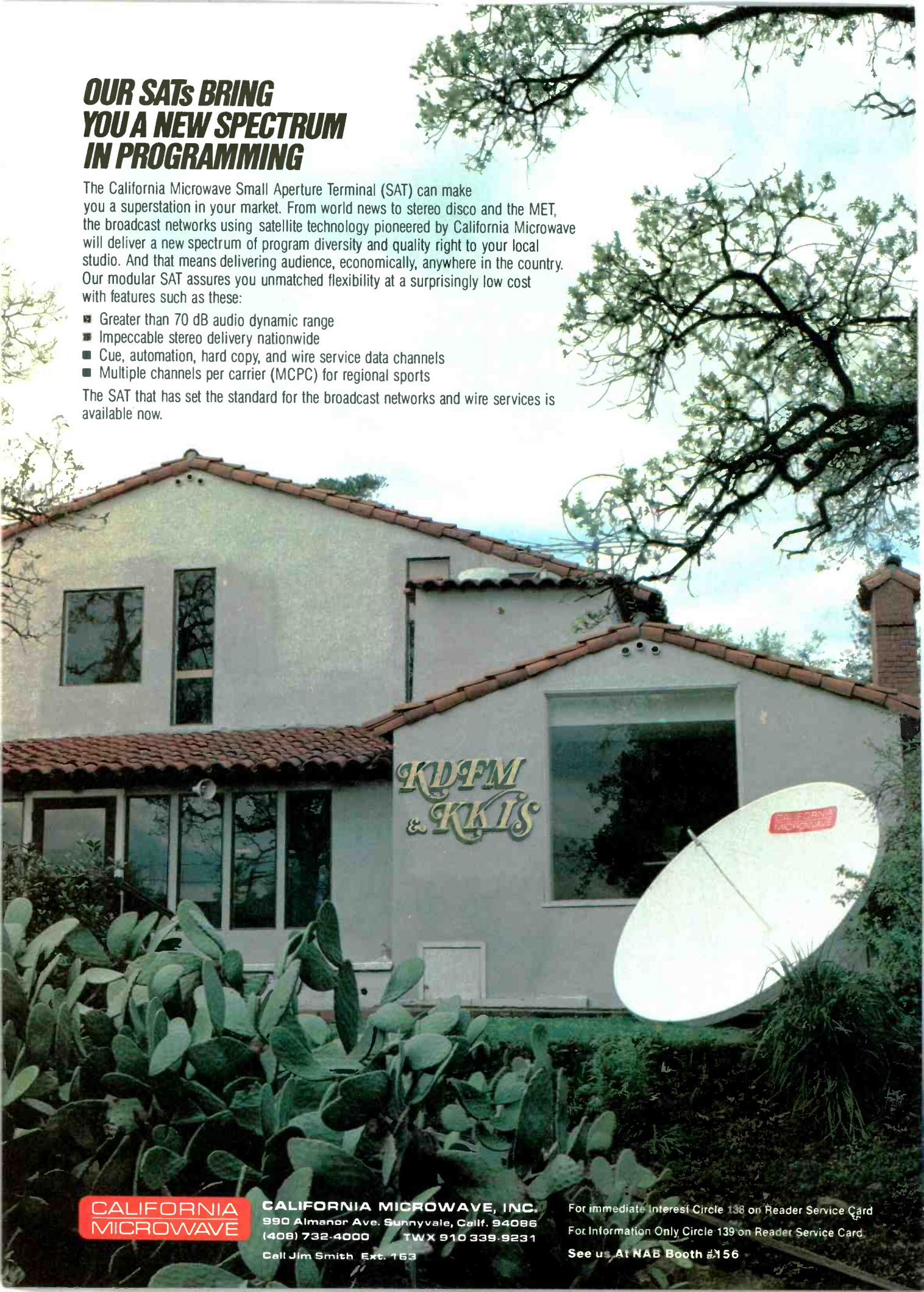

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systems on which the editor can "type" the captions for automatic conversion into digital form.

The final product is a floppy disc containing the digitized caption data and appropriate time and control codes. The floppy disc is sent to the broadcaster or videotape post-production facility, where the data is encoded on line 21 of the video signal. This is accomplished by playing back the master videotape with time code through an encoder/disc reader system and recording the output to produce a closed-caption master. The closed-caption master has the caption data permanently encoded on line 21.

NCI has two-inch quad and ¾-inch helical videotape facilities as well as encoding equipment that enable it to perform the complete process described above. If a client wishes to have the captioning and the encoding done by NCI, only the master tape needs to be sent. The original tape plus an encoded closed-caption master on two-inch or ¾-inch U-Matic tape will be returned.

The encoding process

To encode captions, three pieces of equipment are needed: a simple encoder, a time code reader, and floppy disc reader. The simple encoder inserts caption data on line 21. Required inputs are caption data from the floppy disc reader and SMPTE time code and program video, both from the master videotape. The simple encoder includes a microprocessor, a waveform generator, a keyer, a time code interface, and a decoder that provides an output for monitoring video with open captions during encoding.

The microprocessor synchronizes caption data (serial) with the time code and requests additional captions from the floppy disc reader when the encoder memory buffer is near depletion. The waveform generator shapes the caption data and the keyer inserts the data onto line 21 of the video. The built-in decoder decodes the encoded data into visible captions to provide open-caption monitoring.

The time code reader reads and transmits the SMPTE time code to the encoder from the VTR. Since the microprocessor accepts eight-bit parallel data and the time code reader transmits 32 parallel lines, the lines must be multiplexed. The multiplexing function is accomplished by the time code interface module in the simple encoder. Simple encoders may be purchased with built-in time code readers as an option.

When dubbing or encoding it is necessary to maintain the quality of the time code signal. To accomplish this, it is recommended that a reshaper unit be used in dubbing time code. The time code reader provided as an option in the simple encoder provides a reshaped output.

The floppy disc reader consists of a microprocessor and a disc drive. The reader reads caption data and control codes from the floppy disc, which can store enough caption data to encode over 90 minutes of programming. The encoder interfaces with the reader and provides protocol information on buffer full codes, retransmit codes, specific time code requests, and start controls. The reader transmits the requested information to the encoder and also sends "end data" and "error" codes to the encoder.

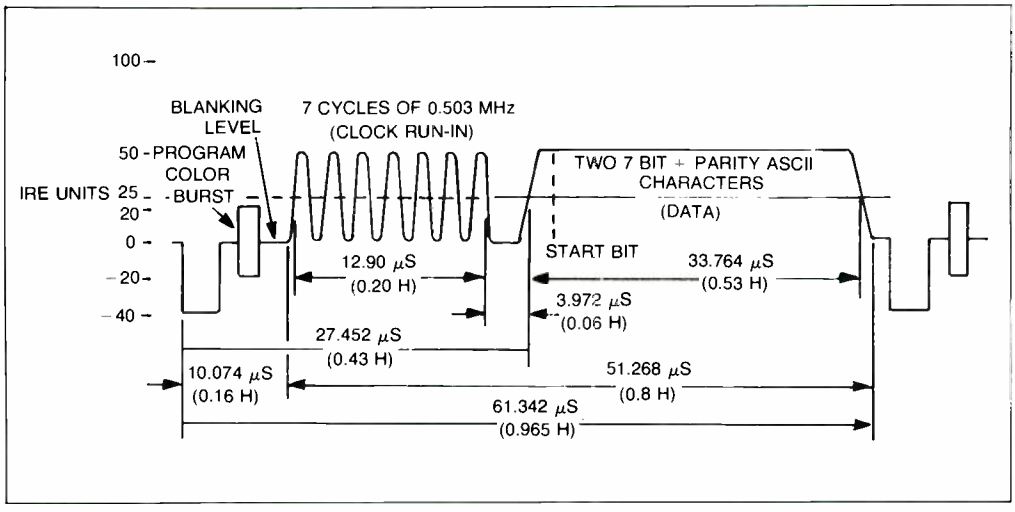

Diagram shows field 1 of line 21 data signal format, with caption area toward the right

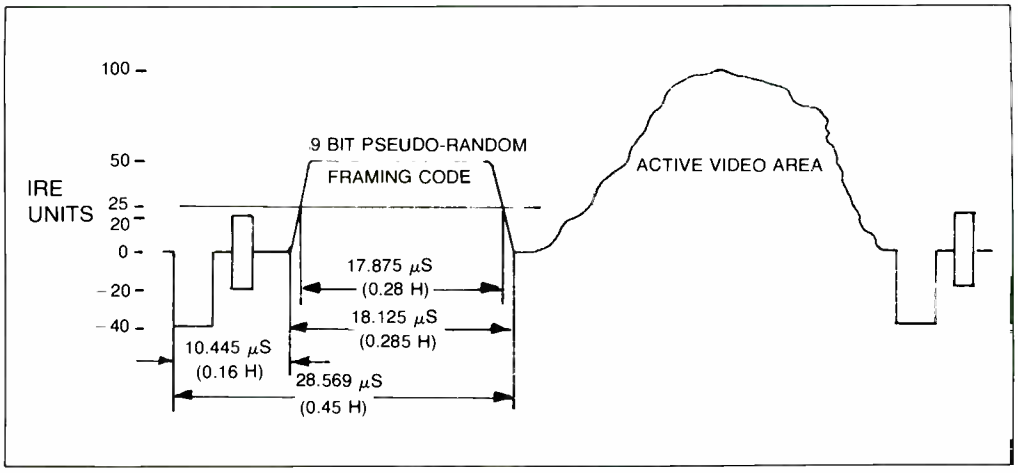

Diagram of field 2 of line 21 has active video area at right

Television "Speaks"

Form of the line 21 signal

The captioning data signal is contained in the television signal vertical interval on TV line 21, field 1. It consists of a run-in clock burst of seven cycles followed by a start bit and 16 bits of data (two- to eight-bit ASCII characters including a parity bit). Line 21, field 2 (first half only) contains a fixed code which was included as a possible decoder aid in locating line 21. Current decoders do not utilize this signal. The second half of line 21, field 2 may contain program video.

The waveform conforms to the standard Television Synchronizing Waveform for Color Transmission given in Subpart E, Part 73 of the FCC Rules and Regulations covering the composite data signal. The instantaneous data rate is 32 times horizontal line scanning frequency ($32F_H$) for a nominal value of 504,000 bits per second. After allowance for the duty cycle of the line 21 signal and start bits, an average data transmission rate of about 480 bits per second is obtained.

Infodata

Typically, program-related captions use only about 25 percent of the capacity of the line 21 system. The remaining capacity can be used to transmit data for other services such as captions in a second language and full-screen text displays for news or other non-program-related information. The full-screen text service, called Infodata, is a form of teletext that provides a continuous scroll of information with 15 lines of 32 characters each on the screen at any given time. All consumer and professional decoders can decode Infodata signals. Presently, ABC, PBS, and 10 PBS stations are using the text channel to transmit information about closed-captioned program schedules. The full capacity of the line 21 system can support Infodata in two languages in addition to program-related captions in two languages or reading levels.

Not essential but often useful are the broadcast decoder and test encoder. The first is a video-to-video device that may be used to monitor caption transmissions and to verify that broadcast transmitters are passing line 21 caption data properly. Videotape machines, processing amplifiers, frame stores, and other devices may have to be adjusted occasionally to ensure that the caption data is not inadvertently deleted.

The purpose of the test encoder is to encode a fixed closed-captioned test message on a video signal. Test captions may be transmitted on network feeds during non-captioned program periods; however, local stations may wish to transmit their own test messages during non-network periods. The test encoder will sense the presence of an incoming captioned program (or network test signal), stop the test transmission, and pass the captioned program to the transmitter. When the captioned program is finished, the test encoder will resume local station test transmission.

Development and implementation of the closed-captioning service took almost a decade of work and required commitment from many organizations. The years of effort have paid off. The most powerful medium in our society — television — now has the technical capacity to be fully available to the more than 16 million Americans with poor hearing. **BM/E**

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Yet KMJQ was the softest station on the dial.

"To achieve our goal," explains Chief Operator Leroy Dietrich, "we placed a lot of emphasis on the quality of the sound. By the day we started the Majic format, we had built a technical ability that we think is probably one of the best in the country.

"We hired an audio consultant to get us started," continues Dietrich. "He installed P 303 pre-amps and MC20 moving coil cartridges on SL-1100A turntables. Then he recommended dbx equipment for definition and dynamics."

KMJQ installed dbx tape noise reduction on all their cart machines. Not just for their program material, but for their commercials, too. "That keeps our advertisers happy because their commercials sound as clean as our music," says Dietrich. "And we use a dbx Model 500 subharmonic synthesizer to restore the low end. It makes the station sound especially well balanced. Even at low listening levels."

KMJQ also needed a compressor/limiter – but they didn't want to ruin the sound quality they had worked so hard to get. "After hearing how smooth the dbx 165 compressor/limiter works, there is no doubt in my mind that it's the best limiter I've ever heard in my life. We use it on voices, and it gives us the control we need without sounding like we have *any* control."

As you'd expect, KMJQ has constantly been making subtle technical changes to maintain their leadership position. "Due to competitive forces in the market, we've had to crank our signal up louder. Without dbx tape noise reduction on our carts, the noise would have been cranked up, too. Now I'm happier than ever that we're fully dbx'ed," says Dietrich. "We not only get the sound we want, but the whole system is incredibly reliable – bulletproof."

Dietrich summarizes his feelings about KMJQ's technical product by saying, "A lot of this is subtle stuff, psychoacoustics. But people comment to us that our station sounds more like the record they bought than the other stations do. A psychological thing, agreed. But it all adds up when you start reading the Arbitrons."

For more information on dbx's complete line of equipment for the broadcast industry, write Professional Products Division, dbx, Incorporated, 71 Chapel St., Newton, Mass., 02195, USA. Tel. (617) 964-3210. Telex: 92-2522. Distributed in Canada by BSR (Canada) Ltd., Rexdale, Ontario.

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Starting with April/ May 1978, KMJQ was rated #1 in audience 12+ for 5 consecutive Arbitrons.

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THE TECHNICAL TACTICS THAT MAKE THE TELEPHONE INTERFACE WORK

By G. Mark Durenberger

Interfacing the studio to dial-up telephone lines is a many-sided problem for the radio engineer. In an extraordinary panel session at the recent NRBA Convention, three experts supplied a full complement of nuts-and-bolts solutions to interface problems: Steve Church, director of engineering, Liggett Group; John Higdon, chief engineer, Broadcast Technical Consultants; and William Ruck, engineering manager, KFOG, San Francisco. Moderator Mark Durenberger has prepared this first part of a two-part summary of the highly useful information.

SEVERAL SCORE OF RADIO ENGINEERS spent three hours on the last morning of the recent NRBA convention learning about the telephone. In an unprecedented open-ended nuts-and-bolts session, we discussed the anatomy of the telephone, the telephone long-distance network, and how to interface phone and broadcast studio. What follows is an attempt to summarize some of this information to give readers a working knowledge of the phone and enable them to install or upgrade their own interfaces.

Rotary or Touch-Tone®, the telephone set consists of two major areas — the switching and the network/handset. If your telephone has a pushbutton bank, chances are it is connected to a Key Service Unit (KSU). Most older KSUs connect to the telephone set via a 25-pair cable. Newer systems use serial data and talk path and may use only two, four, or six wires, but for now we'll deal with the more popular systems. The terminal blocks between the KSU and the phone will be wired in line number order beginning at the top, and will look similar to Figure 1.

In this type of arrangement, you may find four, five, or six wires *per line*. Close inspection of your terminal should tell you which way it's being done. TIP and RING are the talk path, a dc circuit with a voltage superimposed by the nearest exchange or KSU. This dc voltage is used to create talk audio and "side-tone" (the reason you hear your voice in the receiver) and is also employed to make the Touch-Tone® pad oscillate. The A circuit, when switched to ground, operates a KSU relay that switches on the busy lamp for that line. This circuit is also used to put a call on "hold" by momentarily opening this A lead while TIP and RING are still connected. Inspection of the HOLD button on the phone will show you how it's done mechanically, but it can also be accomplished electrically.

Lamp voltage is 10 V ac against ground. The major difference among the four, five, or six-wire schemes in Figure 1 is that in larger systems, grounds are commoned to save pairs. The TIP/RING path is a dc circuit that must be completed to pull up the line relay and provide dial tone or service. Nominal audio impedance of this path is around 750 to 900 ohms. A dc load on TIP and RING of from 250 to 500 ohms will pull up the line relay.

Pushbutton functions

The pushbutton keys on your telephone put three of these circuits, TIP, RING, and A, onto a bus when a line button is depressed (see Figure 2). The output of the TIP and RING bus is fed to the network; it is at this point that it

G. Mark Durenberger is project engineer at KSTP, Minneapolis, Minn.

is interrupted to insert interfacing. The A circuit goes through the HOLD button so external interfacing would include a normally closed contact in this series circuit to permit electronic hold operation.

The other half of the phone is the network/handset. The network performs a variety of chores. It completes the dc path necessary to pull up the line relay, provides means of reducing side-tone below feedback levels, and compensates for varying line characteristics. It may also provide decoupling for a built-in ringer and some click suppression, as well as a match for the transmitter and receiver in the handset. You'll note from Figure 2 that this network is disconnected from the keyset when a high-quality interface is required.

Talk path levels

Incoming telephone level is usually on the order of −18 dBm or so. (Disconnecting the network improves this by 4 to 8 dB.) Outgoing audio is several dB hotter. Losses in the instrument, the path to and from the exchanges, and trunk losses are responsible for the disparity. Long-distance calls require amplification in both directions in what we might call a "full-duplex" arrangement. Most telephone long-distance trunks are four-wire, but great progress is being made in perfecting schemes of bidirectional amplification for two-wire circuits.

Connections On Key Service Unit

6-wire fanout	5-wire fanout	Bell "Comkey" 4-wire fanout	Color
Line 1 Tip	Line 1 Tip	Line 1 Tip	white/blue
Line 1 Ring	Line 1 Ring	Line 1 Ring	blue/white
Line 1 'A'	Line 1 'A'	Line 1 Lamp	white/orange
'A' circuit common (gnd)	'A' circuit common (gnd)	Line 1 'A'	orange/white
Line 1 lamp ground	Line 1 lamp ground	Line 2 Tip	white/green
Line 1 lamp	Line 1 lamp	Line 2 Ring	green/white
Line 2 Tip	Line 2 Tip	Line 2 lamp	white/brown
Line 2 Ring	Line 2 Ring	Line 2 'A'	brown/white
Line 2 'A'	Line 2 'A'	Line 3 Tip	white/slate
'A' circuit common (gnd)	Usually line 9 'A'	Line 3 Ring	slate/white
Line 2 lamp ground	Line 2 lamp ground	Line 3 lamp	red/blue
Line 2 lamp	Line 2 lamp	Line 3 'A'	blue/red
Line 3 Tip	Line 3 Tip	Line 4 Tip	red/orange
Line 3 Ring	Line 3 Ring	Line 4 Ring	orange/red
Line 3 'A'	Line 3 'A'	Line 4 lamp	red/green
'A' circuit common (gnd)	Usually line 8 'A'	Line 4 'A'	green/red
Line 3 lamp ground	Line 3 lamp ground	Line 5 Tip	red/brown
Line 3 lamp	Line 3 lamp	Line 5 Ring	brown/red
Line 4 Tip	Line 4 Tip	Line 5 lamp	red/slate
Line 4 Ring	Line 4 Ring	Line 5 'A'	slate/red
Line 4 'A'	Line 4 'A'	Line 6 Tip	black/blue
'A' circuit common (gnd)	Usually line 7 'A'	Line 6 Ring	blue/black
Line 4 lamp ground	Line 4 lamp ground	Line 6 lamp	black/orange
Line 4 lamp	Line 4 lamp	Line 6 'A'	orange/black
Line 5 Tip	Line 5 Tip	Line 7 Tip	black/green
Line 5 Ring	Line 5 Ring	Line 7 Ring	green/black
Line 5 'A'	Line 5 'A'	Line 7 lamp	black/brown
'A' circuit common (gnd)	Usually line 6 'A'	Line 7 'A'	brown/black
Line 5 lamp ground	Line 5 lamp ground	1T 3	black/slate
Line 5 lamp	Line 5 lamp	1R 3	slate/black
Line 6 Tip	Line 6 Tip	1L 3	yellow/blue
Line 6 Ring	Line 6 Ring		blue/yellow
BL, AG, or spare	BL, AG, or spare		yellow/orange
SG, LK, or spare	SG, LK, or spare		orange/yellow
Line 6 lamp ground	Line 6 lamp ground		yellow/green
Line 6 lamp	Line 6 lamp	ground	green/yellow
Line 7 Tip	Line 7 Tip	ground	yellow/brown
Line 7 Ring	Line 7 Ring	ground	brown/yellow
B or B1	B or B1	ground	yellow/slate
R or R1	R or R1	ground	slate/yellow
Line 7 lamp ground	Line 7 lamp ground	10V	violet/blue
Line 7 lamp	Line 7 lamp		blue/violet
Line 8 Tip	Line 8 Tip		violet/orange
Line 8 Ring	Line 8 Ring		orange/violet
Line 9 lamp ground or T1	Line 9 lamp ground or T1	ground	violet/green
Line 9 lamp or R1	Line 9 lamp or R1		green/violet
Line 8 lamp ground	Line 8 lamp ground		violet/brown
Line 8 lamp	Line 8 lamp		brown/violet
Line 9 Tip	Line 9 Tip		violet/slate
Line 9 Ring	Line 9 Ring		slate/violet

Figure 1. 25-pair standard telephone color code. See text

Since what comes into your building is two-wire, let's look at ways to interface. First, here is a receive-only situation in which we want a high-quality recording arrangement. Figure 3 illustrates the basic connection. Transformer T1 is an isolation coil and in some cases performs impedance transformation. T1 balances out common-mode longitudinal circuit noise and metallic circuit noise and hum. Remember, the TIP and RING path requires dc current to flow to pull up the line relay. But most good coils do not like dc in their windings, so C is added to prevent core saturation. To complete the dc path, an R or L is added. The inductor presents a high impedance at audio frequencies. The resistor is cheaper if talk level is not critical. T1 can be step-up if it's facing a bridging input. The post-equalization suggested by Figure 3 will brighten things up a bit, but you'll quickly reach the point beyond which you'll just add line noise.

The two-way interface

Two-way interfacing is another matter, and there are three approaches. The most popular is the Speakerphone. It's easy to interface, allows some post-conditioning, and has a fairly consistent sound. But it suffers from the one-way gating effect that's likened to a see-saw. The gating allows audio to move in only one direction at a time so simultaneous two-way conversation is impossible. This is the reason most talk-show hosts veto the Speakerphone.

A second choice that does permit two-way talk is the hybrid. One of its forms, the transformer, is described in Figure 4. The hybrid is also called a "four-wire terminating set" when used to convert four-wire to two-wire operation. Telephone audio from the two-wire side enters the hybrid at ¾ and appears at the output port, 5/6. Local mic audio is inserted at ½. When the proper conditions are met, this mic audio is cancelled at the output port and only telephone audio will remain.

Because the hybrid steals its tune from the Wheatstone Bridge, the "proper conditions" are that the impedance of the telephone circuit at ¾ be balanced by a complementary impedance at the balancing network ⅞. You can make this work rather effectively on the bench, using resistive elements, and a very good null will happen. Unfortunately, in the real world the telephone line displays a highly complex reactance which changes from line to line and depends on circuit conditioning, loop length, and even, in some exchanges, the impedance of the calling party's telephone line. So only an approximate null can be accomplished. A perfectly complementary balancing network is almost impossible to realize and would be valid only on a particular line. In the real world, on the average line, look for a null of from 6 to 15 dB unless you re-adjust for each call. (Editor's note: For a full discussion of the telephone-line impedance problems, with actual measurements of a large number of lines, see "What We Found When We Measured Telephone Line Impedances," by Harrison Klein on page 71.)

You'll note from Figure 4 that mic audio encounters a 180-degree phase reversal to be cancelled at the output. Because of varying reactances within the coil, mic audio travels to and through 180 degrees at several points in the audio passband and the result is often audibly hideous. So a mix-minus scheme may be employed as described in Figure 5. Mix-minus has been known to us for years in the recording studio as the echo-send or cue send bus. Mix-minus allows you to add direct mic audio back to the

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console, masking what's happening to the mic coming out of the hybrid. Mix-minus also serves to reduce feedback in certain applications.

The balanced-level mix

Another method that's been around for years is the balanced-level mix method. This approach requires some understanding if it's to work properly, but it's likely to yield best results, is predictable, permits simultaneous two-way conversation, and delivers a good degree of fidelity. Here the major change is that mic audio is routed through the telephone and used again at the console. The balanced-level method does require some gain-riding, however, because to make it work, just like the telephone set, local (mic) audio must be several dB hotter than the caller audio at the same point. Figure 6 displays the basic balanced-level mix system. Here we're concerned with audio going in both directions. It's important to note that for best announcer-caller mix the ideal condition is maximum power transfer, and that occurs when the send amplifier is *matched* to the transformer. (Because the receive side is bridged, we'll ignore it for the moment.)

In the old days, when men were men and tubes were the thing, you simply matched the send amplifier output transformer to the coil. Because these amplifiers had a true 600 ohm source, the only thing you had to worry about was amplifier noise. The match was good and power transfer occurred. But if you connect a solid-state device to this coil, its low source impedance will tend to "short out" the transformer and little caller voltage will be built up in the windings. So a build-out resistor, Rs, is added.

And now we have the voltage-divider equivalent shown in Figure 6 — and we're back to a real-world problem. Because the telephone line is such a complex impedance, the voltage drop across Rs will be non-linear with frequency and mic audio will be altered (although not nearly as severely as in the hybrid). If Rs is made big enough to present a real match, high-end loss of mic audio results. A low value of Rs will flatten out response but swamp the coil. So a compromise is necessary. As a practical matter, if an opamp is the send audio driver and T1 is a 600 to 600 ohm coil, Rs should be between 1000 and 2200 ohms.

The coil, by the way, should be a very good low-loss device. Not more than 1 dB loss should be tolerated. The ideal match to the telephone side is close to 900 ohms, but a standard 600 winding works fine. Do not skimp on this component — it's the most important part of the interface. A Triad A67J is a good choice, unless you're lucky enough to have some big ADC coils in your junkbox. The choke will be 2 Hy or larger with a dc resistance of from 250 to 450 ohms. A wirewound resistor is often added in series with a low-resistance choke to limit current flow.

In any type of telephone interfacing, remember that the passband of the system you're dealing with is limited to about 250 to 3000 Hz. For this reason it's important to precondition the send audio no matter what type of interface you intend to use. A cookbook 18 dB/octave bandpass filter is appropriate for Speakerphone and hybrid send audio, while a gentler filter is employed with the balanced-level system. Post-conditioning includes some upper-mids peaking EQ to brighten things up a bit. Some compression will not only help balance caller/announcer levels but will deliver a more consistent phone sound. Remember, though, that the amount of mic audio rejection will be degraded by the amount of compression employed.

Handling conferences

So far we've dealt with single-line systems. How do you tie two or more callers together? Common practice is

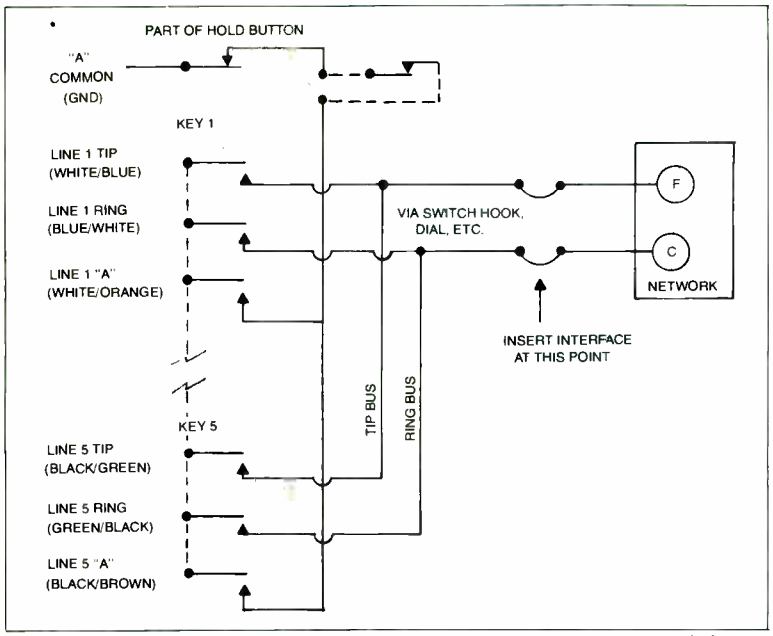


Figure 2, above, shows connections made by pushbuttons on key set, and also point at which interface is inserted

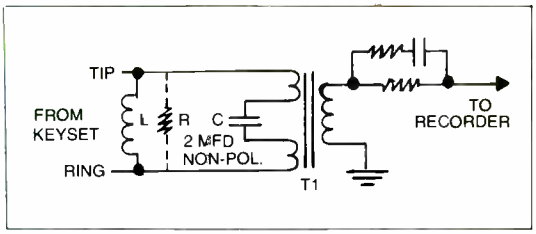


Figure 3, above, shows connections for receive-only on a two-wire system, when recording is to be made

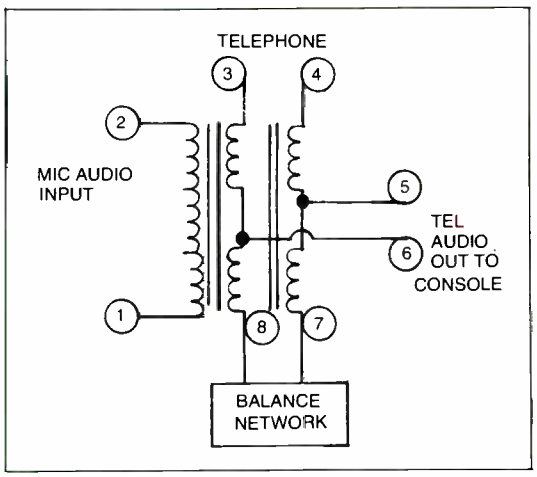
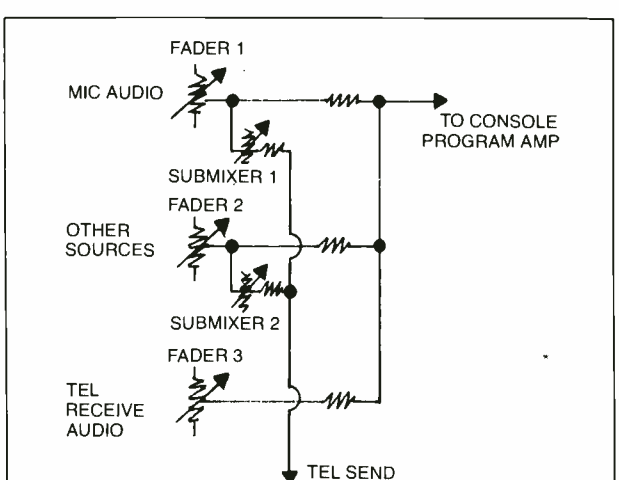


Figure 4 shows a typical transformer-coupled hybrid, which allows two-way conversation with reasonable separation if the balancing network is proper ▶



The mix-minus circuit allows the user to add direct mic audio back into the console, masking what is happening to the mic coming out of the hybrid

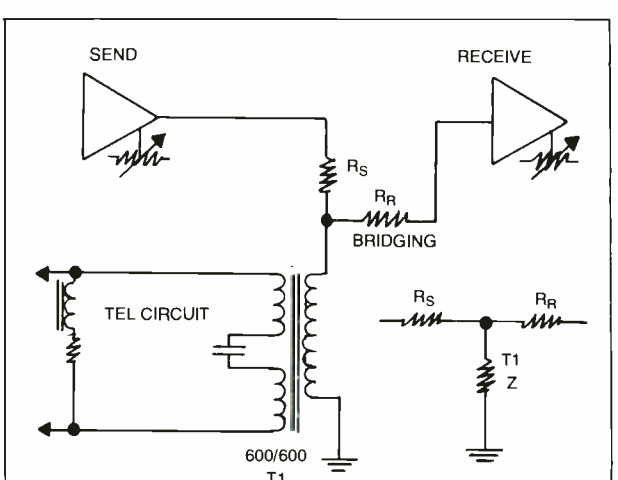
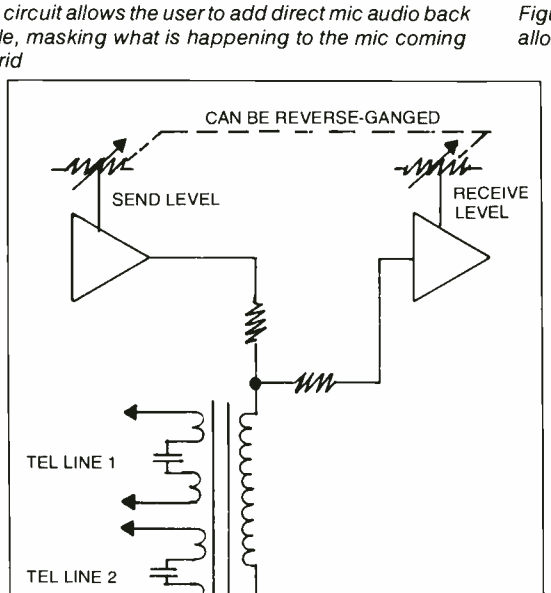
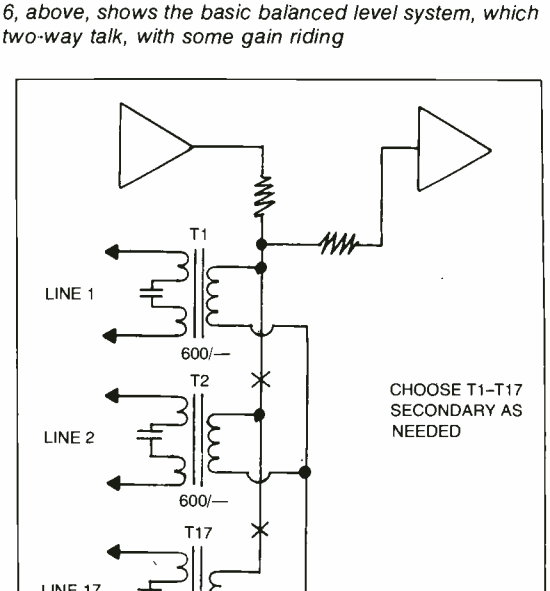


Figure 6, above, shows the basic balanced level system, which allows two-way talk, with some gain riding



In Figure 7 there are the connections for a two-line system allowing the callers to hear each other, but with required isolation in system



Another method of handling several lines is shown in Figure 8, above, with necessary isolation assured

to simply push two buttons down together. This works with a KSU when TIP and RING polarity is consistent. But it doesn't always work that way outside, and a reversal means loss of audio from both callers tied together. Remember too that in some exchanges the TIP and RING battery will reverse when a call out is completed. So the only sure way to prevent the problem is dc isolation. Figure 7 expands our scheme to a two-line arrangement. In this case, if the proper transformer is used, power transfer occurs from caller 1 to caller 2, and they hear each other fine. Send resistance Rs is more critical than with the single-line system, but three callers can be tied together this way with usable results.

Of course, this hookup can be expanded by inserting a hybrid in each telephone line for a few dB of gain and adding a mix-minus scheme, but that layout is a bit beyond the scope of this article so we'll cover it next time. Figure 8 is a picture of a multi-line system showing another way to do it. Note complete isolation.

A final note about conferencing. An elaborate system can put four or six or 10 callers on the air with each other when a talk host wants to conduct a "sing-along." But as a matter of practical communications, most talk-show people agree that three callers conferenced together is about the maximum you can deal with and still preserve coherent communications among the group. So it's not a matter of how many callers can hear each other but rather whether callers can carry on a four-sided conversation, unseen by each other, without stepping on each other. It's my opinion that a practical talk system can be limited to three-conference capability and the wise engineer will design a system to do that well.

Call-directors and human-engineered talk-show line switchers will be the topic of our next article, and we'll finish reviewing what we learned at the NRBA session. I hope you were able to attend that unique conference, and I urge you to lobby your broadcast associations to provide more of these nuts-and-bolts sessions. **BM/E**

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WHAT WE FOUND WHEN WE MEASURED TELEPHONE LINE IMPEDANCES

By Harrison J. Klein

Dial-up telephone line impedances vary over a large range, as this article reports. The engineers need a simple way to measure the impedance of each line in order to devise the best possible interface to studio equipment, often a troublesome problem. The article tells how to make the measurement with test equipment found in every radio station.

ONE OF THE PERENNIAL problems faced by engineers is how best to couple a telephone to other studio equipment. The design of any kind of telephone coupler, whether it be one of the expensive units available commercially or the kind of simple, home-brew hybrid used by many engineers today, requires knowledge of the impedance characteristics of the telephone line. This is needed in order to design a balancing network that will maximize the isolation between input and output (the trans-hybrid loss). Even if one is not designing hybrids but just trying to learn more about telephones, the basic question is: What does a line look like?

Yet there is no readily available source for this important information. There have not even been discussions about general questions such as whether the impedance changes from call to call, or if it differs from exchange to exchange.

As a news/talk station, where the hybrid is to us what the turntable is to a music station, WIND is vitally interested in this information. We therefore set up a program to measure the impedances of phone lines. The method we used could be quite easily duplicated by other stations who would wish to make similar measurements.

The data we obtained may be typical of what would be found in other parts of the country. It is quite different from what might be expected based on the few discussions in the literature about phones. It shows tremendous differences in impedance between exchanges, and substantial differences from call to call on the same line. It also showed that some actual impedances could not be duplicated with passive, lumped networks, which does not bode well for hybrid designers.

In order to have a complete knowledge of impedance, both the resistance and reactance must be determined. Alternatively, the magnitude and phase angle provide the same information. There is a new piece of test equipment on the market, the Plantronics/Wilcom Model T306 Phasor Impedance Measuring Set, which will measure these quantities directly on a dial telephone line. Unfortunately, its purchase could not be justified, so we were forced to devise an alternative method of impedance measurement based on the conventional test equipment we had available.

We want to measure the telephone line directly without going through an isolation transformer so there would be no question that the impedance of the line itself was being determined. This complicated what would otherwise have been a relatively simple matter because connecting something which is not isolated from ground to a phone line will cause severe hum and will make measurement impossible. For this reason, many test instruments which can ordinarily be used to measure the voltage, current, or phase in electronic circuits were unusable here.

How we measured it

We finally settled on a computational method of impedance measurement that requires only a voltmeter to determine both magnitude and phase angle (or alternatively, resistance and reactance) of an unknown impedance. This technique was recently described in a Synergetic Audio Concepts newsletter. The required measure-

Harrison J. Klein is engineering manager of WIND, Chicago, Group W, Westinghouse Broadcasting Co.

Telephone Line Impedances

ments are easy to make and require little judgment on the part of the measurer, helping to maximize accuracy.

To use this method, a resistor R is connected in series with the unknown impedance (see diagram). The resistor should have a value on the same order as the expected impedance of the unknown, but its exact value is unimportant. We used a 620 ohm resistor. A sine wave audio signal of the frequency at which the impedance is to be measured is applied to the series circuit as shown.

The three voltages V_T, V_R, and V_Z are measured with an ac voltmeter (preferably digital for best accuracy). The impedance of the unknown is then calculated using standard equations. These equations are derived from geometrical considerations of the voltages and currents in the circuit (see phase diagram).

These formulas can easily be adapted to a programmable calculator so that when V_T, V_R, and V_Z are measured, the calculator will quickly compute the unknown impedance.

The equations calculate the value of reactance, X, but do not tell whether X is inductive (positive angle) or capacitive (negative angle). In a passive, lumped network, this can be determined by watching how the impedance changes with frequency. If Z rises with rising frequency, X must be inductive. If Z falls with rising frequency, X must be capacitive.

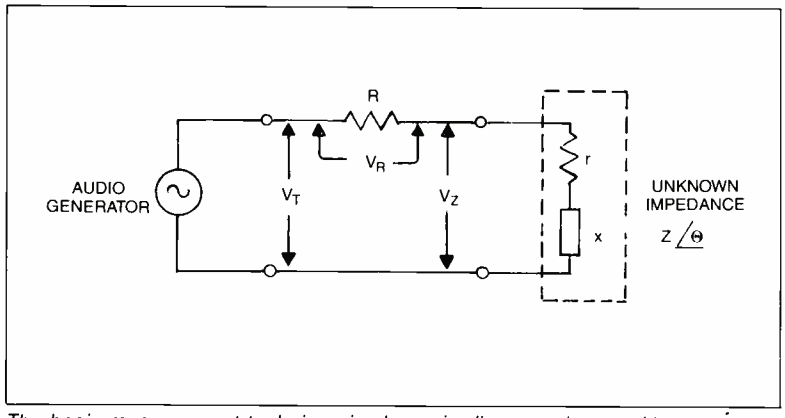
Unfortunately, a telephone line is a kind of transmission line, and transmission lines can shift impedances so that capacitive impedances may rise with frequency and inductive impedances may fall. Therefore, some other method must be used to determine whether X is inductive or capacitive.

The fact that a telephone line is being measured causes other problems. Since we want the impedance under actual calling conditions, the line must be held off-hook. In addition, the dc on the line must be blocked to prevent it from interfering with our measuring instruments.

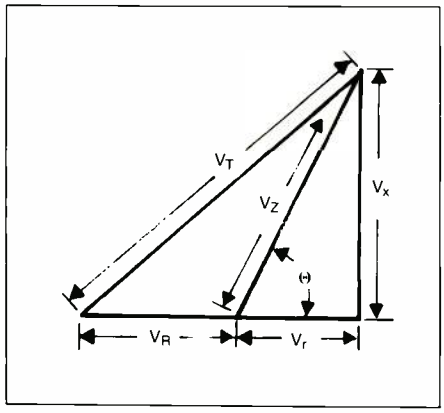
To take all these considerations into account, we devised a test jig for making the measurements and a data sheet for recording them (see diagrams). The 10.5 H coil has low enough resistance to hold the line off-hook, but has a minimum reactance of 13000 ohms at 200 Hz, the lowest frequency of interest. The 1500 μF dc blocking capacitor has a maximum reactance of 0.5 ohms at that frequency. Therefore, these two components have a negligible effect on the measurements.

The two bridging transformers do not affect the measured impedance, but provide voltage and current samples that are used to determine whether X is inductive or capacitive. The transformer secondaries are connected to a two-channel oscilloscope. If the voltage waveform leads the current waveform, X is inductive. If current leads voltage, X is capacitive.

Although the scope might be used to measure the phase angle directly, we chose not to. The telephone line has dc jitter, which causes a somewhat unstable scope display, making accurate measurements difficult. In addition, measuring the angular difference between two waveforms on a scope is much more time-consuming and requires

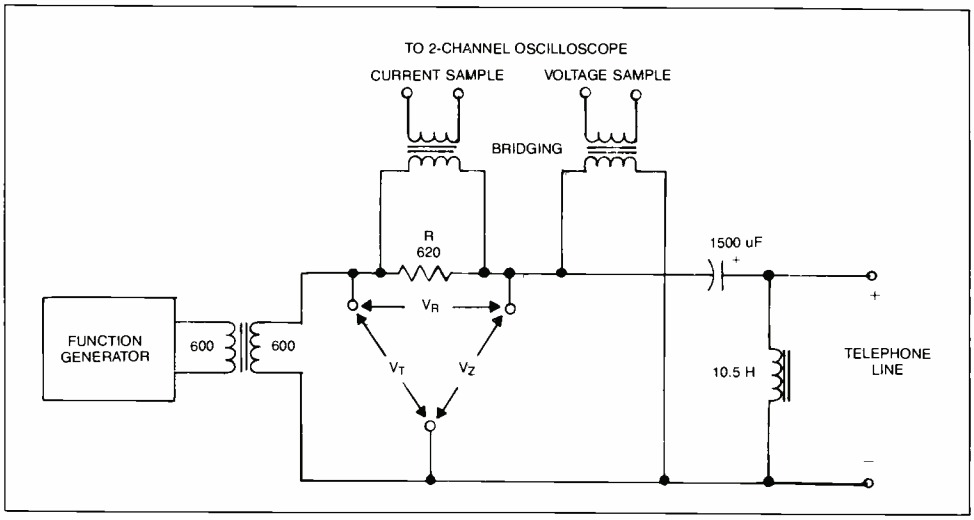


The basic measurement technique is shown in diagram above, with resistor about equal to impedance to be measured. Voltages are measured with an ac voltmeter



Phase relations of voltages in measurement configuration are shown on diagram above

The complete test jig, with values of all components, is shown at right. The two samples fed to the oscilloscope determine whether impedance is inductive or capacitive



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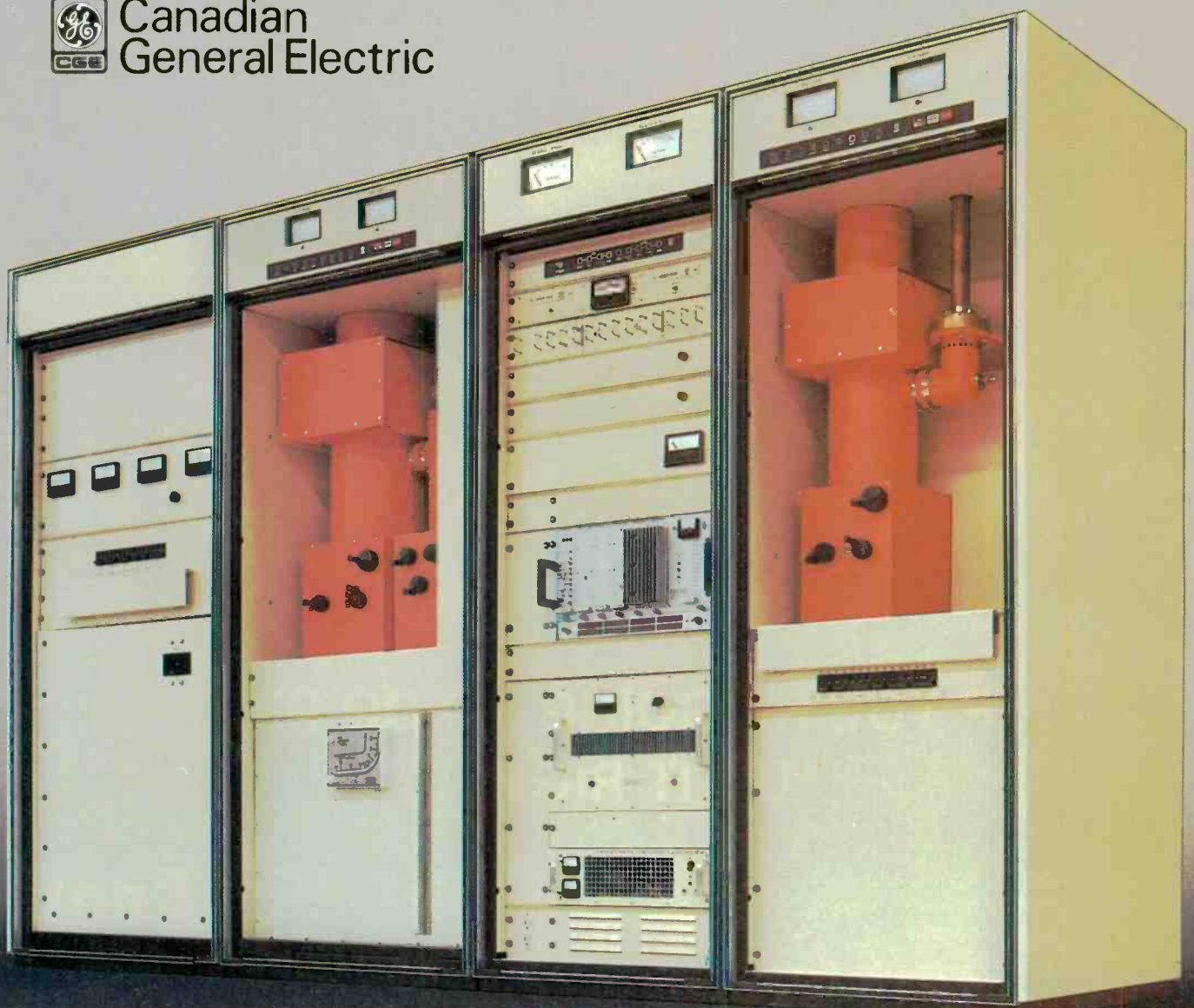

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much more operator judgment than reading numbers on a digital voltmeter.

We chose to make measurements at the standard 1/3-octave frequencies between 200 and 5000 Hz. This covered the 300 to 3000 Hz range of interest while also indicating the general trends at the fringes.

We made measurements on a representative line in each of the four telephone exchanges WIND uses on the air. Each line was measured under several different conditions:

- A local call to the same exchange, if possible (two of the exchanges are incoming-only and cannot place calls);
- A local call to a different exchange;
- A call to a suburban exchange;
- A long-distance call to a different area code.

In addition, a second set of measurements was taken under identical conditions two months after the first set was made. We wound up with 28 different impedance curves from a total of 420 measurements.

The staggering results

To make some sense out of all these numbers, we did some statistical calculations. First, the measurements were averaged at each frequency over all exchanges and all calls. The results are shown in the graph showing the average of all measurements. These results are both staggering and misleading — staggering because of the tremendous range of values. The ±1 standard deviation range at 200 Hz goes from 450 to 1700 ohms! And remember, ±1 standard deviation does not include all measurements. Some are outside even *this* range. Any hopes we might have had that all lines would look somewhat alike were dashed when we looked at this graph.

This figure is also somewhat misleading. Often, a mean will indicate a "typical" result, while the standard deviation shows the scatter around the typical result. That is not the case here. As we will see shortly, *none* of the impedances looked anything like the means of either magnitude or angle shown in the measurements. Other than the fact that all impedances generally decrease with increasing frequency, this figure tells us only that the ranges of Z and Θ are very wide.

A "well-behaved" exchange

When individual exchanges are examined, the results get much more reasonable. The averages of the most well-behaved exchange are shown in the graph for Exchange A. Here, the results varied little from call to call. Although the magnitudes are lower than what we expected in a phone line, they fall gently and continuously with frequency and the phase angle is capacitive, which is what would be expected since the magnitude is decreasing.

One might expect that this line could be balanced quite well with a relatively simple network, and such is indeed the case. The hybrid on this line had used a simple parallel RC balancing network with excellent results. The impedance curves suggest that an even better approximation to this impedance could be made by adding another capacitor in series with the existing network, which would add the low frequency impedance boost shown in the graph.

The individual impedance curves (not shown) that were used to calculate the averages for Exchange A demonstrate that the biggest impedance change occurs when you call outside the exchange. The impedance curves measured in the three calls to different exchanges were all quite similar, but substantially higher than the same-exchange call impedance curve. This indicates that the trunk leaving the local exchange affects the impedance most, while succeeding trunks have little effect.

The second set of measurements, taken two months after the first, showed little difference between corresponding impedance curves. The differences caused by different calling conditions are much greater than the differences caused by impedance shifts with time.

A troublesome exchange

Our biggest problem has been with the "mass-call-in" exchange supplied to broadcasters by the telephone company to prevent us from overloading conventional exchanges during contests, etc. We have never been able to get good performance from a hybrid on this exchange, and the impedance graph for Exchange D shows why.

Here the impedances vary so much from call to call that averages are not helpful. Notice first that each curve has areas of rising impedance, yet the phase angle always remains capacitive. This implies a transmission line effect that cannot be duplicated with simple lumped networks.

In addition, the peaks and dips in the curves sometimes

Table 1

Intermediate quantities:

$$V_r = \frac{(V_T)^2 - (V_R)^2 - (V_Z)^2}{2V_R}$$

$$V_x = \sqrt{(V_Z)^2 - (V_r)^2}$$

$$I = \frac{V_R}{R}$$

Impedance parameters:

$$Z = \frac{V_Z}{I}$$

$$\Theta = \tan^{-1}\left(\frac{V_x}{V_r}\right)$$

$$r = \frac{V_r}{I}$$

$$x = \frac{V_x}{I}$$

where V_T, V_R, V_Z = measured voltages shown in figure 1
V_r = voltage across r in the unknown impedance
V_x = voltage across x in the unknown impedance
I = current through R
Z = magnitude of unknown impedance
Θ = phase angle of unknown impedance
r = resistance of unknown impedance
x = reactance of unknown impedance

Equations used to calculate impedance

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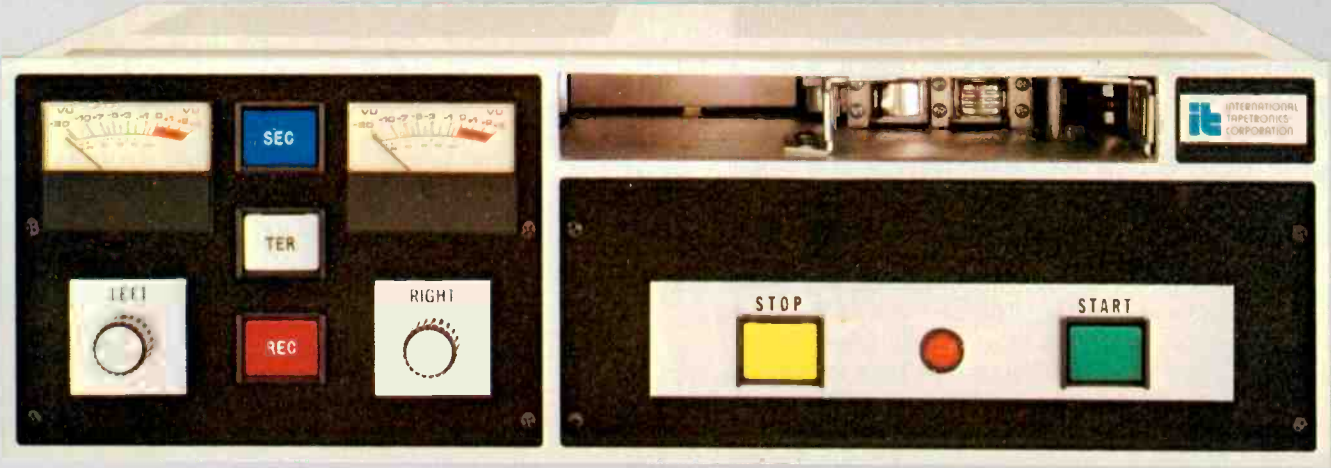

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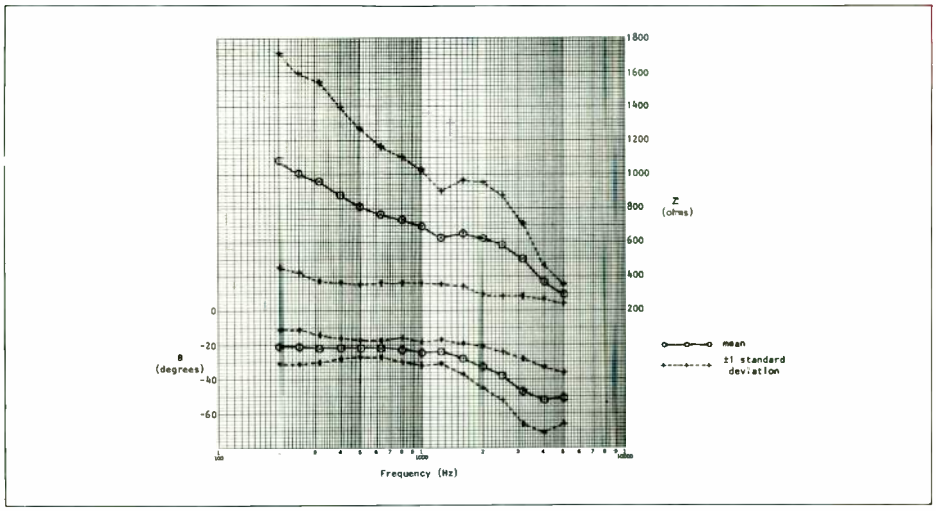
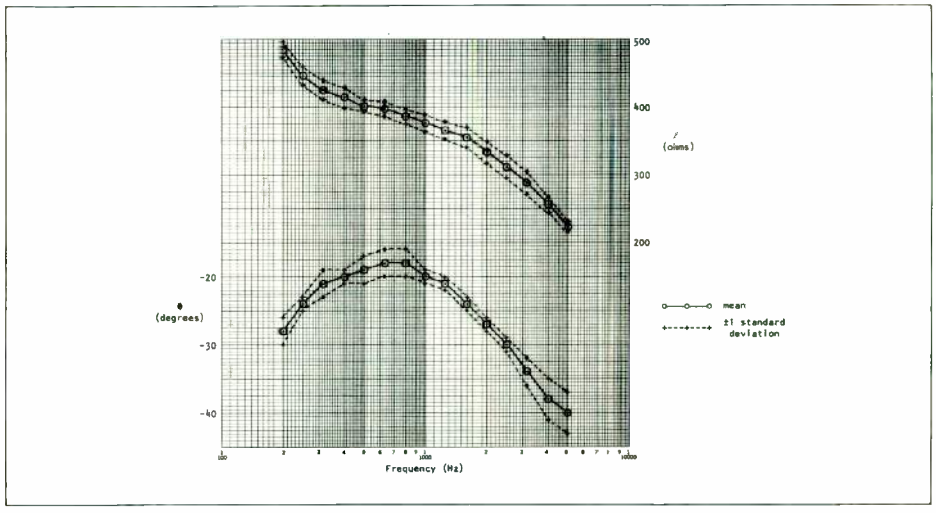
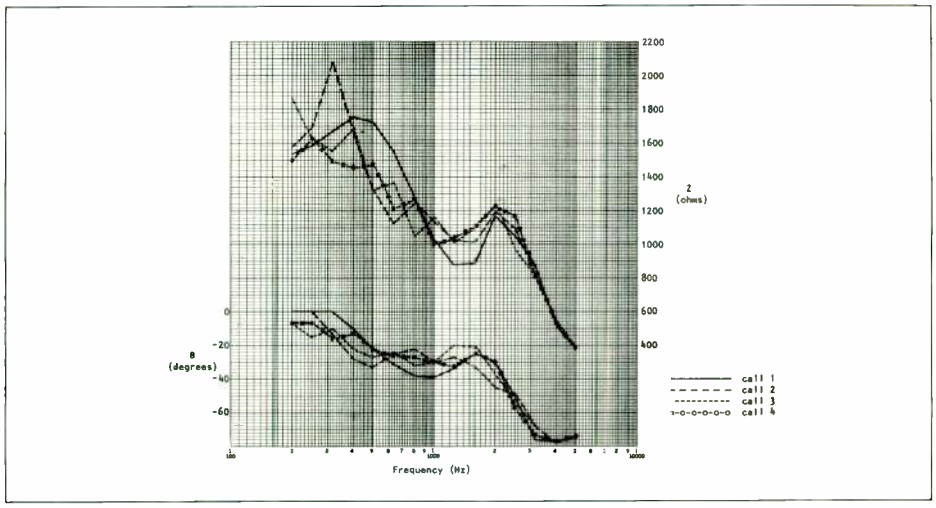
Telephone Line Impedances



Averages of all telephone line impedance measurements show tremendous range of values found



The measurements made at Exchange A, right, showed relatively "well behaved" lines that could be matched reasonably well



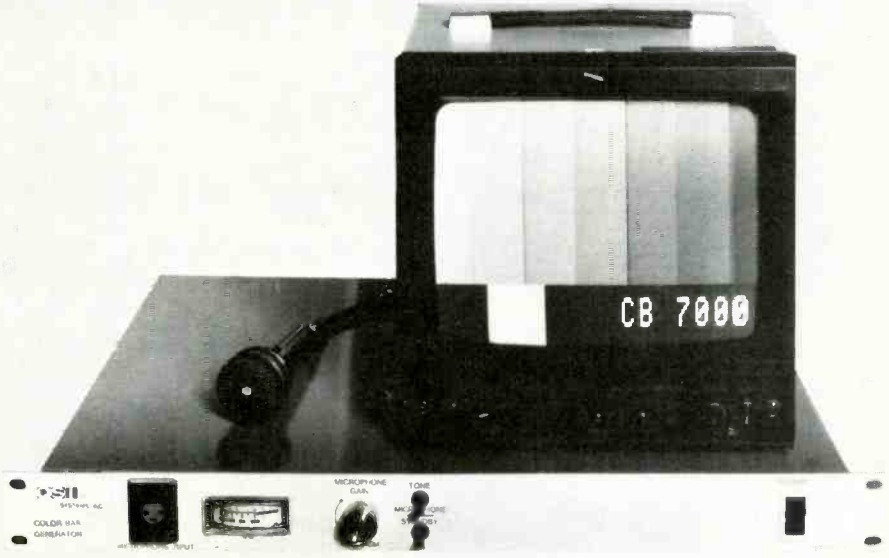
Measurements on lines into Exchange D varied so widely that averages were nearly meaningless; using these lines presented great matching problems

reverse themselves from call to call. This is borne out in adjusting our present hybrids: an excellent trans-hybrid loss can be obtained at one frequency, while 250 Hz away it is 20 dB worse; yet under a different call condition, the bad and good spots reverse.

Graphs of the other two measured exchanges, B and C, showed these two exchanges to lie between the "best" and "worst" exchanges, A and D.

These measurements help provide a better understanding of the problems broadcasters face when trying to develop a telephone interface that will perform well under all necessary conditions. Although some lines are relatively well-behaved so that balancing networks are not too difficult to design, other lines are impossible to balance with passive lumped networks. The differences between exchanges are so great that building a device that will work well with all of them is a major achievement. We can hope that some of the new telephone interfaces that have been or are about to be introduced commercially will solve some of these problems. **BM/E**

you can



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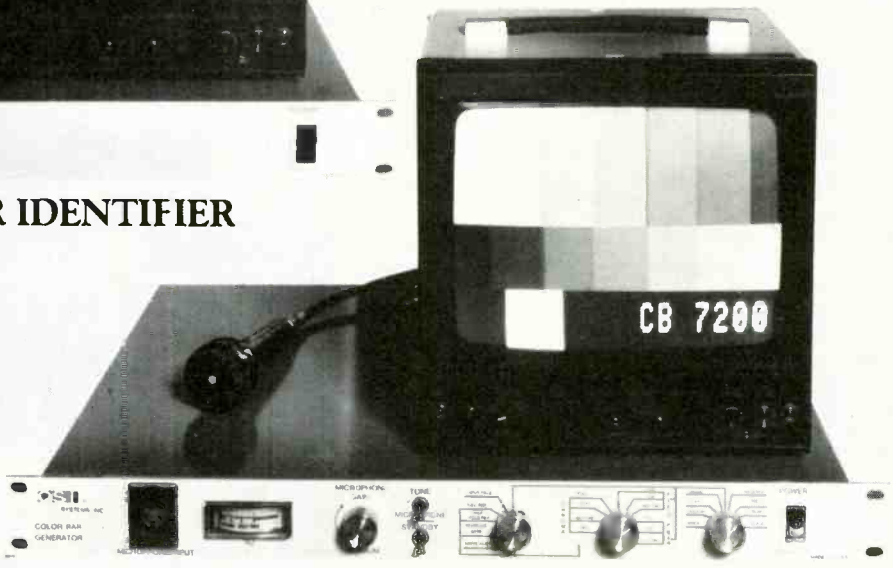

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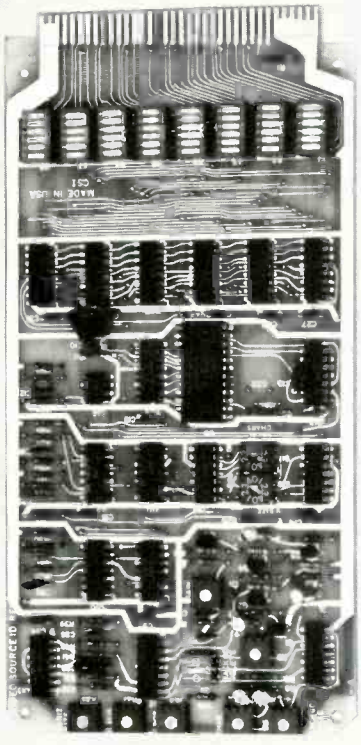

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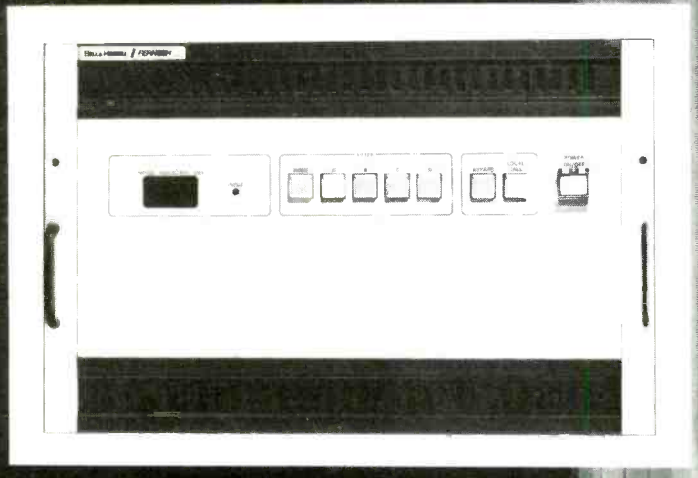
"Our clients definitely get a better end product through the use of the TDF-2."



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KAKE: QUALITY ENG ON A BUDGET

Faced with the classic smaller market dilemma of how to take advantage of newer technology without either assuming the national debt or using sub-standard equipment, KAKE made a rapid transition to ENG while saving money and maintaining quality.

LARRY HATTEBERG is a stickler for video quality. As chief photographer for KAKE-TV, Wichita, Kansas, he always insisted that his photographers maintain high standards while filming. But as with most stations, KAKE saw the value in being all-electronic in its news department. The question that Hatteberg and KAKE management had to answer was how to continue that quality with electronic cameras and still make the switch to total ENG as rapidly as possible. With the cost of the better ENG cameras in the $40,000-plus range, a rapid change was not financially feasible under those circumstances.

ENG wasn't new to KAKE, but the station's three cameras were constantly being rotated among the eight photographers. Hatteberg felt that it was important for each photographer to have his own equipment. He believed that when people have a proprietary stake in a set of equipment they take better care of it. That had been his experience with film cameras, when individual photographers had everything they needed to function and felt as if it was "their stuff." It allowed a photographer to become familiar with the quirks of the equipment and be able to work effectively around it. It was also easier to know what was a quirk and what was a real problem.

The arrangement worked fine when the station was using film cameras that cost a few thousand dollars. Buying eight new film cameras is well within the budget of even the smallest television station. But making that same budgetary commitment with cameras that cost upwards of $40,000 is another thing all together.

Being practical people, the news department management made the decision to move into total ENG at a much slower rate. That meant one or two cameras this year, two next year, and the rest the following year. That was the plan until Sharp came to the station to demonstrate the XC-700. The basic unit costs $12,000 without the lens.

The temperature ranges in Wichita makes it necessary to have dependable equipment

There was a certain amount of skepticism on the part of KAKE's engineering staff on how good a $12,000 camera could be for use in a professional broadcast news operation. According to Hatteberg, "Our engineering staff was all set to pooh-pooh it and say that it was a piece of junk. They didn't say that. They said that it's a good camera. It's an amazing camera for the price."

After the engineering people got through with the camera the news department took over. Ray Depa, KAKE's news director, said, "We took it out into the field and used it and, frankly, we just didn't see a $27,000 difference."

This is not to say that Sharp has built a $40,000 camera for two-thirds less (they don't claim that), but according to the engineering staff at KAKE they have built a camera that is as good if not better than cameras costing twice as much. That was exactly the market that Sharp was after.

Quality ENG On A Budget

The cost of the Sharp XC-700 suddenly presented KAKE's management with some options that didn't exist before. When the positive report came back on the camera Larry Hatteberg faced a dilemma: "Now what do we do? Here we've got a camera that we could afford to purchase all at once. We decided at this point to take a chance on what was an unproven camera.

"We figured that in three years we were going to be buying all new cameras because of advances in technology. This could not be a long-term investment in cameras. And at $44,000 dollars a camera we just wouldn't get our investment back in that three-year period.

"We decided to go with the Sharp camera. It's not as expensive as a $44,000 camera, but we were able to go with assigned equipment, a camera with which our photographers were happy, and we didn't see that great a difference in the image [for the additional amount of money involved].

"Now, I see a little bit of a difference in the image but I'm a trained observer. My wife can't see it, my friends can't see it, and people at home, I don't think, can see it. At this point we are really very happy with the camera."

Assigned equipment eases maintenance

Hatteberg makes much of his photographers having assigned equipment. "I think the key to keeping a camera looking good is assigned equipment — having one person use that camera," Hatteberg explains. "I don't care whether it's a $2000 camera or a $50,000 camera, that's the key." Hatteberg feels that for a station the size of KAKE, that system is the only way to keep ahead of problems.

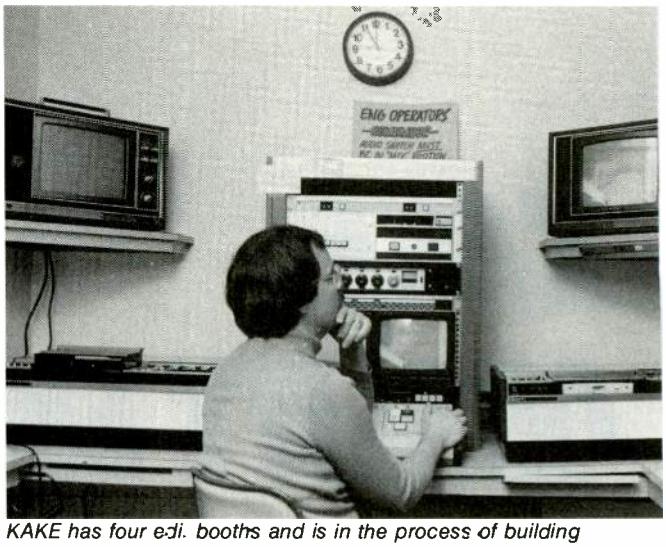
Each week, on the photographer's day off, the camera and recorder (KAKE uses Sony BVU 50s) are left in the newsroom maintenance shop. During that time, the two engineers assigned to handle maintenance on news equipment have plenty of time to check out the gear. A regular schedule of preventive maintenance has forestalled some of the problems that other stations have had after the switch to ENG. "A station that does not commit to a good maintenance program for its ENG operation," explains Hatteberg, " is asking for disaster. You've got to be on top of it all the time."

While setting up a good maintenance program is a must, there also must be a commitment on the part of the maintenance engineers to make sure that the equipment is always in excellent condition. "Our engineers really want to make that camera look good. They go that extra mile. I've got to give them credit — they really care and that makes a big difference," adds Hatteberg.

Cameras are half the ENG equation

Making the transition to ENG involves not only cameras but also editing equipment. And while there hasn't been the level of commitment to one brand of editor as there was with the Sharp XC-700, KAKE is favorably impressed with the Newsmaker editor from Cinema Products, for many of the same reasons the station cited for buying the Sharp cameras.

"For a news department," says Hatteberg, "it's a fine little editor. It's inexpensive but it does things that an editor costing three times as much can do. It's very accurate. We're real happy with it and I think that we're going to replace one of our older units with it." If the editor continues to perform up to the standards set by the station, there is little doubt that it could become the editor of choice at KAKE.



KAKE has four edi. booths and is in the process of building another. The station is also putting in a room for microwave reception

The Sharp XC-7C0 with the attendant gear has allowed TV-10 to go ENG much faster than originally planned


Regular maintenance has kept the KAKE equipment working with few problems. Hatteberg says good maintenance is the key to a successful operation

The psychology of transition

Dennis Decker is a photographer/editor at KAKE. He had no physical or technical problem making the transi-

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Quality ENG On A Budget

Larry Hatteberg, chief photographer at KAKE, has won many awards for his film work, but feels that ENG is a necessity in today's marketplace

tion to ENG. He had used ENG cameras before. But he was first and foremost a film cameraman. "You know the old joke," he relates. "Old cameramen never die, they just fade to black." He tells the story because he had felt that the change to ENG had taken away some of his creativity. "There was always that good feeling," he explains, "of going out on a story and coming back and saying, 'I got it.' You would screen the film for the first time and think, 'Boy, that's beautiful.' You'd hit the right exposure and everything was just perfect. It was a great feeling. With tape, the way everything is automated it's hard to mess up."

Decker felt that he had lost the control that made him a good photographer. He had difficulty in his mind dealing with a system that only required you to point the camera and let it do all the work. He even felt that there were just some kinds of shots that you could only get with a film camera. Decker didn't like the feeling of operating like an automaton. But Dennis Decker is not an automaton, he's a photojournalist, and he best describes his rebirth as an electronic photojournalist:

"I shot this warehouse fire. It was blazing like you've never seen it blaze before. As I shot it I had the same feeling that I had with film. I felt in control for the first time. I knew that what I was seeing through the viewfinder was what I was going to get. It was a tremendous feeling.

"When I rolled up to that fire at two o'clock in the morning I felt independent again. I felt that everything was working for me; the camera, the BVU, and myself were working as one like it had been with film.

"I think that some photographers who have made the transition have yet to feel that. They're doing a good job but they are not feeling the satisfaction that they once had.

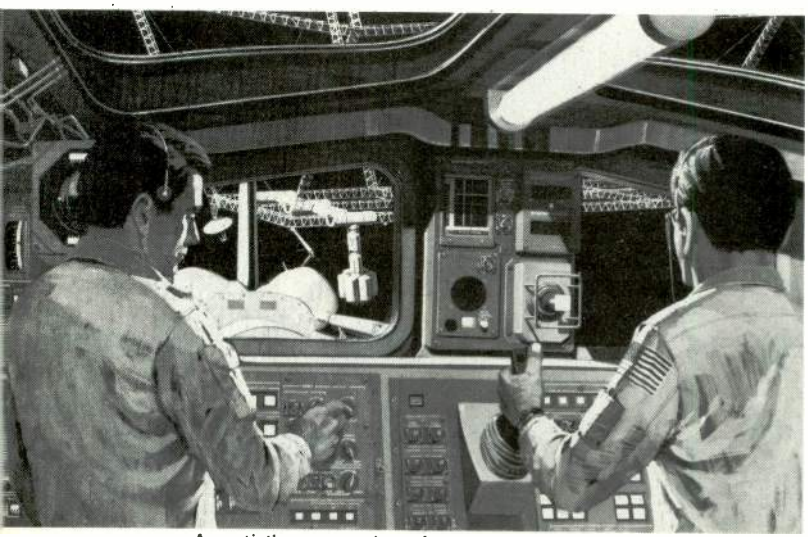
"I think that when 'old photographers' went from film to tape they thought that they'd died. They have yet to wake up to the fact that it is a new beginning. And it's time for them to reassess the skills that they had and how they can put those into the new era."

Fade up. **BM/E**

Space Shuttle

Launch of the space shuttle will be controlled from this center, which has been outfitted with a sophisticated launch processing system. The Apollo moon mission launches were controlled from here

For broadcasters who remember the first satellite transmission of a television picture on the night of July 10, 1962 via Telstar I, the promise only imagined then will be fully realized. For radio broadcasters at popular music stations who remember the excitement of Telstar captured by the popular song of the same title, their share in this satellite age will be just as great as that enjoyed by television. Satellite communications already provide the distribution of high-quality music programs and television programs economically superior to terrestrial transmissions at any distance greater than 700 miles. But demand for satellite channels already outstrips capacity. Anyone viewing the dramatic coverage of the U.S. hostages held in Iran cannot help but understand the potential, but anyone who tried to acquire transponder time during those exciting days in January will also remember the "no vacancy" response of the satellite operators — if they were even able to reach the jammed switchboards at Western Union and RCA. Owners of transponder time, like Wold Communications, were equally deluged with frantic requests for time on the birds; all three of Wold's "flying saucer" transportable uplinks were fully booked. The situation was similar wherever satellite communications equipment was present. A few lucky stations, like Portland's KATU, which has its own transmit/receive earth station (and very fortunately happened to have a reporter in Europe at the time on another assignment), were able to scoop their competition with satellite reports piggybacked by their affiliated network.



An artist's conception of how two crew members will execute cargo handling from a special cargo control panel aboard the Columbia

Stations like KATU, which have entered the future with a vengeance and silenced their critics with results, also lead the way to the routine use of satellite technology at the local station level. In last month's "Panels of 100 Survey of Broadcast Industry Needs," earth station equipment shot out of nowhere on broadcasters' wish-lists to take seventh place in the minds of radio broadcasters and second place in the minds of television broadcasters. Sixty-two percent of radio broadcasters and 80 percent of television broadcasters stated that earth station equipment was on their list of 1981 equipment needs. In both cases, the support for earth station interest came evenly from managers and engineers. There seem to be few doubters left.

Cost of communication plunges

NASA's Office of Space Transportation Systems will be offering the first cut-rate space fares via the shuttle. In years gone by, launch costs necessarily included the complete consumption of the vehicle. Cost of the satellites necessarily included a return on investment period equal to the life of the bird since repair was impossible. Satellites always used "ultimate" designs, since once orbited, they could never be upgraded.

With the space shuttle, NASA expects to recover its investment in the vehicle and ground systems over a

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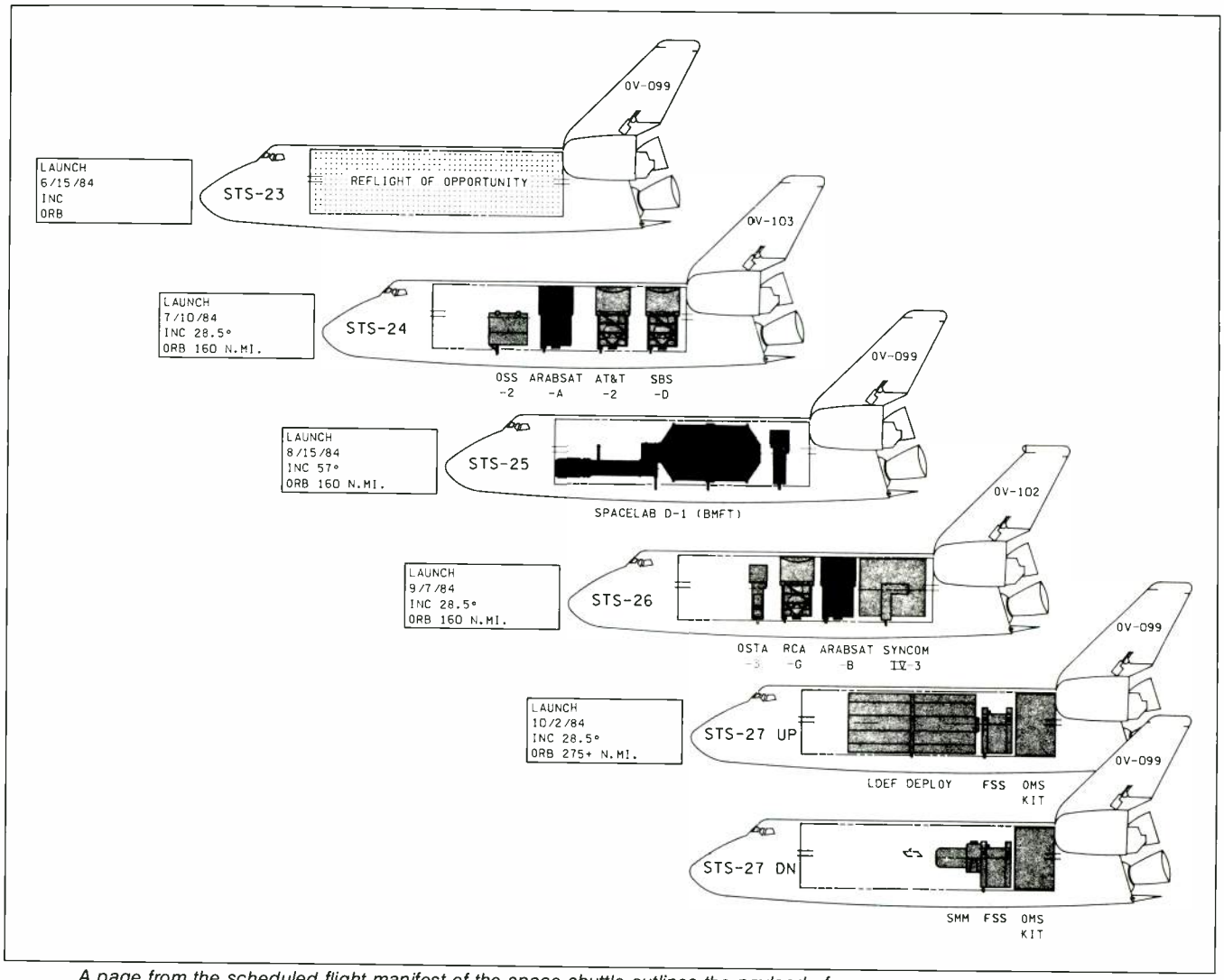

A page from the scheduled flight manifest of the space shuttle outlines the payload of several 1984 flights

12-year period and has not included the cost of original research and development in its freight rate calculations. A shuttle launch will cost one- to two-thirds less than launches aboard the non-reusable Delta, Atlas-Centaur, and Titan rockets that have lifted most previous commercial satellites into orbit. When the shuttle program is fully operational and is undertaking a planned 50 missions per year, NASA estimates that launch savings will amount to half a billion dollars a year, "depending on inflation."

The huge cargo area of the space shuttle measures 60 feet long by 17 feet wide by 13 feet high. The weight of the payload can be up to 65,000 pounds. These capacious accommodations will greatly ease the design problems for satellite manufacturers. Functions and capabilities left out of pre-shuttle satellites can be built into the new generation. The liberated design potential this presents to the manufacturer will increase satellite productivity and reduce costs.

In fact, the freedom to design bigger and more efficient space craft will ultimately save even more than the reduced launch costs. Previously, launch costs have represented about 20 percent of total mission costs, with 80 percent of costs going into the actual payloads. NASA expects that payload costs can be cut by 30 to 40 percent.

Another unique area for economy stems from the actual flight characteristics of the shuttle craft. Because of the extremely gentle acceleration of the shuttle, passengers and payloads will experience g-forces no greater than 3 g. This means that the crew can include civilian personnel in reasonably good physical shape, chosen for the particular needs of the mission. Employees of commercial satellite manufacturers can accompany the satellite into orbit to care for its special needs or be taken into orbit to repair malfunctions aboard equipment launched earlier. The gentle shuttle flight also means that design considerations for individual satellites will not have to include their ability to withstand the 7 g stress of standard launch.

The Columbia

The shuttle consists of four primary parts: two solid rocket boosters (SRBs), an external fuel tank that carries the liquid fuel for the shuttle's main engines, and the orbiter are reusable; only the external tank (ET) is expended fully during each flight.

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The SRBs are solid fuel rockets that fire at launch and help the main engines through the first two minutes of flight. After the craft has reached an altitude of about 24 nautical miles, the SRBs separate from the orbiter and ET and parachute to a soft landing at sea, where they are retrieved by ship. The SRBs are returned for refurbishing and refueling and are expected to be good for up to 50 missions.

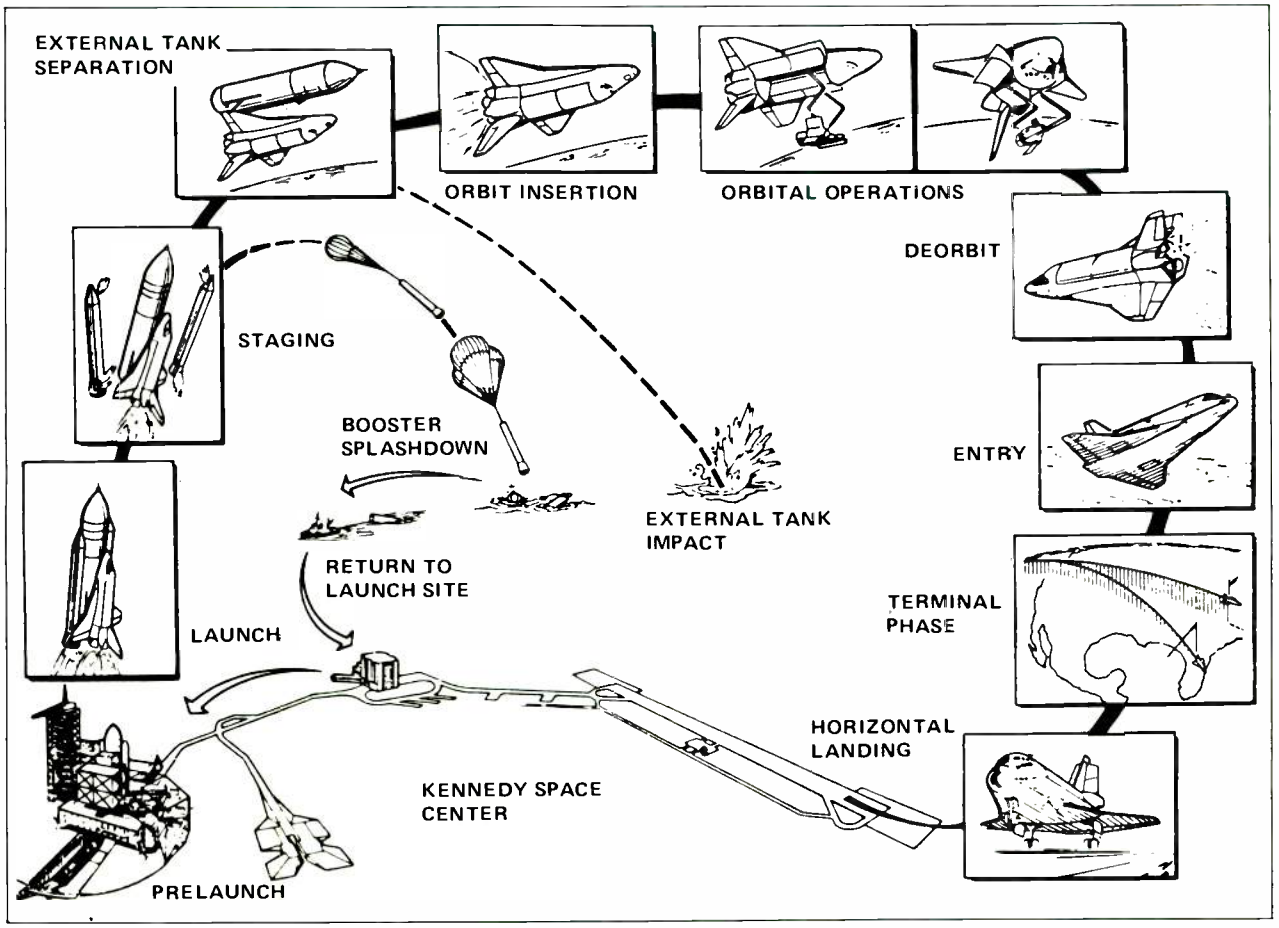
The orbiter, which houses the main engines, derives its fuel from the ET. The fuel is a liquid oxygen/liquid nitrogen mixture in a six-to-one ratio. The main engines develop sea-level thrust of 375,000 pounds and burn for about 8.5 minutes. As the orbiter escapes the earth's atmosphere and begins to enter orbit, the ET separates and falls back to earth. The ETs are expected to land somewhere in the Indian Ocean, but no attempt will be made to recover them.

The orbiter and its crew are expected to remain in orbit for about seven days on the average mission. The crew will be maintained in a "shirt-sleeve working environment" with an oxygen/nitrogen mixture and temperatures equivalent to earth's atmosphere at sea level. Food is plentiful and interesting if not tasty, but will resemble food served aboard commercial airliners. In fact, even the W.C. resembles those used aboard airliners, with the only apparent difference being the presence of footholds and straps to keep the user on the seat in this weightless environment. At present, no on-board entertainment is planned for the crew, but the 2020 controls on the flight deck should manage to hold their attention.

After the mission is complete the crew (which can consist of up to seven persons) begins the reentry process. The orbiter is slowed by small engines and begins to near the earth's atmosphere. The flight attitude is somewhat reminiscent of a "pancake landing" as the orbiter presents its underside to the upper atmosphere where the high friction temperatures are fended off by specially designed ceramic-like tiles that can remain cool to the touch on the inside while the facing side reaches temperatures of 1200 to 1300 degrees Farenheit. (Actually, numerous types of insulation are used on the various parts of the vehicle with varying insulative properties depending on the expected temperature the part of the craft is expected to experience.)

After the orbiter has slowed enough and penetrated the upper atmosphere, the craft will maneuver like a normal aircraft, although it will be unpowered flight. The craft can control lateral flight over a range in excess of 1000 miles. If the launch, as in the case of the first mission, leaves from the Kennedy Space Center at Cape Canaveral, it will return and land on a standard airstrip at the Center. Other missions may be flown to and from Vandenburg Air Force Base in California.

Just as explorers ventured into the American West in the eighteenth and nineteenth centuries, the full exploitation of the West's potential could not be realized until the advent of the railroad. Once again, Americans are on the verge of tapping vast new resources through the development of an efficient transportation system capable of establishing and maintaining commerce with the new frontier. **BM/E**



A space shuttle typical mission profile

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HIGH-DEFINITION TV AROUND THE CORNER

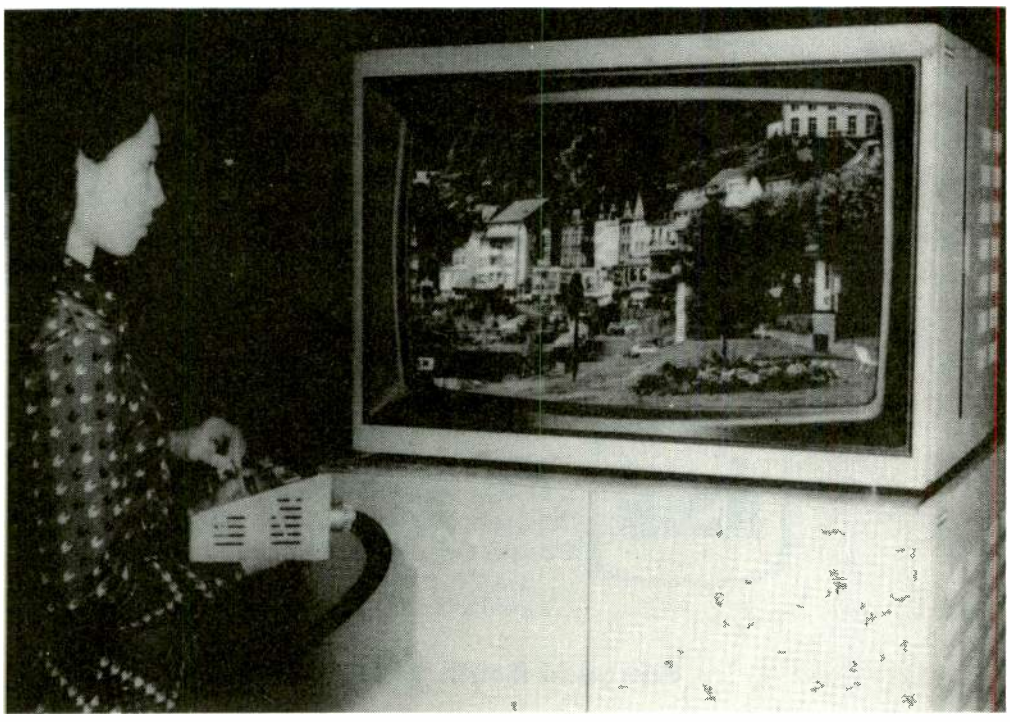
At last month's SMPTE Television Conference, American broadcasters got their first in-person look at Japanese high definition television. The truly superb pictures witnessed by delegates to the SMPTE immediately inspired discussions of "when will it come?" The details supplied in this article on the research done in Japan are a prelude to a discussion of the demonstrations shown at SMPTE, which will be covered in our SMPTE report, next month.

RESEARCH INTO HIGH-DEFINITION TELEVISION by NHK — the Japan Broadcasting Corporation — began in 1968. Studies on the acceptable picture quality and size, signal standard, and broadcasting systems were carried out with simulated film, HD TV cameras, and wide-screen CRT displays developed by NHK, while transmission tests via the Japanese BSE satellite have been made to determine the appropriate transmission system. NHK has now provisionally adopted an HD-TV standard that provides 1125 scanning lines, an aspect ratio of 5:3, and a line interlace ratio of 2:1, with a field repetition of 60 Hz and a video frequency luminance bandwidth of 20 MHz.

For the realization of an HD TV broadcasting service, hardware from the camera to the display device had to be developed by NHK. Satellite broadcasting may prove to be the most economical and technically feasible transmission system because of the wideband nature of HD TV. FM transmission or digital transmission is likely to be used for the HD TV system of the future. FM, digital, and fiber optic transmission methods are described in the article; one of these techniques, or a combination, will bring HD TV to Japanese viewers.

Subjective evaluation tests using color transparencies

Editor's note: The information on high definition television was obtained from papers written by Takashi Fujio, Junichi Ishida, Taro Komoto, and Taiji Nishizawa of NHK's Advanced Television Systems Research Group.



Experimental television receiver with 5-to-3 aspect ratio and 1125 scanning lines gets viewer test in Japan

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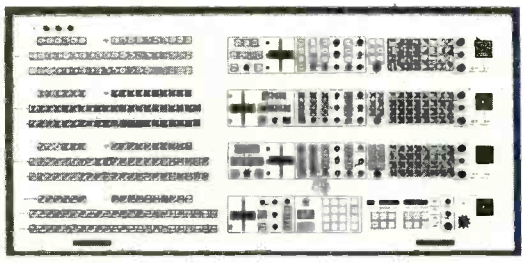

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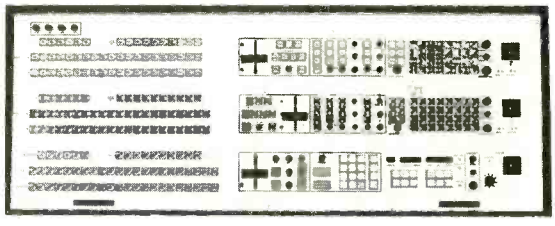

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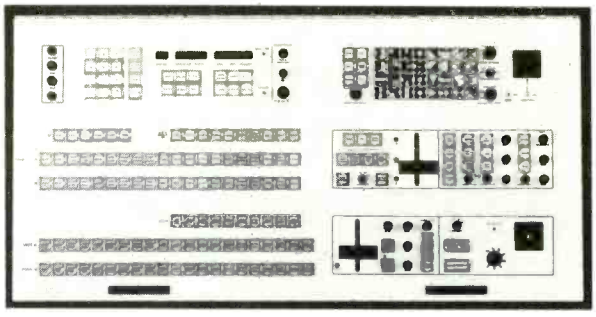

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were carried out to investigate the subjective effects on picture quality of screen size and the number of scanning lines. At first, transparencies were projected onto a specially prepared screen formed by two cylindrical lenticular lenses set at right angles to each other and a diffuser. These transparencies were of printed pictures made by a screen printing technique. They had varying resolutions produced by different values of screen or mesh fineness.

It was found that a television picture having scanning lines and a 2:1 line-interlace ratio has the same subjective picture quality as that of a transparency having 0.6n ~ 0.7n scanning lines. This result agrees well with others obtained from tests for interlace effects on picture quality using an experimental television system with various numbers of scanning lines and interlace ratios.

When the screen area was doubled, the subjective value of the picture quality was improved by about one grade in a seven-grade scale because of increased "realism" and the stronger impression produced by a bigger picture. The 30-inch wide-screen CRT NHK developed in collaboration with manufacturers has a picture area about twice that of a conventional 20-inch CRT and about six times the number of picture elements (2,600,000). It incorporates a high-resolution electron gun and can resolve more than 1000 TV lines. The video bandwidth of the display is expanded to 45 MHz at −3 dB. The display is provided with a zooming-up function that can magnify an optional area on the picture screen about four times.

Experimental apparatus for HD TV studies

NHK Technical Research Laboratories developed a range of equipment with 1125 scanning lines for its high-definition studies. In 1970, for example, a 22-inch color CRT monitor having a shadow mask with a 310 μm pitch of fineness and an aspect ratio of 4:3 was developed. In order to obtain good convergence over the entire area of the display, a digital convergence system was incorporated. The registration of the three-color images was accomplished via stored digital convergence-error signals. A wide-screen television display measuring 1 m by 0.5 m (approximately 39.4 by 19.7 inches) was developed the same year; the unit optically combined three 26-inch color CRTs via half-mirrors. The wide-screen display with 30-inch CRT, described above, was developed in 1977. The following year SHF receivers for HLO-PAL and Y-C separate FM transmissions were developed for satellite transmission tests.

In 1974 NHK developed a high-definition color camera, telecine, and color encoder. The color camera, with resolution of 1125 lines, and a black and white camera with resolution of 2125 lines both incorporate a new pickup tube, the Return Beam Saticon (RBS), which has superior resolution and S/N. Currently a high-performance laser beam telecine is under development. Other equipment includes a signal-processing system that improves hue stability in the flesh-tone color region (developed and tested in a 525-line TV system) and an HLO-PAL color encoder and processor for Y-C separate signal time-multiplexed with PCM stereo sound, perfected in 1977.

Studies to test the results obtained from the film simulation experiments were carried out with these machines. The results were as follows:

Table 1 — Required S/N Ratio For HLO-PAL FM Transmission

n (lines)	1,125
Signal bandwidth (f_b)	30 MHz
Desired S/N ratio (weighted)	53 dB (for threshold of detectability)
Weighting value	12.0 dB
Required S/N ratio (unweighted)	41.0 dB
De-emphasis effevt*	2.8 dB

*Expected S/N improvement by de-emphasis processing

Table 2 — Required S/N Ratio For Y-C Separate FM Transmission

n (lines)	1,125	
Y or C	Y	C
Signal bandwidth	20 MHz	6.5 MHz
Desired S/N ratio (weighted)	53 dB (for threshold of detectability)	
Weighting value	13.4 dB	9.5 dB
Required S/N ratio (unweighted)	42.6 dB	46.5 dB
De-emphasis effect*	9.9 dB for Y signal, 10.1 dB for C signal	

*Expected S/N improvement by de-emphasis processing

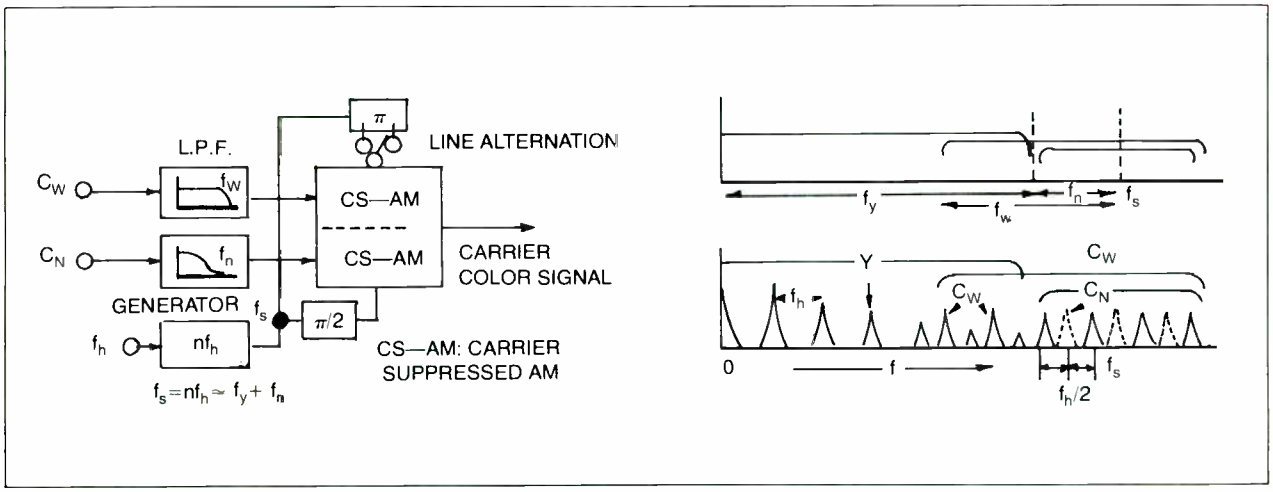

Fig. 1 shows, left, block diagram of the chrominance modulator used in experimental high-definition television broadcasts by NHK, Japanese television authority. On the right is the frequency spectrum of the color subcarrier signal in the HD system

- In a television system operating on a 2:1 interlace and 30 Hz frame, 1600 scanning lines are sufficient to obtain satisfactory picture quality with no line flicker.
- In a high-definition television system with 1125 scanning lines and a 4:3 aspect ratio, a desirable signal bandwidth is about 15 MHz. In this case, picture quality deterioration is not perceptible even at a viewing distance of three times the picture height.
- On a 1125-line system with a 5:3 aspect ratio, desirable bandwidths for wideband chrominance component and narrow-band chrominance component are 6.5 MHz and 4.5 MHz respectively.

HLO-PAL signal

The high-definition television system of the future should be such that image information can be transmitted with high stability. However, stable transmission of information can be achieved by tradeoff with the bandwidth.

A composite color signal named HLO-PAL is one high-definition television signal used for terrestrial broadcasting. This signal has been utilized for transmission test at NHK's laboratories. A block diagram for the signal processing and a frequency spectrum of the signal are illustrated in Figure 1. With this signal system, efficiency in frequency utilization will be reduced a little owing to multiplexing of the chrominance signals, but there will be less crosstalk between two chrominance components and between the luminance signal and the chrominance signal. The picture quality therefore will be less degraded by variations of transmission channel characteristics.

Y-C separate transmission

Satellite transmission will be one feasible broadcasting system for future high-definition television. A wideband FM transmission system is desirable. However, for FM transmission of the composite color signal that multiplexes the chrominance signals in the high-frequency range of the luminance signal, such as in the NTSC and HLO-PAL system, high transmitter power will be required to to keep a high S/N ratio in the chrominance components. For efficient transmission of the signal with low power and narrow bandwidth, the Y-C separate transmission system in which luminance signal and line-sequential chrominance signal are transmitted through individual FM channels is desirable. PCM stereo audio signal is multiplexed in the horizontal blanking period of

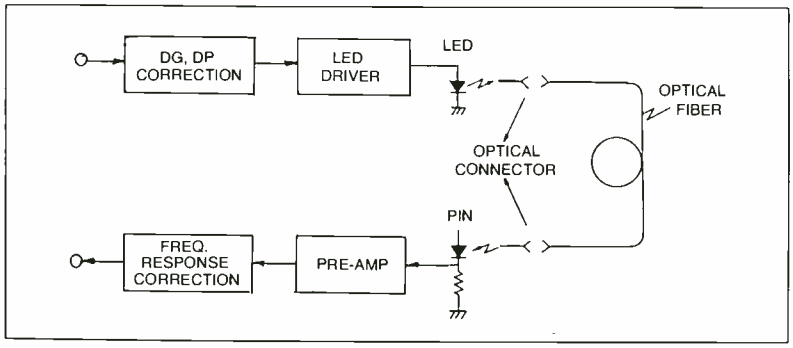

Fig. 2. Overall arrangement of experimental optical fiber transmission system used with high-definition television

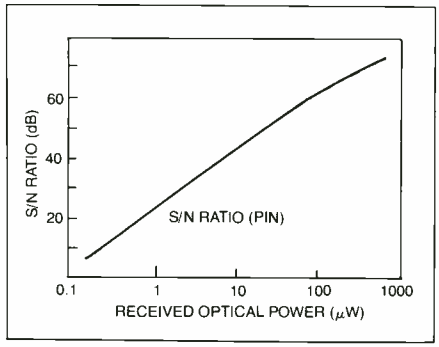

Fig. 3. Graph shows the S/N ratio in optical fiber transmission as function of received optical power

Table 3 — Parameters For High-Definition Television Signal Transmission (Tentative)

Parameters	Composite color signal transmission	Y-C separate transmission		Composite color signal transmission	Y-C separate transmission	
		Y	C		Y	C
Carrier frequency	22.8 GHz			42 GHz		
Video bandwidth	30 MHz	20 MHz	6.5 MHz	30 MHz	20 MHz	6.5 MHz
Type of modulation	FM	FM	FM	FM	FM	FM
Radio frequency bandwidth	100 MHz	75 MHz	25 MHz	100 MHz	75 MHz	25 MHz
Video signal-to-noise ratio* (unweighted)	40.9 dB	42.6 dB	46.5 dB	40.9 dB	42.6 dB	46.5 dB
Carrier-to-noise ratio (99.5% of time)	25.6 dB	17.3 dB	19.8 dB	25.6 dB	17.3 dB	19.8 dB
Receiving antenna diameter	1.6 m	1.6 m	1.6 m	1.0 m	1.0 m	1.0 m
Receiver noise temperature	800 K	800 K	800 K	1100 K	1100 K	1100 K
Atmospheric attenuation (99.5% of time)	6 dB	6 dB	6 dB	14 dB	14 dB	14 dB
Required e.i.r.p. at the edge of service area (-3 dB)	74.7 dBW	65.2 dBW	62.8 dBW	88.1 dBW	78.6 dBW	76.3 dBW
Satellite transmitting antenna bandwidth	1.0°			1.0°		
Satellite transmitter power	3.2 kW	360 W	210 W	70.8 kW	8.0 kW	4.6 kW
		570 W			12.6 kW	

*S/N ratio for threshold of noise detectability

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the luminance (Y) signal. In this system, amplitude peak after preemphasis is suppressed to an extent of negligible picture degradation in order to make a large frequency deviation. Thus, a high S/N ratio can be achieved with a low transmitter power.

By using the single weighting function for noise affecting television signal which the authors proposed, the desired S/N ratio for the same noise impairment as in other television systems can be defined. Table 1 shows the desired S/N ratio for threshold noise impairment which is required for the FM-transmitted HLO-PAL signals, and Table 2 shows those for the Y-C separate FM transmission.

The Y and C signals are preemphasized. The crossover frequency f_t for the Y signal is 0.8 times the cutoff frequency f_0; and the f_t for the C signal is 0.25 f_0. The gain in the high-to-low frequency range is 12 dB.

FM TV broadcasting in 22 GHz, 44 GHz, and 80 GHz

The most economical and practical system for the proposed high-definition television service may be the transmission by satellite broadcasting and reception by home antennas. The VHF and UHF bands are unusable for the transmission of the broadband signals of high-definition television. At present, 12.2 GHz, 23 GHz, 43 GHz, and 86 GHz bands are reserved for satellite broadcasting services. Rain attenuation is very large in the 42 GHz band and 85 GHz band, so the use of the 23 GHz band looks most feasible.

Typical satellite link parameters are listed in Table 3, based on the required S/N ratios given in Table 2. The radio frequency bandwidth is 100 MHz, and the time fraction of S/N ratio which does not exceed the threshold of noise detectability is 0.5 percent during the worst month of the year. It can be seen from Table 3 that the satellite transmitter power is 600 W per one degree coverage for the Y-C separate transmission system. This transmitter power is likely to be achieved by the late 1980s.

The use of the 42 GHz band may be impractical since 20 times the power required in the 23 GHz band would be needed. This is because of large rain attenuation at 42 GHz band.

The Japanese experimental broadcasting satellite "YURI" was launched in April 1978, and various transmission experiments are now being carried out.

NHK performed a high-definition television experiment with the cooperation of the Japanese Ministry of Posts and Telecommunications, employing Y-C separate transmission. A one-channel stereo PCM audio signal was time-division multiplexed in the horizontal blanking period of the Y signal. The satellite link parameters of the experiment are shown in Table 4. As the result of the experiment, the S/N ratio of the received picture was approximately equal to the threshold of detectability when received with a 2.5 m diameter antenna.

Digital transmission of high-definition television

It is important to consider not only FM transmission systems but also digital transmission systems, especially for future broadcasting systems. Considerable bit rate reduction can be expected utilizing digital signal processing techniques such as intra-frame coding (DPCM and block coding) and interframe coding. The total bit rate is

250 Mb/s including a sound channel. Digital satellite transmission parameters of the DPCM coded signal are shown in Table 5. The carrier-to-noise (C/N) ratio required to keep the bit error-rate (BER) under 10^{-5} is 18.8 dB, in which a total C/N ratio degradation of 6 dB is assumed.

Table 4 — Parameters For Satellite Transmission Test In 12 GHz Band

Parameters	Y	C
Video bandwidth	20 MHz	6.5 MHz
Radio frequency band	75 MHz	25 MHz
Satellite transmitter power	100 W	100 W
Receiving antenna diameter	2.5 m	
Carrier-to-noise ratio	16.6 dB	22.0 dB
Video signal-to-noise ratio (unweighted)	40 dB	45 dB

Scene in experimental high-definition system shows refined detail that results from using around 1000 horizontal scanning lines, rather than standard 525

Enlargement of section of above scene about four times demonstrates that scanning lines just become visible in parts of picture; detail holds in most parts

The C/N ratio degradation is caused mainly by intersymbol interference due to band limiting and the nonlinearity of transponder. In this case, the required satellite transmitter power is 1010 W, which is not large compared to FM transmission.

If interframe coding is adopted, a smaller bit rate can be utilized, resulting in the reduction of the transmitting bandwidth and transmitter power. Thus digital transmission is competitive with FM transmission.

Fiber optic transmission of high-definition signals

Optical fibers are very suitable as transmission lines for broadband high-definition television signals because of their wide bandwidth and low loss characteristics. NHK has developed several optical fiber transmission systems. The first experimental system is shown in Figure 2. With this system, a baseband high-definition television signal modulates the light intensity output of an LED. The light beam is transmitted through a low-cost step-index optical fiber and detected at the receiving end by a PIN photodiode and high input-impedance amplifier.

Figure 3 shows the received optical power and S/N ratio of a detected television signal. In the case of transmitting

Table 5 — Parameters For Digital Transmission Of High-Definition TV

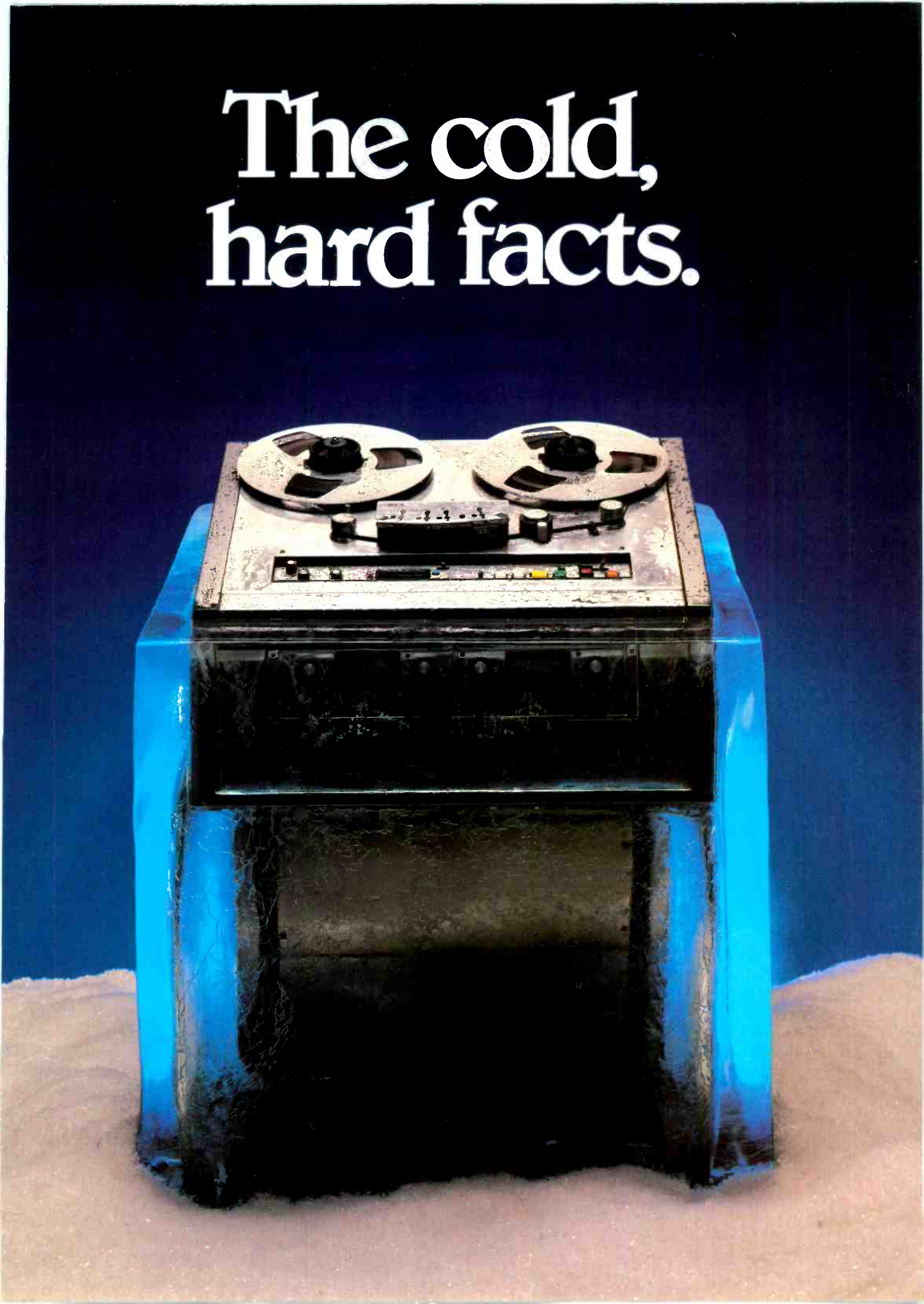
Parameters	Digital transmission (DPCM)
Bit rate	250 Mb/s
Type of modulation	4ø PSK
Radio frequency bandwidth	150 MHz
Bit error rate	10^{-5}
Carrier-to-noise ratio (99.5% of time)	18.8 dB
Receiving antenna diameter	1.6 m
Receiver noise temperature	800 K
Atmospheric attenuation (99.5% of time)	5 dB
Required e.i.r.p. from satellite at the edge of service area (-3 dB)	69.70 dB
Satellite transmitting antenna bandwidth	1°
Satellite transmitter power	1010 W

30 MHz band composite color television signals of a 1125-line system, the threshold of noise detectability is 41 dB, so the received optical power must exceed 10 μW. Input optical power is about 100 μW, so the permissible loss in the optical fiber is 10 dB. Recently developed optical fibers have losses as low as 3 dB/km, and it is therefore possible to transmit high-definition television signals over 3 km without any repeater.

Another system using a trans-impedance amplifier was also experimented with. The output noise of this system has a flat spectrum. The light modulation index is 50 percent and the S/N ratio obtained with 15 μW optical power is 43 dB.

A new system in which a laser diode is used with a transmission capacity of 500 MHz for long-distance trunk line transmission or distribution with a community antenna reception system via the broadcasting satellite is now being developed. In this system frequency-modulated signals of high-definition television and VHF standard television signals are transmitted by frequency multiplex through graded-index optical fiber. **BM/E**

The cold, hard facts.



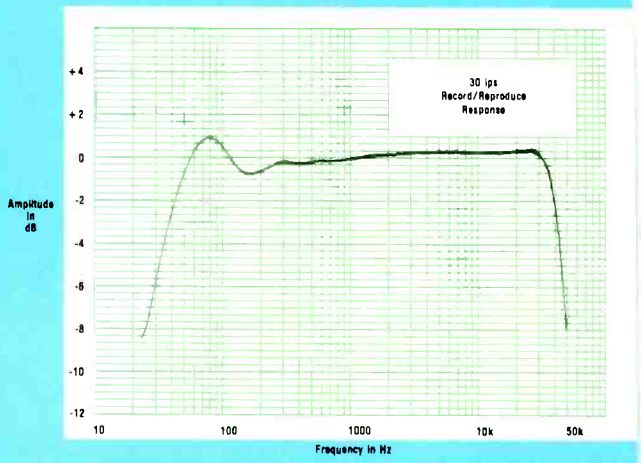
Specifications speak for themselve

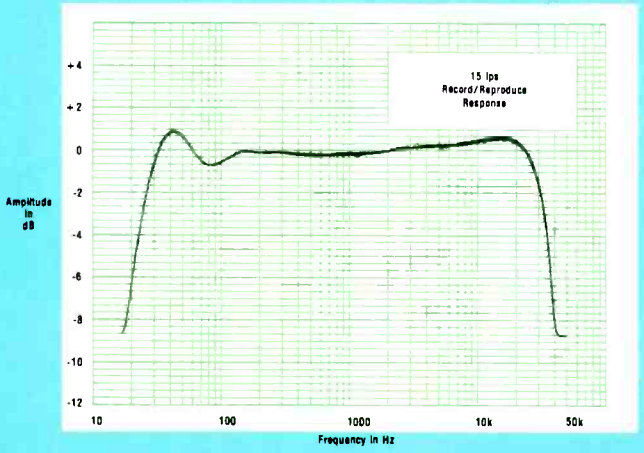
MCI invites you to compare specifications for the JH-110B against those of any oth tape recorder on the market today. No pretty pictures, no bright copy, just facts. The 110B...unsurpassed in a field of professionals. And that is a cold, hard fact.

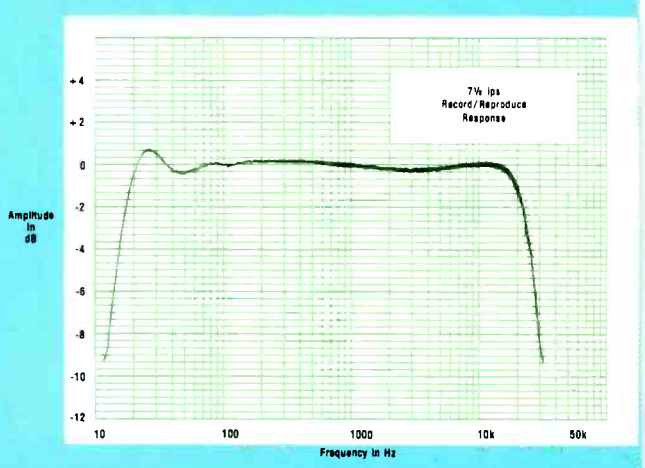
Unless otherwise specified, the following conditions apply to all graphs:

Speed: 30 ips
Overbias: 1.0dB @ 10kHz
Fluxivity: 0dBm = 250nWb/m
Speed: 15 ips
Overbias: 3.0dB @ 10kHz
Fluxivity: 0dBm = 250nWb/m
Speed: 7½ Ips
Overbias: 3.0dB @ 10kHz
Fluxivity: -10dBm = 80nWb/m

All tests were performed utllizing Scotch Type 226 Tape.

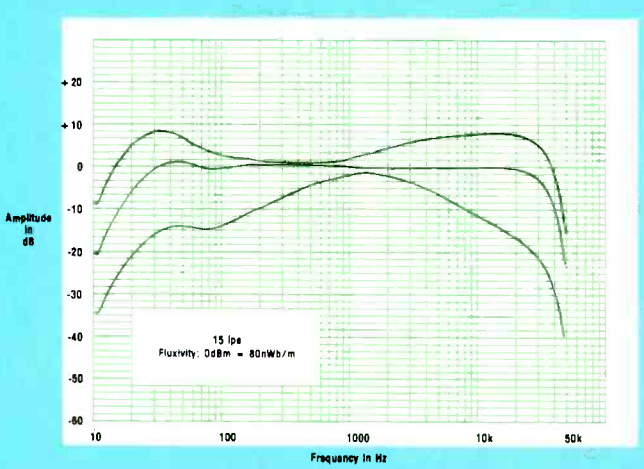






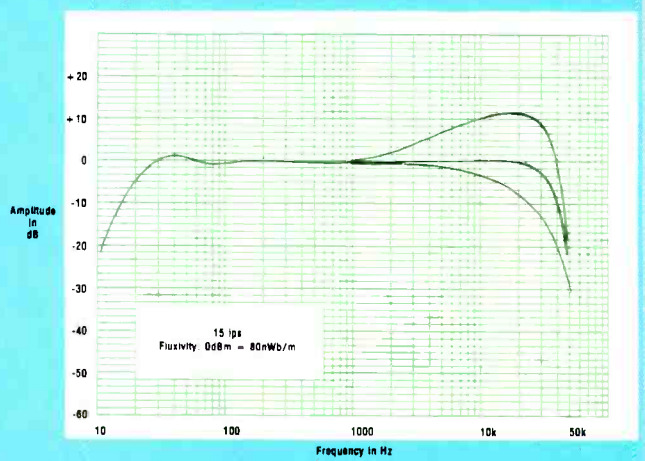
RECORD/REPRODUCE RESPONSE

These graphs represent the frequency response of the recorder on and off tape, assuming a constant input level. They demonstrate the flat an extended response of the JH-110B Recorder.



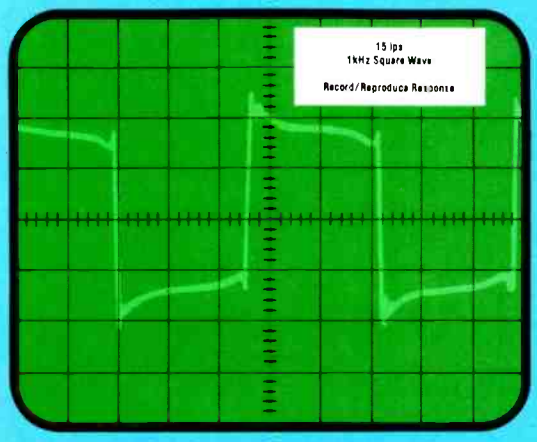
REPRODUCE EQ RANGE

A wide range of reproduce equalization adjustment ensures that the JH-110B will conform to NAB, IEC and AES standard response curves. There is sufficient range to compensate for head wear and to align to reference tones on aged or degraded tape copies.



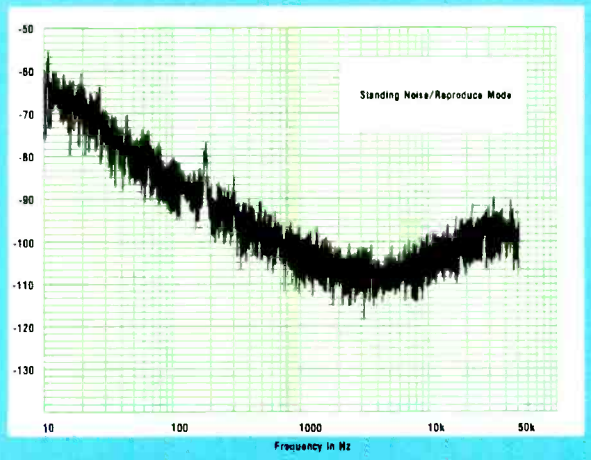
RECORD EQUALIZER RANGE

The record circuitry of a recorder is aligned to complement the reproduce response previously aligned to match standard curves. T JH-110B features a wide range of adjustment to allow alignment us any of the range of tapes available today.



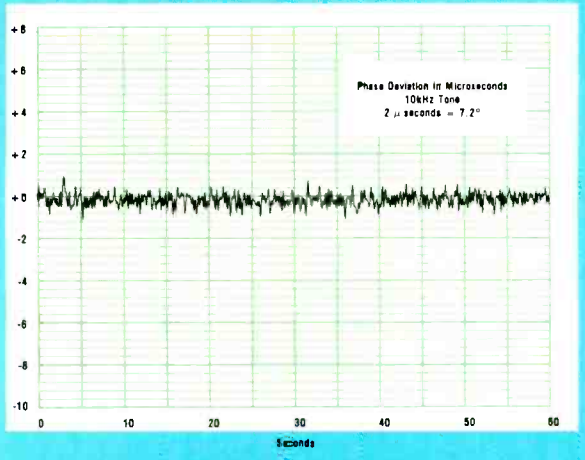
SQUARE WAVE RESPONSE

are Wave Response demonstrates both transient response and se linearity throughout the recording process. Response such as the JH-110B produces excellent reproduction of live, dynamic erial and reduces copy to copy degradation.



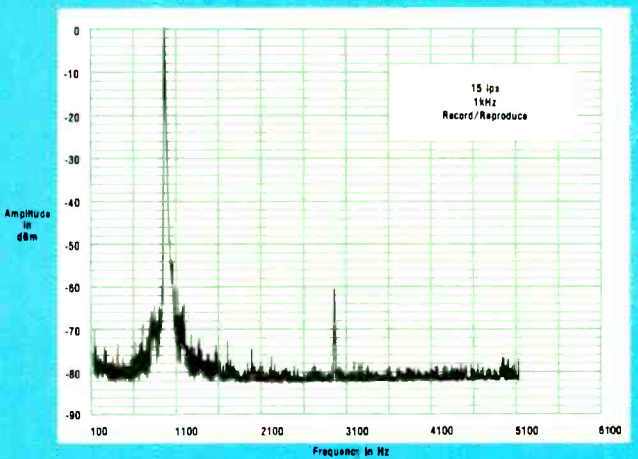
STANDING NOISE/REPRO MODE

s is an amplitude versus frequency plot of the various noise nponents generated internally by the electronic circuitry. Use of st technology and high specification components ensures low se figures on the JH-110B.



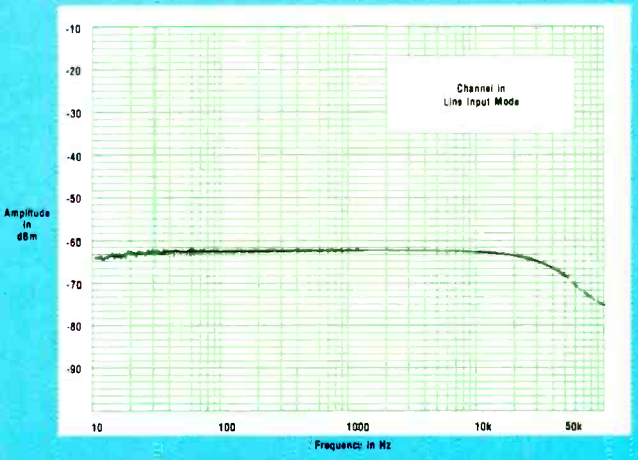
TAPE WALK

asing between tracks is very important and is a function of the achine's tape path stability. The JH-110B transport and head sembly design yield a most stable tape path for maximum phase egrity.



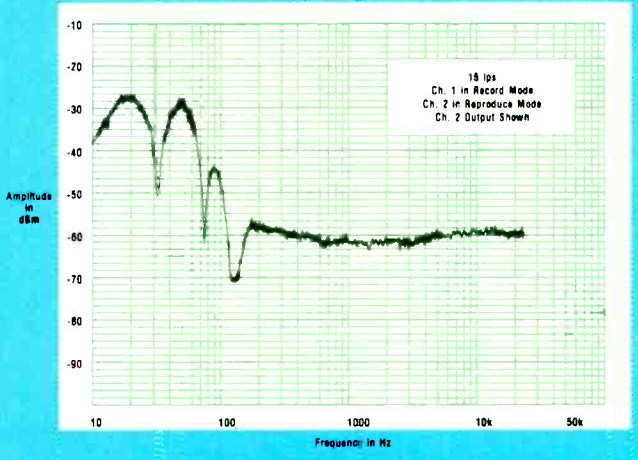
DISTORTION/PURITY OF SIGNAL

Both flutter, or variations in tape speed caused by transport eccentricities, and distortion degrade the purity of recorded signals. Using latest technology op amp design, the JH-110B minimizes second order distortion, while maintaining a wide dynamic range and very low noise floor. This, in combination with the closed loop servo capstan drive system and standard scrape flutter filter provides purity of signal unsurpassed by any other professional recorder. Odd order harmonic distortion and modulation noise are functions of the tape used.



COMMON MODE REJECTION RATIO

Common Mode Rejection is the ability of the electronics circuitry to reject any signal applied equally to both sides of its balanced input, signals such as RF, hum, etc. The JH-110B design ensures a high Common Mode Rejection Ratio, making it ideal for use in any operational atmosphere.



REPRODUCE CROSSTALK

Crosstalk is the leakage from one track or channel to another, and is primarily a function of the heads. The JH-110B exhibits excellent crosstalk figures across the frequency spectrum, including minimizing of the low frequency nodes encountered in typical head design.

JH-110B Specifications

Frequency Response

	Record/Reproduce	
30 ips, AES	40 Hz - 28 kHz	+.75/ - 2 dB
15 ips, NAB	30 Hz - 24 kHz	+.75/ - 2 dB
7.5 ips, NAB	30 Hz - 20 kHz	+.75/ -1.5 dB

	Record/Sync	
30 ips, AES	50 Hz - 16 kHz	+.75/ - 2 dB
15 ips, NAB	30 Hz - 10 kHz	+.75/ - 2 dB
7.5 ips, NAB	30 Hz - 4 kHz	+.75/ - 2 dB

Signal-to-Noise

Record/Reproduce, reference to 510 nWb/m

Unweighted, 20 Hz - 20 kHz	mono	2TK	4TK
30 ips, AES	70	66	66
15 ips, NAB	68	64	64
7.5 ips, NAB	67	63	63

Weighted, dB(A)			
30 ips, AES	74	71	70
15 ips, NAB	70	68	68
7.5 ips, NAB	70	67	67

Distortion

Harmonic distortion,
510 nWb/m, 1 kHz fundamental

3rd harmonic:	30 ips, AES	<.35%
	15 ips, NAB	<.52%
	7.5 ips, NAB	<1.6%
2nd harmonic:	30 ips, AES	<.10%
	15 ips, NAB	<.10%
	7.5 ips, NAB	<.10%
3% 3rd harmonic: fluxivity level	30 ips, AES	1040 nWb/m
	15 ips, NAB	1020 nWb/m
	7.5 ips, NAB	1000 nWb/m

Distortion is primarily a function of tape formulation and bias setting used. All specifications are typical and may vary.

Bias and Erase Frequency

120 kHz

Depth of Erasure

(Ref. 250 nWb/m)
At 1 kHz better than 80 dB

Amplifier Electronics

Input impedance	10k ohms balanced
Output impedance	120 ohms balanced
Output clipping	+ 24 dBm

Transport

Speeds

Fixed	7.5, 15 and 30 ips
Variable	± 20% around fixed speeds

Configurations

¼ inch	Full track
¼ inch	2 track
½ inch	2 track
½ inch	4 track

Reel sizes

Available with NAB A (3,5 or 7 inch), NAB B (10½ or 14 inch), DIN 1000m (11½ inch)

Tension

5½ oz. ± ¼ at all play speeds, beginning to end of reel

Long term speed stability

Better than .02%

Wow Flutter

30 ips	<.022% DIN 45507 weighted
15 ips	<.035% DIN 45507 weighted
7.5 ips	<.055% DIN 45507 weighted

Rewind time

2400 ft.	110 seconds
4800 ft.	170 seconds

Start time

to o.1% DIN 45507 flutter, 10½" reels

30 ips	900 msec
15 ips	500 msec
7.5 ips	500 msec

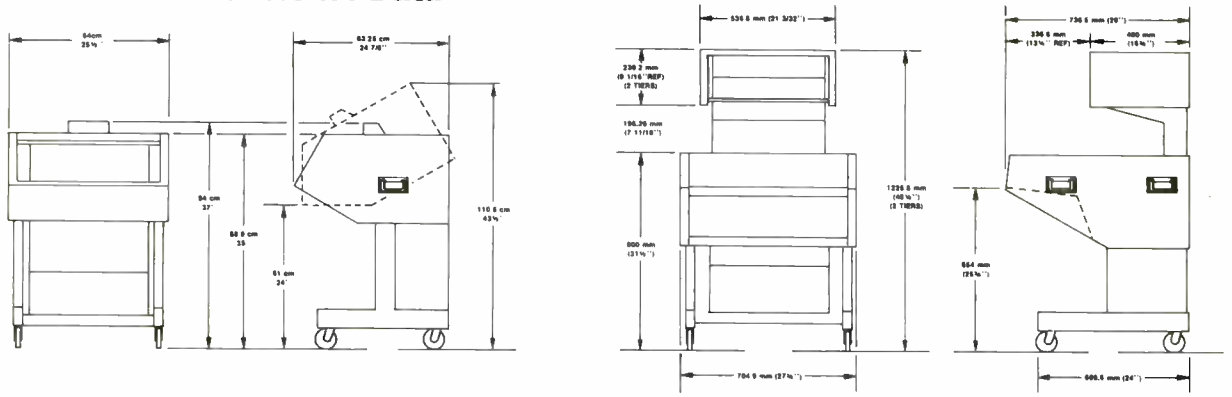
System Weight

Transport unmounted	34 lbs.
Electronic drawer, dual channel	19 lbs.
Variable profile cabinet (VP)	73 lbs.
High profile cabinet (HP)	115 lbs.
Power supply	23 lbs.

FLEXIBILITY TO MEET YOUR NEEDS.

The JH-110B is available stock in mono, stereo, 4-track and 8-track formats for use with ¼", ½" and 1" tape on reels from 5" up to 10½" in diameter (14" diameter optional). Ready for mounting in the MCI variable profile (VP) cabinet with electronics under the transport or in the MCI high profile (HP) cabinet with electronics over the transport, it can also be mounted in your 19" rack or custom console.

JH-110B Dimensional Data



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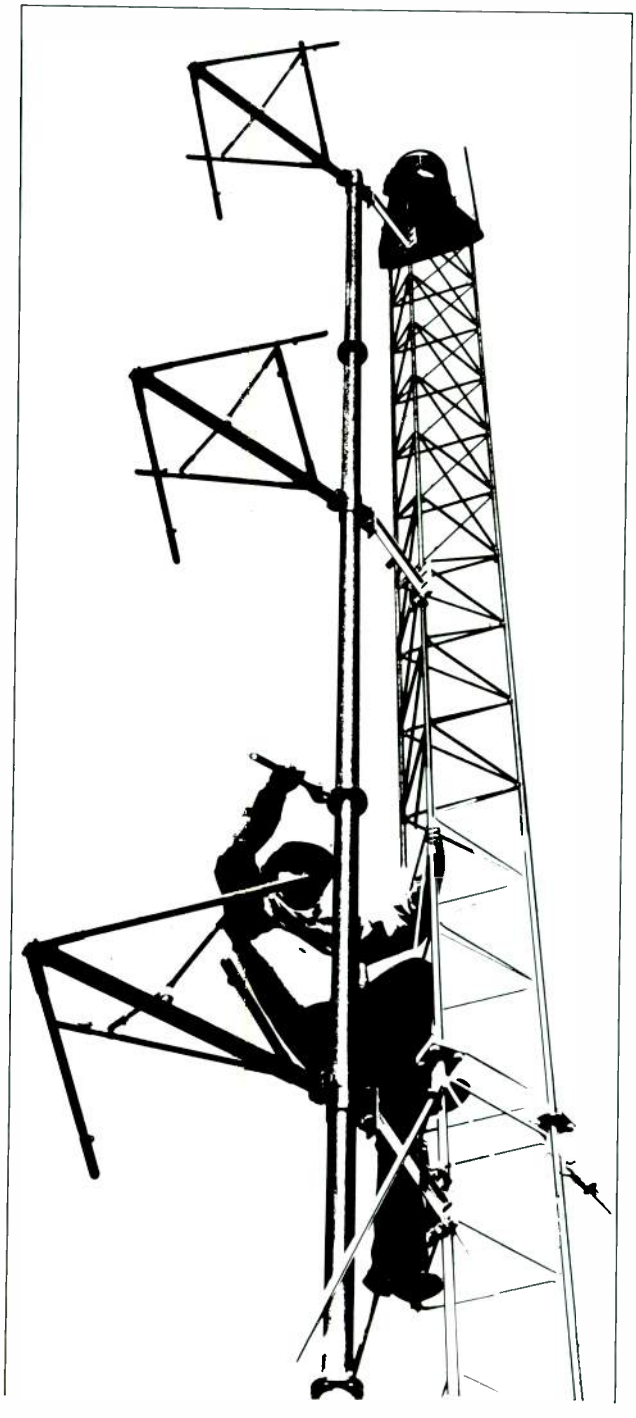
PART 1

QUALITY ASSURANCE AND CONTROL: YOU CAN'T HAVE ONE WITHOUT THE OTHER

By John M. Cummuta



While radio management and engineering spends thousands of dollars on research and equipment and thousands of hours on "tweaking" the operation, a sinking sense of two steps forward, three steps back often characterizes the outcome. A quality assurance program is one way of gaining certainty that you can get from where you are to where you want to be.

TODAY'S RADIO BROADCASTER is a beleagured businessperson bobbing in a marketplace that throbs with nonbroadcast entertainment and information competition. As the enemy closes in, our protagonist is distracted by the internal pressures of 9 kHz, FM reclassification, AM stereo, dissolution of clear channels, ad nauseum.

If these weren't enough, AM radio now finds its one-time understudy, FM radio, shifting into overdrive with only the taillights still visible. In response, we find AM/FM combinations returning to simulcasting, a myriad of technical "tricks" to improve AM response, and a general demise of spirit as the market further fragments.

It's true that home and auto audio products, cable "FM services," videotape and disc ware, home computers (and associated entertainment/information products), and the disco club down the street are all competitors of ours in this new multi-faceted market. It is further true that regulatory changes just over the crest of yonder hill will likely bring more colleagues into the fold. Help from the outside seems unlikely. Notifying of next of kin of radio's terminal condition, however, would be exceedingly premature.

It's not entirely impossible that many of our troubles result from a kind of reactionary paralysis. Could it be that a medium exploding with creativity in its infancy has stagnated in a sort of structured disarray? We run out and tell a client that "radio is red hot" and the most innovative possible avenue for his advertising. Then we dash back to the station and try to figure out a new improved way to say "new improved."

The general manager and program director sweat blood over the rating book, and with bulging eyes and remorse in

John Cummuta is operations manager and chief engineer at KNEI, Waukon, Iowa. Prior to joining KNEI, Cummuta was quality assurance engineer for the Collins Telecommunications Group of Rockwell International.

The moving coil replacement from Stanton Magnetics... the revolutionary 980LZS!

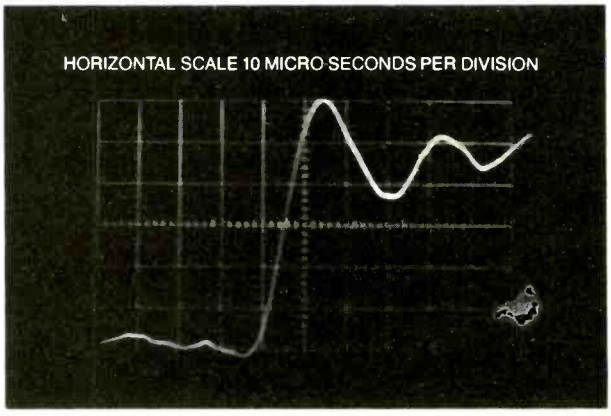
Now from the company to whom the professionals look for setting standards in audio equipment comes a spectacular new cartridge concept. A low impedance pickup that offers all the advantages of a moving magnet cartridge without the disadvantages of the moving coil pickup. At the same time it offers exceedingly fast rise time—less than 10 micro seconds—resulting in dramatic new crispness in sound reproduction—a new "openness" surpassing that of even the best of moving coil designs. The 980LZS incorporates very low dynamic tip mass (0.2 mg.) with extremely high compliance for superb tracking. It tracks the most demanding of the new so called "test" digitally mastered and direct cut recordings with ease and smoothness at 1 gram $^{+1/2}_{-1/4}$.

The 980LZS features the famous Stereohedron™ stylus and a lightweight samarium cobalt super magnet. The output can be connected either into the moving coil input of a modern receiver's preamps or can be used with a prepreamp, whose output is fed into the conventional phono input.

For "moving coil" audiophiles the 980LZS offers a *new standard* of consistency and reliability while maintaining all the sound characteristics even the most critical moving coil advocates demand. For moving magnet advocates the 980LZS provides one more level of sound experience while maintaining all the great sound characteristics of cleanliness and frequency response long associated with fine moving magnet assemblies.

From Stanton...The Choice of The Professionals.

For further information write to: Stanton Magnetics, Terminal Drive, Plainview, N.Y. 11803.



Actual unretouched oscilloscope photograph showing rise time of 980LZS using CBS STR112 record.

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Quality Assurance & Control

their souls dispatch the engineer to crank up the loudness. Fresh from this high level "brain session," the PD rearranges the hour clocks, tweaks the record rotation, swaps the morning drive guy with the afternoon drive girl, and all the troops wait for the verdict of the next book.

All of the above would be considered major changes for most radio stations today, but are they truly changes? When we get right down to it, aren't we playing the same old game with the same old deck of cards — occasionally shuffling them to gain a poker-faced advantage over the guy across town?

Management teams at stations all across the country are working so hard that they dream about commando raids against Arbitron's Maryland headquarters — a dubious proposal at best. Are we handcuffing ourselves in management decision-making by limiting the scope of our imaginations and the depth of our data? Procedures are in place on several fronts to control the quality of operation at most radio stations. After a fashion, they're doing a credible job of "controlling quality" — but who's determining what that "quality" is?

Managers at such a station are practicing a form of quality control, but do they appear confident about their latest adjustments? It looks more like Tums time again, and the sad fact is that they're doing a reasonably good job of QC. Why do these radio professionals sometimes feel as though they're trying to control a forest fire by doing a rain dance?

While quality control is a necessary function, it's only moderately effective the way it's practiced in broadcasting today. Most of the above-mentioned adjustments, both in engineering and programming, generally produce rating changes within the statistical error range, and therefore of questionable value. Further complication results when combinations of refinements are implemented simultaneously, each camouflaging the effect of the others. The problem is that quality control is only part of the necessary program. What's missing is a *quality assurance* function in broadcasting.

Since both terms, *quality control* and *quality assurance*, have been borrowed from the manufacturing industry, we'll use industrial analogies and comparisons as we elaborate. The best place to begin is the beginning, so let's define our two quality functions, and start the journey explaining their usefulness to the broadcaster.

The sole purpose of having any kind of quality program is to accomplish some sort of improvement in whatever it is we're doing. So let's describe the "control" and "assurance" functions in terms of their objectives. The fundamental objective of *quality control* is the prevention of defects, while *quality assurance* aims to establish for the customer a satisfactory expectation that he will receive, from the producer of goods or services, the quality *he* has specified.

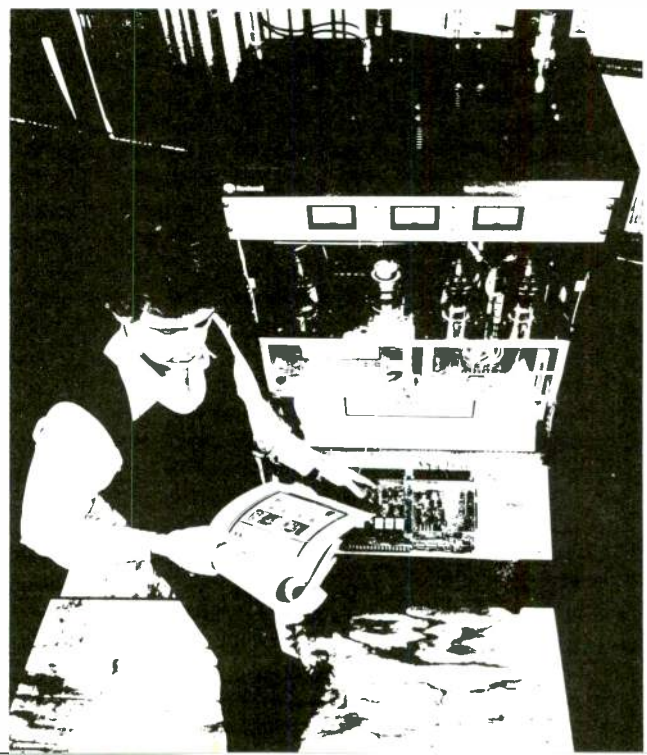
QC and QA — what's the difference?

The differences between these definitions include perspective, chronology, and scope. Quality assurance peers from the customer's perch, while the perspective of quality control is that of the producer. Chronologically, quality assurance significantly precedes the implementation of quality control in the proper order of things. In terms of scope, quality assurance has been described as the "womb to tomb" function, whereas quality control has a limited *internal* applicability.

"What does all this industrial gobbledygook have to do with my radio station?" you ask. Just this: *we are* industry. Yes, after a fashion, ours is no more than a producer/consumer situation, and those principles that apply to hardware manufacturers pertain also to our software industry. We produce an entertainment/information product, and in this *caveat emptor* world, we can no longer dictate to the consumer what he or she would like to hear from us.

"Did the man say dictate?" you screech. "Why, we spend thousands of dollars on research to find out what our listeners want to hear."

Do we? Or, more accurately, do we spend thousands of dollars on research to either confirm our assumptions or fine-tune our ultimate format? Could it also be possible that much of our costly research is underutilized? Is the consumer really the king of the radio marketplace, or are we basically giving John Doe his choice among different models of Detroit gas guzzlers? Are we saying "What do



Quality Assurance & Control

you want?" or "What, out of these elements we've already decided to air, do you find least offensive?"

Let's assume for a moment that a deeper understanding of these two quality disciplines would be beneficial to your operation. Again, we'll begin at the beginning. In 1924, a very bright man working for Bell Telephone Laboratories (of course) devised the first control chart. His name was Dr. Walter A. Shewhart, but you already knew that, right? What Dr. Shewhart's chart did was prove that you didn't have to inspect every item coming off an assembly line to control quality. You could take a shot at the odds and sample a mathematically determined number of the final products, ending up with a reasonably good feeling about the whole lot.

The consequence of this sampling would be information leading management to the proper control points in the production system to adjust out the causes of defects. Shewhart didn't tell us where to look or what to look for as quality indicators — he just said that once it was decided what standards of quality would be observed, we didn't have to look at every copy.

This worked fine for a while, and Henry Ford cranked out shiny new black Model A Fords year after year. Then, one rainy day on the south side of Chicago, someone asked for a green Model A. Now Henry's quality control team had been producing facsimile cars flawlessly — so their quality control function was working well. But their customer acceptance was falling off. Why? Because they were controlling quality, but not assuring it.

Another very bright person, who unfortunately did not work for the Bell Labs and hence didn't get his name recorded, decided that industry needed to involve the customer in establishing quality standards. That way quality could be assured right down to the user acceptance level.

In simple terms, what this means to the broadcaster is that it's possible to have a beautifully sculpted signal, with resonant-voiced announcers and scientifically chosen music — and end up with a product few people want.

This should never happen in an industry whose very nature is communication. Dialogue with our community is critical — but so is an open mind. All the information in

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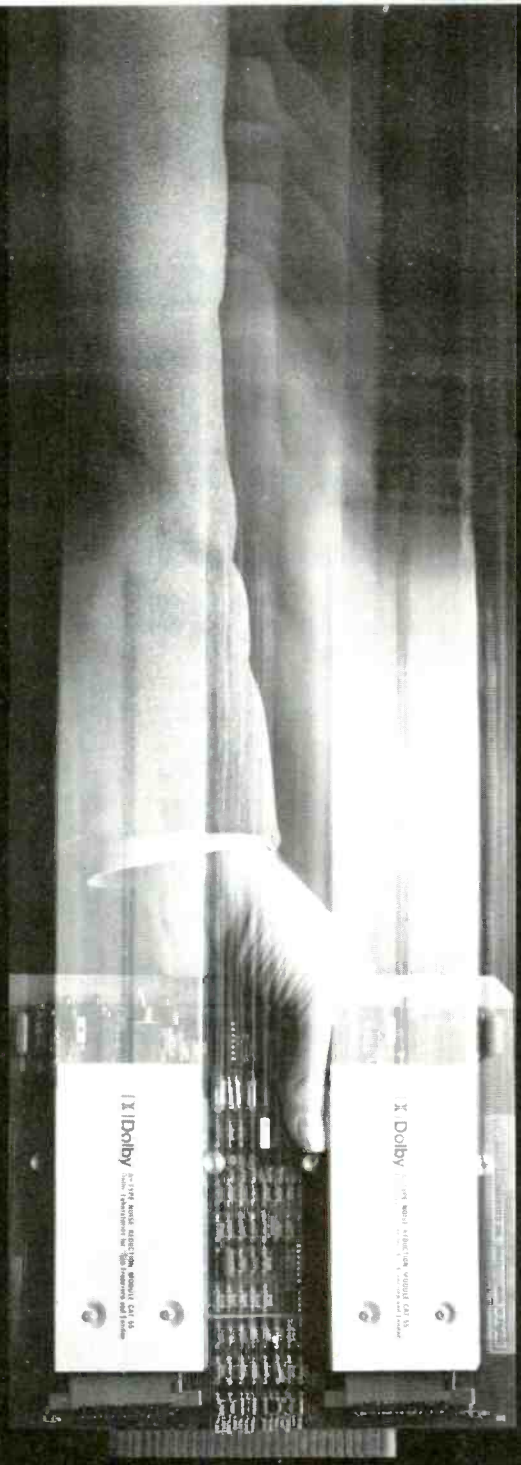

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Dolby A-type noise reduction has been accepted for years throughout the world for high-quality tape recording and other audio transmission and storage media. It provides 10 dB of noise reduction from 30 Hz upwards, increasing to 15 dB at 9 kHz and above, without the audible side effects (such as noise modulation and overshoot distortion) associated with more conventional techniques. Dolby noise reduction can also lead to lower distortion, as it permits more conservative recording levels to reduce the risk of tape saturation.

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the world's computer banks is useless in the hands of someone with granite preconceptions. A fresh look at who we are, what we can do, and whom we can do it for would go a long way toward transfusing anemic radio enterprises.

As critical as the proper data is, knowing how to use it cannot take a back seat. The quality assurance function offers a straightforward road map through the forest to grandmother's house, leaving plenty of management flexibility for control. You see, quality assurance is only a tool — but like the lugwrench, an indispensable one.

The foundation of quality assurance

People in our communities have needs and wants that no one can satisfy as radio can. In some cases FM will serve better than AM, but the reverse is also true. Taking stock of our assets and potentials begins a process that must proceed in an orderly fashion toward ambitious but realistic goals. What that means, of course, is that we need a management plan and the resources to effect it. To plan a course, however, we must first know where it is that we wish to go. This is the purpose of a quality assurance program. QA gives management a clear picture of where they want to be and how to proceed. The resources are no problem in radio — our personnel and our medium are all we need.

Radio has elements like immediacy, flexibility, responsiveness, imagery, and economy that completely outdistance the competition. We can become the people's source for information and entertainment, but management must be in control of the process. In Part 2 of this article, we'll identify both the management tools and the procedures to get from here to there.

The implementation of a quality assurance function extends a sense of stability to the broadcast manager. The philosophy changes from one of reaction to *action*. Instead of waiting for the next John Travolta movie to see what the new "hot format" will be, the quality assurance-oriented manager knows he's meeting his target audience's needs.

Quality assurance should also take a little heat off the chief engineer because the facts would lead one to believe that any benefits derived from squeezing, compressing, slicing, dicing, and punching holes in the signal are short-lived, if they exist at all. Even if there was some way to make the signal demonstrably more noticeable than the other guy's, it would only serve to increase the sample rate of the station. To keep those listeners, the broadcaster needs to have the product the consumers want.

In the Part 2, we'll take quality assurance, as applied to broadcasting, from finding out what the customer wants to sending the finished product out through the antenna. We'll see how to establish quality requirements *in writing* so they can be used as quality control elements for ongoing evaluation. The "control loop" is a process we'll implement for making quality adjustments. And we'll examine how the information fallout from a quality assurance program can aid in such areas as sales, news, and public affairs. As we put together a quality program, we'll see if it can solidify the quicksand we sometimes seem to tread. **BM/E**

"My CADO/Chase Media System gives me total control of my station..."

says Jay Asher, President, WJDA, Quincy, Mass.

"I looked at eight different computers. For the money, no one came close to CADO. It's exactly what I would have designed for the station myself.

"The system flows. It does everything: music format control, traffic and billing, accounts receivable, payroll, general ledger, management reports, spot sales . . . everything.

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"As long as you're paying all that money for a traffic/billing system, you might as well go with the best. I did."

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OPTIMIZE KLYSTRON EFFICIENCY TO SAVE ENERGY DOLLARS AND PROLONG TUBE LIFE

By Robert S. Symons

UHF TV transmitter efficiency is not always what it seems to be. Klystron efficiency is the largest part of overall transmitter efficiency. Understanding how the manufacturer specs klystron efficiency is useful in achieving optimized transmitter operation.

THERE ARE AT LEAST four definitions of UHF TV klystron efficiency in use today. Depending on which definition is used, the efficiency of a given klystron can be expressed as 40 or 44 percent. The definition chosen will also affect the specification of overall transmitter efficiency — for example, a transmitter rated 17 percent efficient by one measure could be as much as 48 percent efficient by another.

How these various efficiencies are defined and the range of efficiencies that can be expected is the subject of this article. The manufacturer's specified efficiency can often be obtained by careful adjustment of critical parameters. This is especially true if a picture of minimum quality is acceptable. The first reason for this is that a specified efficiency always represents the minimum-performance tube a manufacturer is willing to ship, measured on the channel at which the performance is least impressive. The klystrons shipped by reputable manufacturers must always exceed their specifications, and will usually exceed them by a significant margin on most channels.

In addition, a manufacturer of high-quality transmitters will never operate the klystron at full output power. The operation at less than full power is done to insure low phase and amplitude distortion. Figure 1 shows the output power and the phase of a typical klystron as functions of the drive power delivered to the tube. Peak-of-sync output power and peak-of-sync drive power are shown on the curves. In order to insure low distortion, the peak-of-sync output power is usually limited to 90 percent of the maximum power of which the klystron is capable with the rated beam input power. Again, there is a safety factor; in this case, between the actual distortion the transmitter manufacturer wants in the design and the permissible distortion under FCC regulations. It is usually possible for the broadcast engineer to adjust a transmitter for increased distortion in order to obtain higher efficiency. If the increased distortion is within FCC specification, this is legitimate. However, it is not legitimate for a transmitter manufacturer to guarantee such an efficiency.

Robert S. Symons is program manager for Varian Associates, Microwave Tube Division, Palo Alto, Calif.

Optimized beam current and cavity loading

Reducing the beam current in older TV klystrons frequently will increase efficiency. The reason for this is that bandwidth increases with beam current while efficiency decreases. Most of these tubes were designed to meet the much wider bandwidth requirements of some European television signals, which may be as great as 8 MHz. For U.S. television service, the beam current in these klystrons can be reduced substantially. When this is done it is necessary to decrease the coupling to the output cavity. This results in a higher cavity Q, and the impedance at the output gap of the tube is also higher. In any efficient tube it is always necessary to develop enough RF voltage across the output tuned circuit to almost stop electrons. In external cavity tubes, such as the Varian 4KM150LAH shown in Figure 2, the user can adjust the loading by changing the position of the coupling loop in the output cavity. Figure 3 shows the dollar savings for electric power that can be achieved by properly adjusting an H-suffix tube for minimum acceptable current and bandwidth when compared to the older corresponding tube adjusted for maximum bandwidth. This kind of

Klystron Efficiency

high-efficiency adjustment is equivalent to that which has been suggested by the BBC.

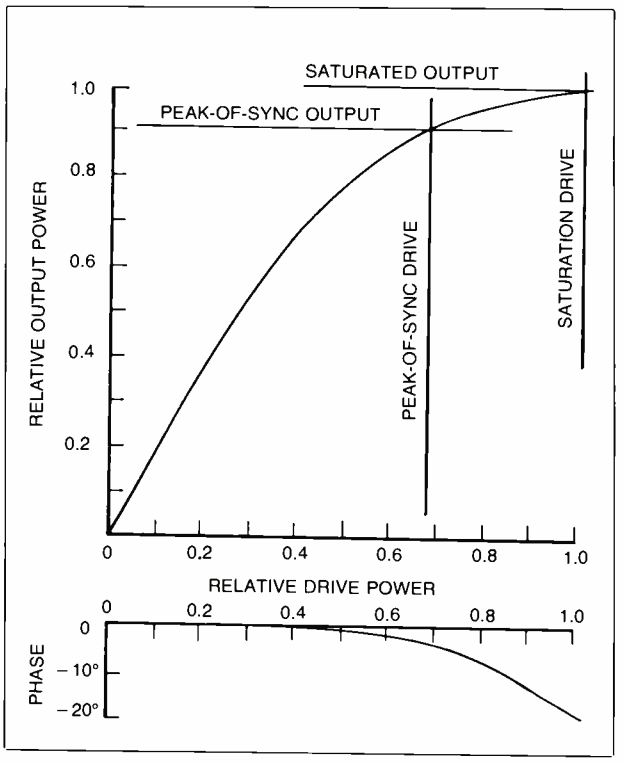
Even though the loading of the output cavity of an internal cavity klystron is not adjustable at present, it would be a great waste of money for a user of these tubes to retrofit with external cavity tubes, which are fragile and subject to breakage due to handling and mistuning. For internal cavity tubes, the klystron manufacturer can make the loading adjustment inside the tube. This has been done in newer klystrons such as the VA-953H, shown in Figure 4. Thus, internal cavity tube users can obtain the advantages of reduced-current, high-efficiency operation when their klystrons wear out.

In addition, Varian offers special impedance transformers (aural couplers) which permit very low beam-current, high-efficiency operation of klystron in aural service. Savings from the use of aural couplers are shown in Figure 5. Varian is also developing variable couplers (impedance transformers) for internal cavity tubes in visual service so that users of older versions of these tubes will be able to enjoy higher-efficiency operation. Users of the newer H tubes will be able to eke out the last few percentage points in efficiency which are difficult to achieve with a fixed coupler. It is important to understand that the broadcaster can adjust the output cavity loading and the beam current. Improved efficiencies are obtained along with unacceptable bandwidths if the current is reduced too much, however. This is particularly true on low channels where the required percentage bandwidth is the largest. Therefore, make accurate bandwidth measurements when increasing the efficiency this way.

By using the above techniques, it is possible to obtain a worthwhile increase in the efficiency of almost any klystron UHF TV transmitter. The picture quality degradation will be acceptable. However, if such adjustments are made, it becomes important to understand definitions of klystron and/or transmitter efficiency and to understand the measurement errors that can be made in trying to determine each.

Various definitions of efficiency

Before entering into a discussion of the various definitions of efficiency, it is worth mentioning that most engineers place the most trust in power measurements based on the heating of a known flow of water in an RF



◀ *Fig. 1, left, shows relations of output power and phase as functions of drive power in a typical klystron*

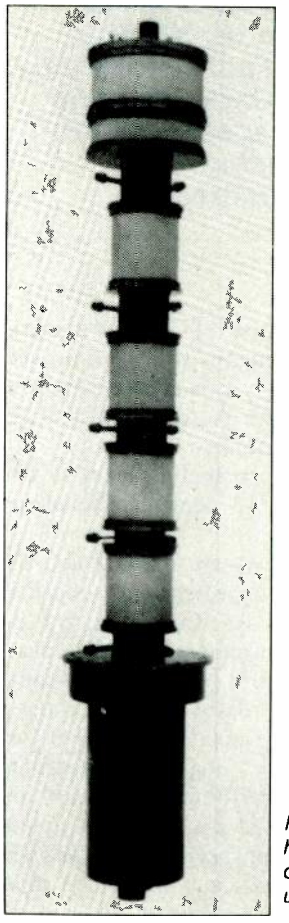
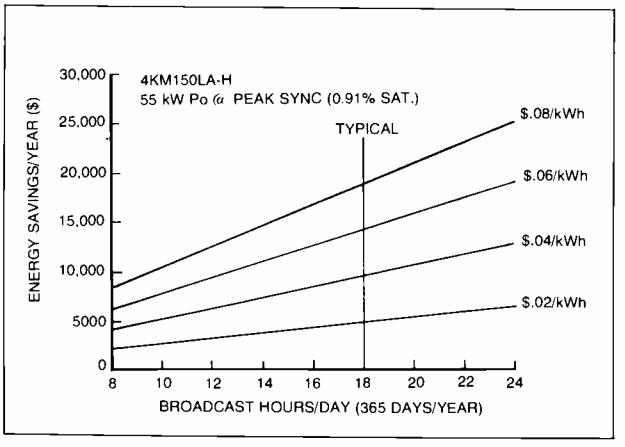


Fig. 2, left, is a high-efficiency external cavity klystron, allowing user adjustment



◀ *Fig. 3, left, shows energy savings in dollars for adjustment of external cavity klystron for minimum acceptable current and bandwidth*

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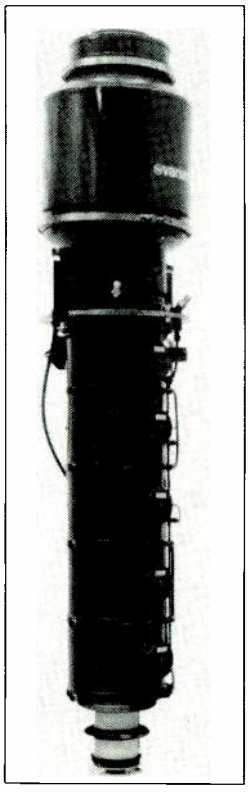

Fig. 4. In Varian 953H internal cavity klystron, adjustments are made by manufacturer

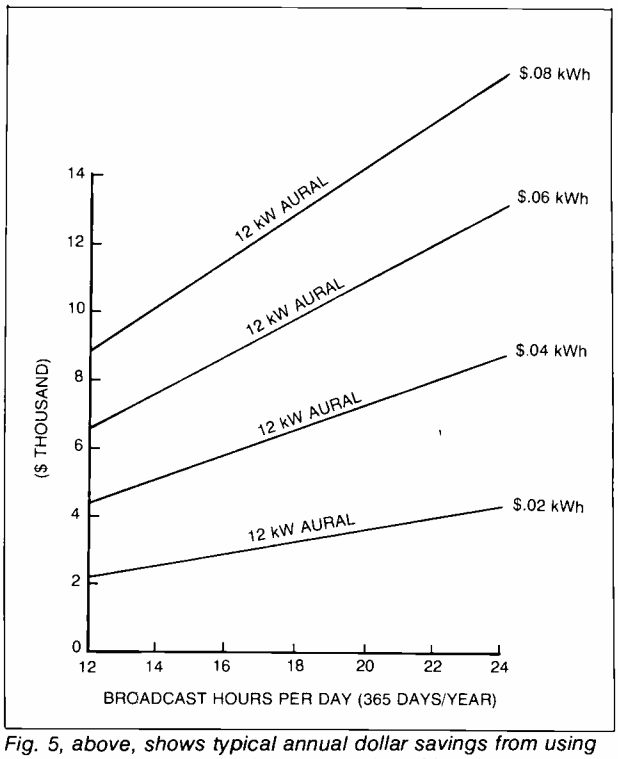

Fig. 5, above, shows typical annual dollar savings from using aural coupler to allow optimum operation of klystron

load. This load dissipates the entire output power. They place less trust in measurements made using directional couplers. Directional couplers are very useful, particularly after they have been calibrated against a waterload, because they permit the measurement of power while the transmitter is operating into the antenna. However, they have two disadvantages. For example, a one-half dB error in a directional-coupler coupling factor is equivalent to a 10 percent error in measured transmitter output. The directional-coupler coupling factor, expressed in dB, must be known to at least one and preferably two decimal places. Another disadvantage of directional couplers is that the coupling factor for harmonics is greater than for the fundamental. If there is no low-pass RF filter between the klystron and the power meter, one may adjust a transmitter to maximize harmonic power while the fundamental power is actually being reduced. However, if the necessary precautions are taken, average power can be measured very accurately. Peak power is more difficult to measure. It is usually inferred from an average power measurement and the ratio of peak-to-average power for a given waveform. This ratio may not be known. Thus, it is easier to determine efficiencies that are based on a definition involving constant power rather than varying power.

As an example, using a waterload, calibrated flow meter, and thermometers, klystron manufacturers agree that the saturated efficiency of current klystrons lies in a relatively narrow range near 44 percent. The peak-of-sync efficiency is nine-tenths of this. Each is measured with the klystron operated continuously at that power. So much for the 40 and 44 percent numbers mentioned in the first paragraph. It is more important to the broadcaster to define and measure efficiencies which relate transmitter output to the electric power bill.

Cutler and peak-of-sync efficiency

Two such definitions are in common use. Cutler[1] has proposed using an efficiency relating the average power of a TV signal (which varies from black to white in a sinusoidal fashion during the visual portion of the signal) to the average input power to the klystron. The ratio of the average power of this signal to the peak-of-sync power is 0.352. For a klystron transmitter with no beam current modulation and using a 40 percent peak-of-sync efficiency klystron, the "Cutler efficiency" will be 14 percent. With beam-current pulsing, the beam current can be reduced between sync pulses. The average input power is thus reduced, and the "Cutler efficiency" is raised to 17 percent.

Another definition of transmitter efficiency relates the peak-of-sync power to the average input power. While this is not a true efficiency, it is a ratio that relates the most commonly used transmitter power parameter to the power usage. It is equal to the "Cutler efficiency" multiplied by 2.84. On this basis, the beam-pulsed TV transmitter example with the 40 percent peak-of-sync efficiency klystron has a "peak-of-sync transmitter efficiency" of 48 percent.

Both "Cutler efficiency" and the "peak-of-sync transmitter efficiency" are difficult to measure. In the case of "Cutler efficiency," unless the white RF voltage of the transmitter is exactly 12.5 percent of peak-of-sync RF voltage and the black RF voltage is 75 percent, the average power will be a different fraction of the peak-of-sync power for the same klystron efficiency. Thus, the measurement will be in error. For example, if the "white output" is higher than 12.5 percent of the peak-of-sync

[1]Cutler, C.C., "New Opportunities for UHF Television Transmitters," UHF Comparability Task Force, Office of Plans and Policy, Federal Communications Commission, Washington, D.C, Feb. 1980.

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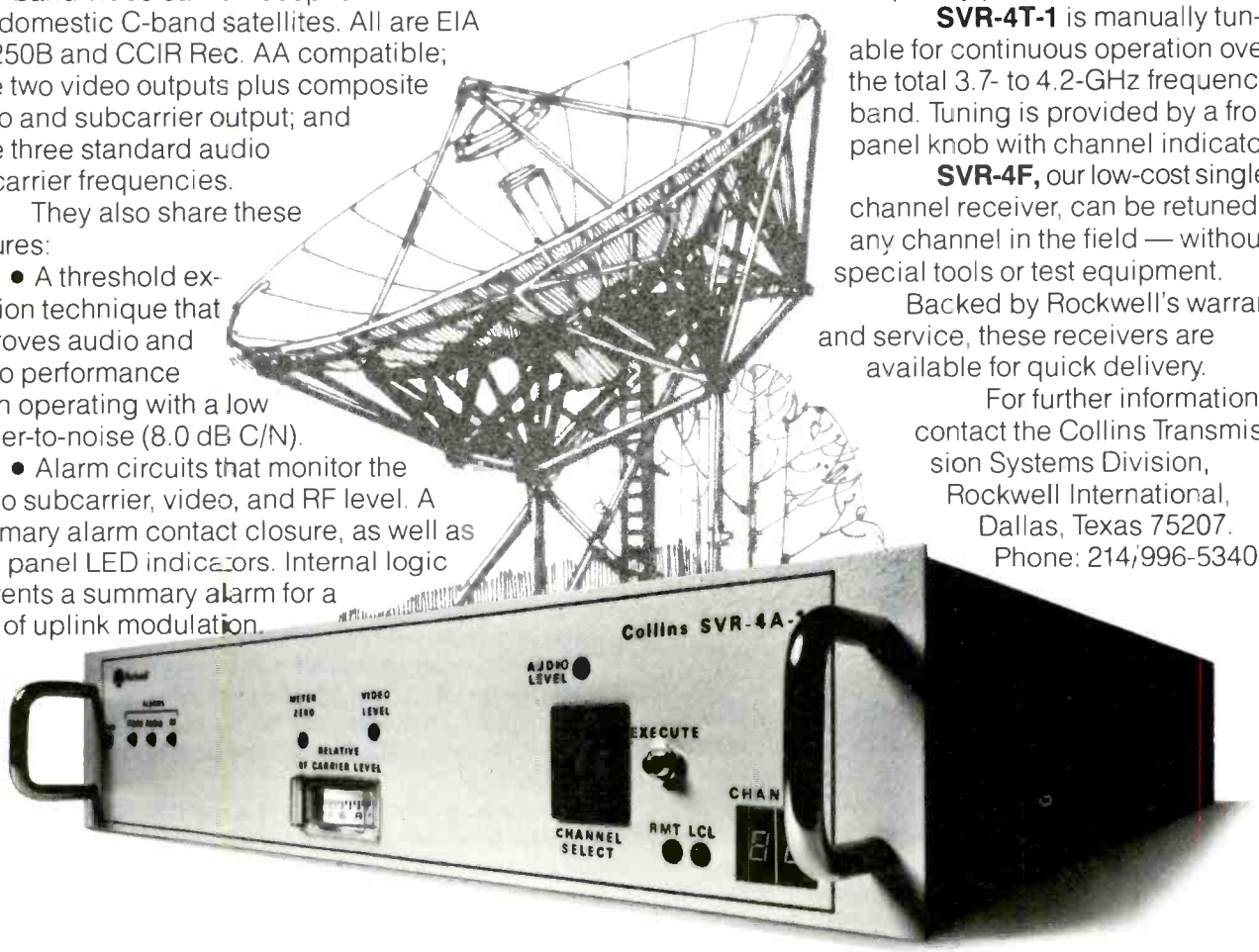

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Klystron Efficiency

RF voltage, the measured transmitter efficiency will appear to be higher than it actually is. The detectable video signal, however, will actually be lower. If there is sync-pulse compression, higher efficiencies than actual will also be measured.

The "transmitter peak-of-sync efficiency" is usually measured by transmitting a black raster for which the ratio of average to peak-of-sync power is 0.597. The peak-of-sync power is inferred by measuring the average power and dividing it by 0.597. One possible way of checking the peak power is to transmit a white raster, for which the ratio of average power to peak-of-sync power is 0.179, and again calculate the peak power. If this measurement differs from the peak power measured with a black raster, something is wrong with signal levels and the efficiency measurement should not be trusted.

When beam current pulsing is used, an unrealistically high "Cutler efficiency" or "peak-of-sync transmitter efficiency" may be measured. This is so even though the black, white, and peak-of-sync RF voltages are correct. This problem arises when the beam current is reduced too much during the video interval. Although there may be enough current to support the black output voltage, there is not enough beam current to support the color burst. It is possible to calculate, from the simplest theoretical considerations, how much the beam current can be reduced during the picture interval. The load impedance at the output cavity of a klystron is constant, and the maximum RF beam current is very nearly proportional to the dc beam current. The maximum RF voltage that can exist in the output cavity will also be proportional to the dc beam current. The output power will be proportional to the dc beam current squared. In addition, the output power of the klystron during a single-sideband color burst signal is 0.66 times the peak-of-sync power. The square root of 0.66 is 0.81, so if the beam current is reduced to less than 0.81 times the current at sync, it is reasonable to assume that the signal is distorted. If one weights the peak-of-sync current and the reduced current during the picture interval by the times the transmitter is operating at each level, the average beam current will be 82.5 percent of the peak. Transmitter efficiency will be increased by a factor of 1.21. These calculations are compatible with operating experience.

Because no klystron used in any production or experimental beam-pulsed TV transmitter has a saturation efficiency much higher than 50 percent at its best channel, measurements which indicate efficiencies higher than 60 percent are suspect. Even at 60 percent, measurements are probably made with the klystron saturated at peak-of-sync output. If the 10 percent margin between peak-of-sync and saturation is allowed, such a transmitter would be 54 percent efficient. This would not be unreasonable to expect from a transmitter specified at 48 percent using a selected klystron on its best channel.

Present-day klystrons and klystron transmitters are capable of better performance than that for which they are guaranteed. Nevertheless it is important that broadcasters, transmitter manufacturers, and klystron manufacturers remember that specifications are legal documents. This does not mean that tube and transmitter manufacturers should not offer assistance in helping broadcasters achieve optimum equipment performance. **BM/E**

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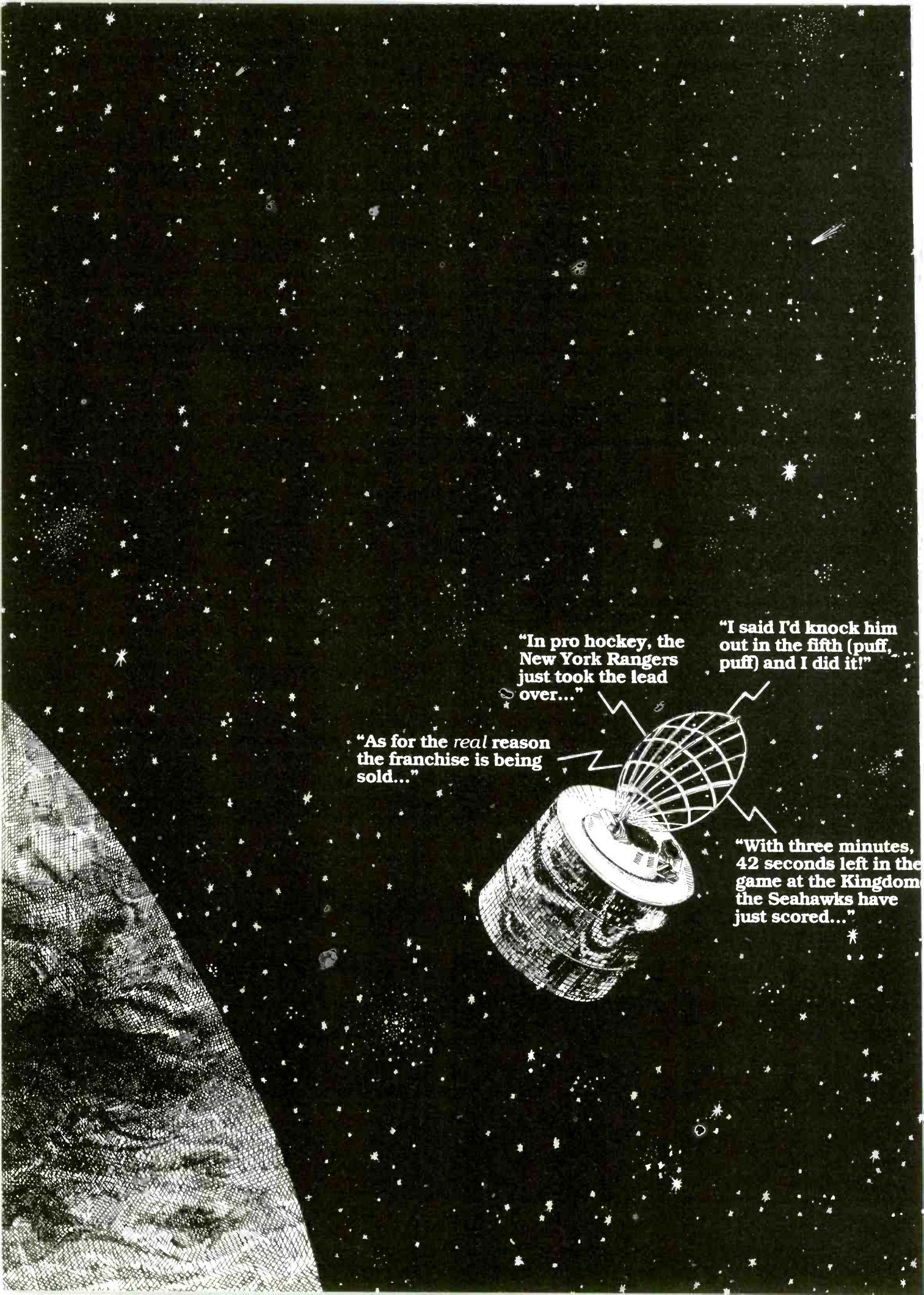
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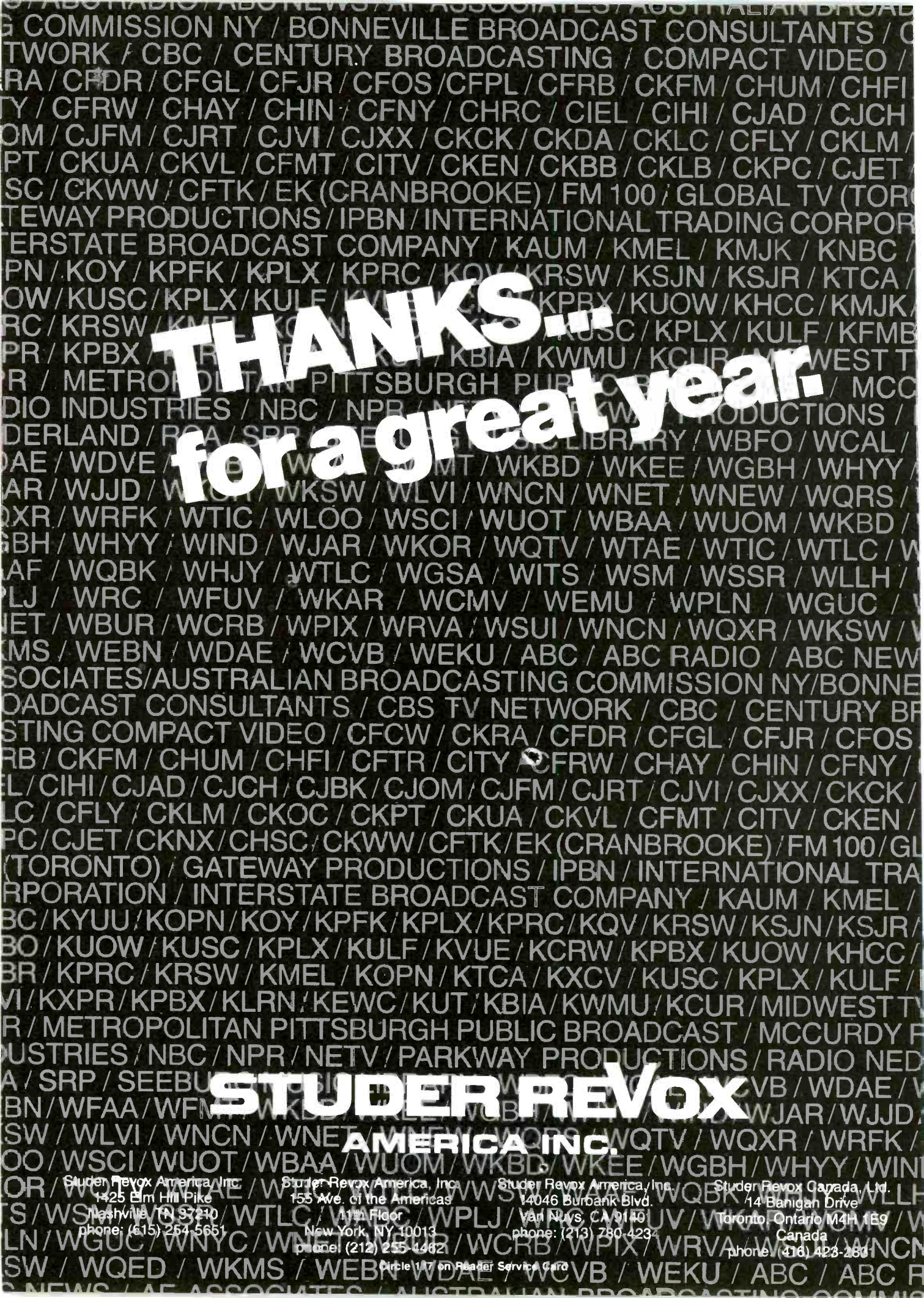
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TUNING A DIRECTIONAL ARRAY WITH NEGATIVE RESISTANCE TOWERS

By Frank S. Colligan

Negative resistance towers found in directional antenna arrays need not be the headache old engineers' tales once made them out to be. The calibration procedure described here makes tuning negative towers easy.

NEGATIVE RESISTANCE in an electrical circuit? Yes — and it is often found in an AM radio directional antenna system. A negative resistance tower in a directional antenna system is simply a tower that *receives* more power, coupled in from the other towers, than it radiates. As has been well and long known, the impedances at the bases of AM towers operating directionally are a first-order function of their self-impedances and the current ratios and phases on the other towers as coupled to any one given tower through their mutual impedances. A 90 degree tower may measure 65 + j110 ohms when standing alone. When operated as an element of a directional array, the base impedance at the same tower may very well drop down to a very low value. Depending heavily on the current ratios and phasings of the other nearby elements, the base impedance will wander radically as small adjustments to current ratios and phases are made. Quite frequently it will wander through zero resistance and further into the region of *negative resistance*. It will radiate a certain amount of power and will want to dissipate another amount of power by some means other than radiation. When the latter quantity exceeds the former, the tower's resistance is negative. We therefore must give it some resistance to work into. For example: assume that a certain directional antenna system is working in proper and desirable adjustment. Tower 5 is known to be of negative resistance. Let's see if it is. Its height is such that it also has an inductive base operating reactance. Upon arriving at the tuning house, we open the antenna feed bus at the network "output" point or at the ammeter at meter plug A in Fig. 6. Placing a series RC circuit from the tower to ground, the transmitter is turned on and we find with amazing ease that R and C can be adjusted so as to restore that tower's assigned current ratio and phase. Once this adjustment has been found, all the other towers will *automatically* fall back into line with their proper current ratios and phases. The common point will have changed, always to a *lower* value.

When we adjusted the dummy load on the tower to reestablish the desired current ratio and phase, we gave this tower the conjugate load impedance that it wanted to see for that condition. We merely reverse the algebraic signs of both components of the dummy load and that gives us the operating impedance of that tower.

Another way of looking at the negative tower phenomenon is as follows. Suppose we have two towers, one driven with some power while the other one is idle or detuned. We walk over to the base of the latter and connect an arbitrary value of resistance and reactance across it to ground in order to cause some current to flow. Next, we look at the antenna monitor and find that the resulting current ratio and phase on that tower just happen to be the values we need for a desired two-tower antenna pattern. Then that tower's operating impedance is exactly equal to the conjugate of the RC or RL dummy circuit we placed across the tower. Reverse their algebraic signs and you have it.

The above examples are more than an academic demonstration. The author actually performs the procedure given in the first example in dealing with one or more negative towers in a directional antenna tune-up. One of the easiest applications was a five-tower in-line array with *three* negative towers. At the outset, the three negative towers were conjugately loaded, just as in the first exam-

Frank S. Colligan is an independent telecommunications consultant based in Washington, D.C.

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ple, with preset estimates of the operating impedances. The remaining two positive resistance towers were adjusted to their required current ratio and phase values. The transmission lines to these two towers were matched up in the usual way. During these procedures the negative resistance towers were totally ignored. Later on when the buttons were punched up on the antenna monitor for the negative towers, they were found to have almost automatically fallen in place near their assigned current ratios and phases. Starting in descending order of power distribution, minor adjustments were made, in sequence, to the resistors and reactors at each tower base. The nicety of doing it in this way is that by following descending order of power distribution, adjustments to any one tower will have a minimum effect on the adjustments already done on the higher power towers. After about a 20-minute workout with the three negative towers and a very slight trim on the positive towers, the whole array was done! A few field-intensity measurements were made to confirm the pattern formation, but with due allowance made for the power being lost in the loading resistors on the negative towers. As a historical note, back in the days before operating impedance bridges and similar devices were available, the operating impedance and power on a negative tower were actually easier to measure than on a positive resistance tower. It could be done virtually at a glance. Power was simply the square of the finally resulting base current times the resistance the dummy load resistor measured.

Finally, we must recover the negative tower return power and recirculate it back to the positive towers for radiation. We must eliminate the dummy resistors and set up what might be called a passive feedback system. The *algebraic* sum of all the power values in all of the towers must equal the power delivered by the transmitter back at the common point. This procedure is very simple. The return power must be brought back from a negative tower to the common point or *a* common point. This return power then joins the power delivered by the transmitter and the total feeds the positive resistance towers. The negative towers' return power must be brought back into the system in the proper amplitude and phase to a common point. The amplitude and phase requirements may be discussed separately.

Fig. 1 shows two generators feeding a common load resistance and through a common transmission line 150 degrees long. Naturally, the two generators are and must be in phase with each other. In Fig. 2 the second generator is physically moved to another location, at such a physical distance that it must be reconnected to the line input point, a common point, with a 70-degree line. Its phase will remain at zero degrees, as shown. The −70-degree line delays its power by −70 degrees and this must be compensated for. So we put in a +70-degree phase-shifting network to cancel the phase lag caused by the line. The power at A and B is now all back in phase and everything is fine, as in Fig. 1.

In Fig. 3 we redefine things a bit. The load resistance is that of a positive resistance tower. Generator B, the one we moved, is a negative resistance tower. In directional antenna work we always pick a positive resistance tower

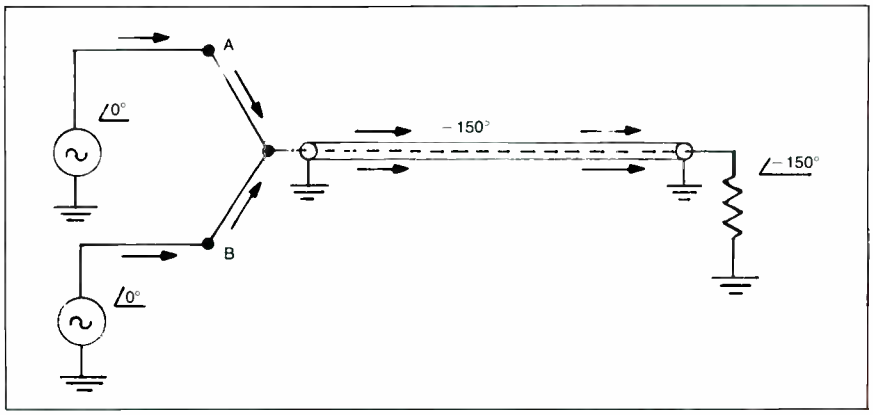

Fig. 1 shows two generators feeding a common transmission line through equal feeds; all is in phase

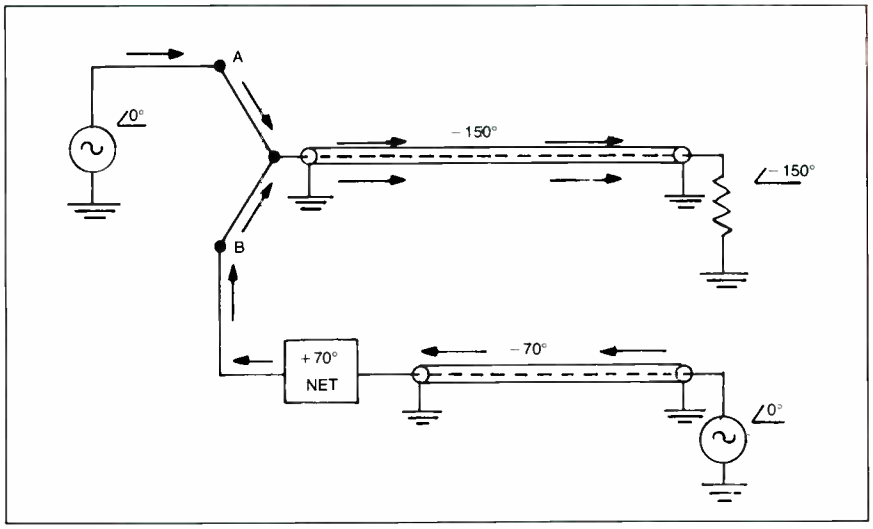

Fig. 2 has one generator at a greater distance so the separate transmission line introduces −70° shift; a compensating net is needed, as shown

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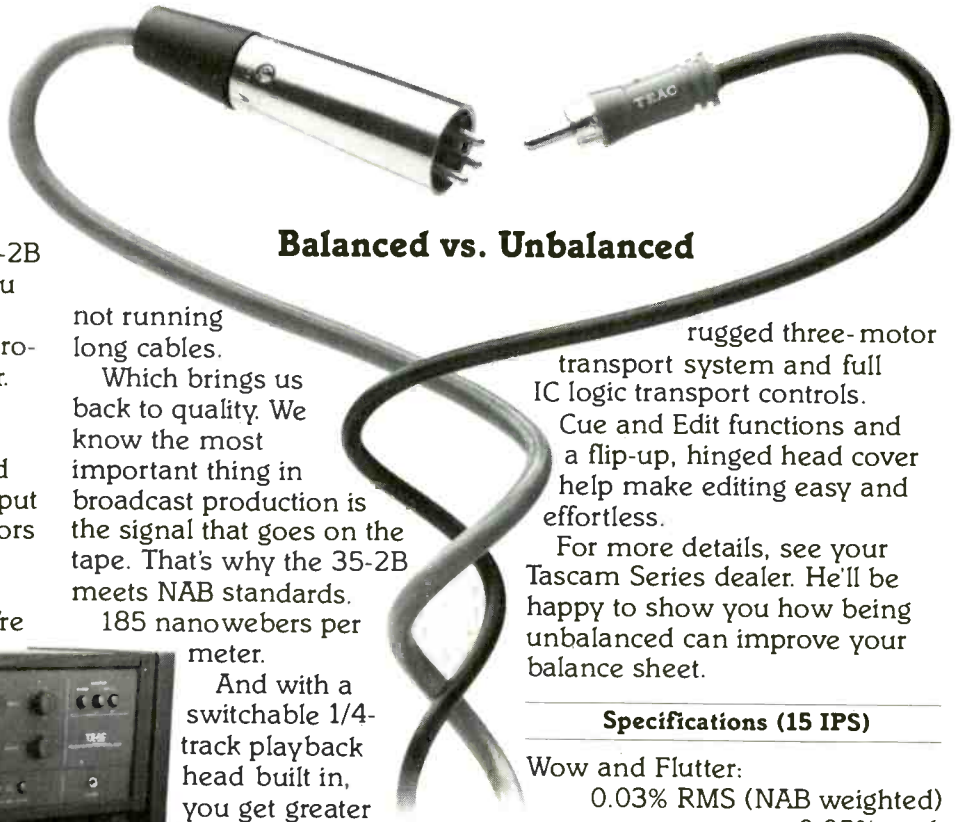

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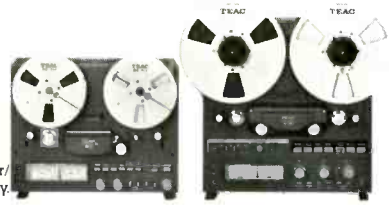

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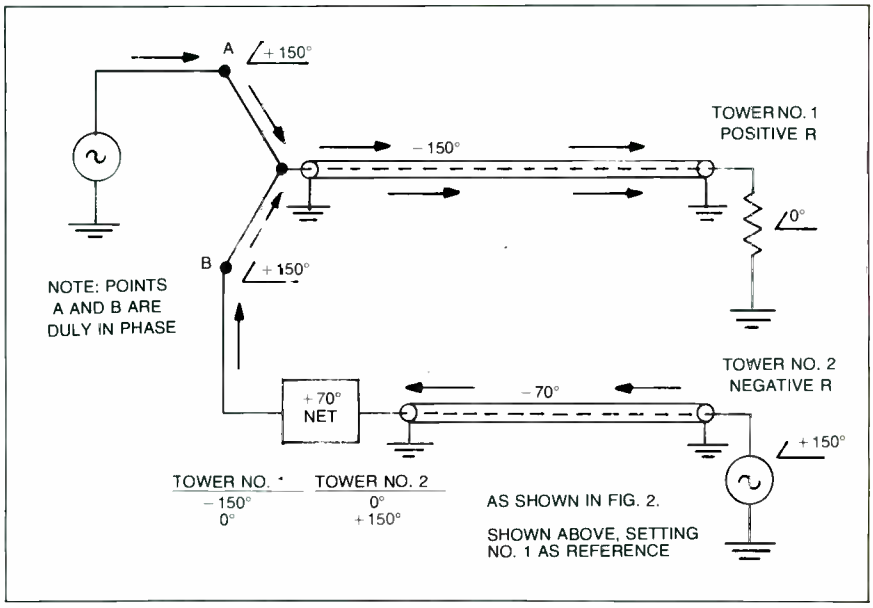

In Fig. 3, generator A starts at +150°, is delayed by transmission line to arrive at Tower 1 at 0°. Tower 2, negative resistance, returns power at +150°, through two transmission lines and compensating net, ending at 0°

to serve as the pattern reference tower, so we shift the reference point of the system out to Tower 1 and call it zero degrees. With this new reference point, the common point now lags Tower 1 by −150 degrees. Let's say that for purposes of the radiation pattern, Tower 2 is to be set to +150 degrees by design and intent.

Note very carefully the phase shifts in Fig. 3. Generator A starts out at a phase of +150. Its power is delayed by a −150 transmission line on its way to Tower 1. As shown, it arrives at Tower 1 at zero degrees.

Generator B, the negative resistance tower, starts out at its adjusted, pattern-assigned value of +150 degrees. Travelling *back into the transmitter building*, it is first delayed by the line by −70 degrees. The +70-degree network cancels the line delay so the energy at point B is at a phase of +150 degrees again. Also, it is in phase with generator A. Together the powers from generators A and B proceed down the line to Tower 1. The line to Tower 1 cancels the +150-degree position they were both at back at the transmitter house, so now both arrive at Tower 1 at zero degrees. Going to Fig. 5, we find the more complex but typical system of a two-tower directional array with Tower 2 of negative operating resistance. In the left-hand column we tabulate the phase shifts involved with Tower 1, the chosen reference tower. We arrive at Tower 1 with a total of −141 degrees of phase shift, lagging behind the generator. Since Tower 1 is the reference tower, we call it zero degrees. This simply means that the generator *leads* Tower 1 by +141 degrees.

On to the negative resistance tower, a *second generator*. Its assigned pattern phase requirement is +37. We *start* there with a value of +37 degrees at the top of the right-hand column of figures. We must plan the phase shifts so that the negative tower's power goes back into the transmitter building and *right back out again* to the positive resistance tower, Tower 1. Starting at Tower 2, at +37 degrees, we go through the LTU and lose −90 degrees. Proceeding on to the left, we lose another −232 degrees in the transmission line. Continuing to the left, we gain +80 degrees in the phase control network and then lose −14 degrees of incidental phase in the power divider. Note that at this point in time, literally in *time*, the power that started back into the transmitter house from out at the negative tower has been delayed by all these phase shifts to a value of −219 degrees. The full circle complement of −219 degrees is +141 degrees. These two values, −219 degrees and +141 degrees, are exact equivalents. Their arithmetical difference is of course 360 degrees. Note now that the power from the negative resistance tower, a generator, meets the power from the transmitter exactly in phase with the transmitter. As noted previously, the transmitter leads the reference tower, Tower 1, by +141 degrees. The negative tower power has now properly, in time, met the transmitter power. They combine and together they proceed out to the reference, positive resistance tower. Picking up again at the input to the Tower 1 phase net, we continue on down the right-hand column of Fig. 5. We gain +110 degrees through the Tower 1 phasing network. Next we lose −341 degrees through the Tower 1 transmission line. (Leaving the transmitter building, we are now travelling to the right.) Finally, we gain +90 degrees at the LTU at Tower 1.

To review, power left the negative tower and travelled around in a near loop or U-turn back out to the reference tower. Encountering all of the phase shifts, starting with its own assigned pattern phase, the return power made the U-turn and *arrived at Tower 1 at zero degrees phase*. The right-hand column in Fig. 5 tabulates all of the phase shifts that must be planned and allowed for in the entire system. Note that all of the numbers in that column add up to −360 degrees, which is the same as zero degrees. This is the condition for proper phase distribution for a negative resistance tower.

One special note must be added. During the entire procedure of planning the phase distribution for a negative tower, not once was the term "180 degrees" mentioned or used. A 180-degree phase shift inserted into the U-turn was *not* necessary! It *never* was necessary! It *never* will be necessary! It has nothing to do with a *negative* resistance tower, nothing at all! This myth was probably born out of the fact that combining the return power of a negative tower with that of the transmitter requires that the algebraic sign of the negative resistances involved along the way must be made and kept negative. Power combining at

the transmitter house will be discussed later, including getting the negative tower return power.

A simple field observation has been made by the author too many times in the past to count. With a directional coupler (reflectometer) inserted in the transmission line to (or from) a low resistance tower (+R or −R), the pattern parameters for such a tower are observed on the antenna monitor. Starting off, let's assume that the tower's operating resistance is about +4 ohms. Because we have a positive resistance, the directional coupler on its transmission line naturally says that the direction of power flow is *towards* the tower from the transmitter. On a negative resistance tower, a directional coupler naturally shows the direction of power flow to be opposite — that is, *from* the tower and *towards* the transmitter. Next, an adjustment is made on the phasor controls for this tower. The most direct adjustment is to lower this tower's current ratio, using what is usually labelled a "power" control. The tower's operating resistance will then drop down, pass through R=O, and go over to a *negative* or −R condition. The directional coupler is a very sensitive device for indicating this crossover point, the latter becoming obvious when the former indicates a sudden and distinct reversal in the direction of power flow. After this is made to happen, we glance at the antenna monitor's phase indicator and notice that the phase angle has shifted a few degrees, typically no more than 10 or 15 degrees away from the starting point value. If we believe the myth that 180 degrees must be inserted in the negative tower's phase distribution (right-hand column of Fig. 5), then the adjustment to force a positive resistance tower into a negative resistance condition would have also shifted the phase indication on the antenna monitor 180 degrees away from the phase indication at the starting point of such a test. In the countless times that such a test has been made, 180 degrees never has and never will have anything to do with a negative resistance tower.

We turn now to the process of properly combining the negative tower's return power back into the system. At the beginning, we discussed conjugate impedance loading of a negative resistance tower, and indeed it is the ultimate in a quick and easy way to handle such a tower right from the very beginning. Once the antenna parameters (to form the proper far field pattern) and transmission line matching have been accomplished, we must remove the resistors from the negative towers and bring that power back into the phasor cabinet for combining with the transmitter power. From there this power and the transmitter power will be distributed among the positive resistance towers.

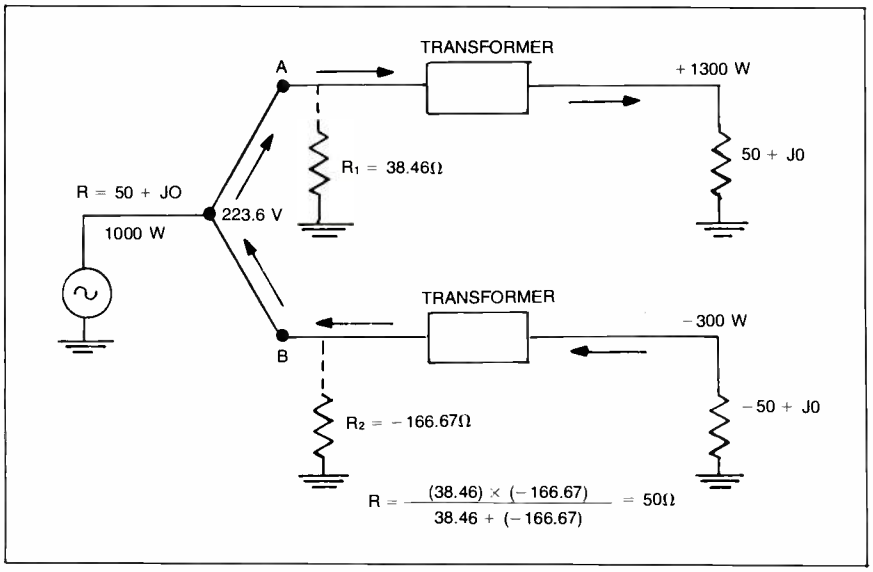

Fig. 4. Use of power dividers to adjust power into positive tower and from negative tower, with required 1300 W to Tower 1

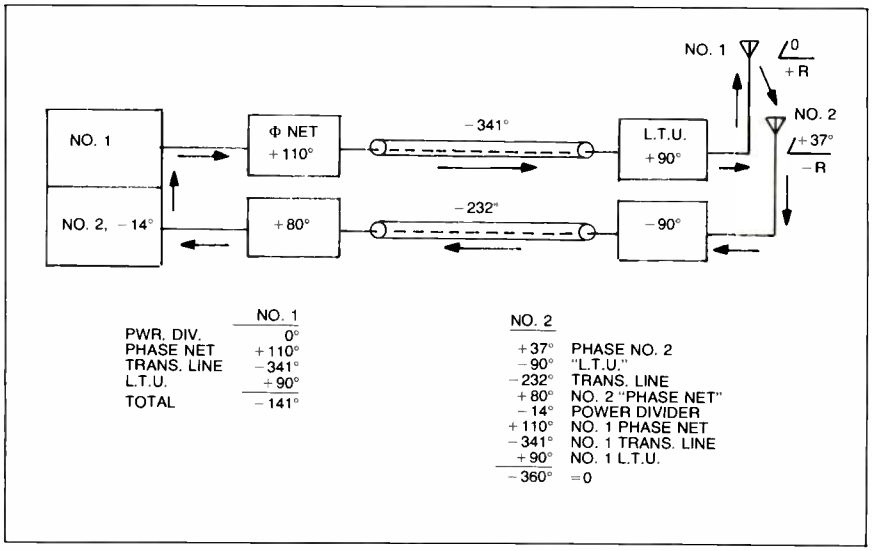

Fig. 5. Phase shifts in typical two-tower system, one with negative resistance, all referenced to 0° at Tower 1

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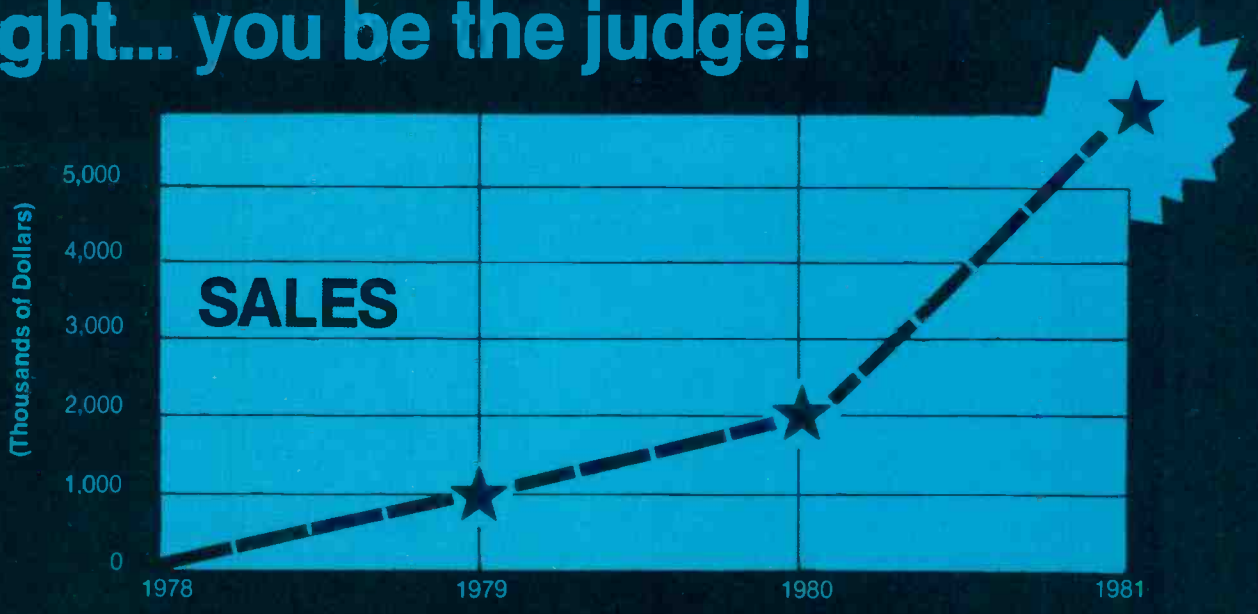

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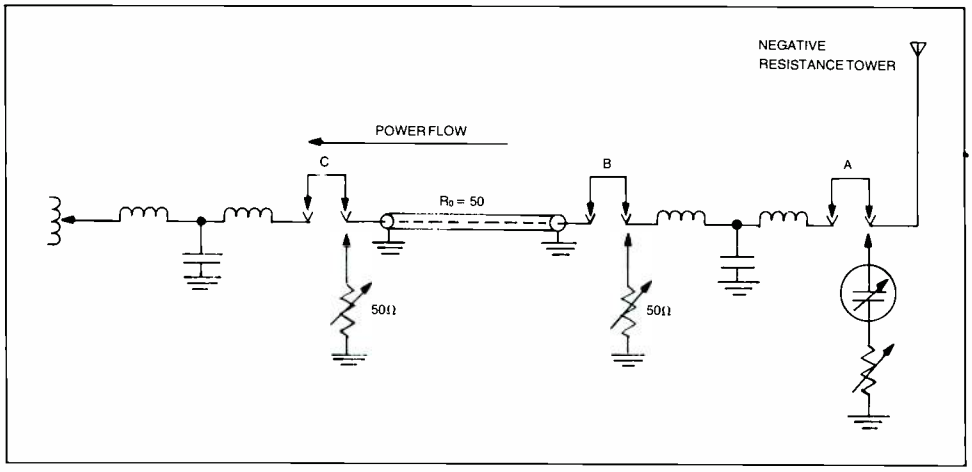

Fig. 6. Typical phasing units and transmission line to a negative resistance tower, showing check points

As mentioned previously, this must be done in descending order of power on the negative towers. Starting with the highest power tower we recombine the power from each negative tower on a *one-at-a-time* basis. More on the details of this procedure later.

Power dividers

First, a note on power dividers in general. They all share one common characteristic. In dividing a common source of power, the transmitter, into the various proportions required by the pattern, we are feeding a group of unbalanced coaxial loads whose impedances are typically 50+j0 ohms. All power dividers, without exception, operate to transform each 50-ohm load up to other values that are different for each tower. When these transformed values are all connected in parallel and then tied into a common voltage source, power will split in the desired and precalculated fashion.

In Fig. 4 we find a simplified block diagram of how power is divided up in proportions required by a two-tower directional array. Tower 2 is operating as a *negative* resistance tower. The transmitter will supply 1000 W to a 50-ohm load, the common point. This dictates a common-point voltage of 223.6 V. Prior computations predict that Tower 1 will require 1300 W to do its job in the pattern. Likewise, Tower 2 will be required to handle −300 W. The sum of these powers is, of course, 1000 W. By simple arithmetic we calculate that for a fixed common-point voltage of 223.6 V, delivery of 1300 W must be made into a resistance of 38.46 ohms. On Tower 2, we find that for the same 223.6 V at the same point, 166.67 ohms must be used for 300 W. Because the power from the negative is coming in, not going out, this value must be considered to be −166.67 ohms. In Fig. 4, these two resistances are connected in parallel and the common point resistance is calculated as being the result of connecting +38.46 ohms in parallel with −166.67 ohms. The result is 50 ohms. Note that we have combined two resistances in parallel to come up with a value that is *higher* than 38.46 ohms, not lower. There is no mystique to this at all and, in fact, this phenomenon may be readily seen in the field. Upon removing the conjugate passive load from a negative resistance tower and returning the power back into the overall system, the common point resistance will go *up*!

Going to Fig. 6, we get into the practical details of recovering the power from a negative resistance tower and returning it back to the system. As mentioned at the outset, a negative is best adjusted initially by conjugate loading. Meter plug A is opened up and the RC network is placed across the tower to ground. An RL network would be used if calculation predicted that a negative tower's operating impedance might contain capacitive rather than inductive reactance. Again, with the positive towers all in proper adjustment, R and C are adjusted at the negative tower to obtain the required current ratio and phase for the pattern. The reaction of the positive towers to these adjustments is usually minimal. After the RC network is in final or near final adjustment, it can be disconnected and measured in the usual way. Reversing the algebraic signs of both the R and jX values will give the negative tower's operating impedance. Close the meter plug at point A, calculate and set the arms of the "LTU" to the desired values. Open up meter plug B and place a 50-ohm dummy load across the network "input." Turn on the transmitter and note that if the "LTU" has been set correctly, there will be no change in any of the antenna monitor parameters or the common point impedance. We are well on the road to home.

Turn off the transmitter, remove the 50-ohm resistor, close the meter plug at B and then, if you like, open meter plug C and bridge the same 50-ohm load across the transmission line "input." Turning on the transmitter for a moment will show the same result again — everything is going along just fine! Turn off the transmitter, remove the 50-ohm load, but leave the meter plug at C open. Place a directional coupler (reflectometer) into the jack at point C and observe the standing wave ratio. In the diagram we have this tower's "phase control" network and power divider coil to the left of point C. Turn on the transmitter and adjust the "phase control" network for one and only one simple singular condition. Adjust to obtain a 1:1 VSWR as shown on the directional coupler. Keep the directional coupler's forward-reverse switch in the reverse reading position and simply adjust the network elements to the left of point C for a null condition, which indicates that the *load* end of the coupler is seeing 50+j0 ohms. Caution! When inserting the coupler into the jack at point C be very careful that its *load* end points in the direction of power flow! In the case of a negative resistance tower, the direction of power flow is that shown in Fig. 6, *away* from the tower and back in towards the

common point. Turn off the transmitter, remove the directional coupler, and place the shorting plug back into the jack at point C. The negative tower is now properly tuned and feeding all of its power back into the system. It was all so simple and easy — and upon returning to the front of the equipment you will find the antenna monitor readings to be the same as they were before. You will find that the common point resistance has gone *up*! You may now proceed to give the same treatment to the next lowest power negative tower.

Notice that in the preceding paragraphs, the terms "LTU" and "phase control" as well as transmission line "input" were, as they are now, placed in quotation marks. The fact is that the true LTU (line termination unit) is *not* at the tower base in the case of a negative resistance tower. Attempting to control line matching on a negative tower by tweaking the tower base network is an exercise in futility leading to chaos. Don't try it! The tower base network is really the negative tower's share of the phasor. It is simply located out at the tower base instead of in the phasing cabinet in the transmitter building. The *true* LTU is located in the phasing cabinet and, as in the case of positive resistance towers, the front panel controls are marked as phase and power controls. On a negative tower, line matching must be done, as we just did, back in the phasing cabinet at the transmitter building. We must conform to the absolute law that the standing wave ratio on a transmission line can never be reduced or even affected in any way except at that end of the line that is *receiving* power! The controls on the phasing cabinet for a negative tower trim array parameters while also shaping the far field radiation pattern. They do it in a way that is different from that of a positive tower. The negative tower phase and power controls simply place varying amounts of mismatch on the negative tower's transmission line. This is reflected back to the base of a negative tower such as to change the impedance it sees at the tower base. These changes, usually small ones, naturally change the current ratio and phase on a negative tower as a result. After final and precise current ratios and phases have been determined and set on the array for the final pattern and FCC filing, the transmission lines for the negative towers may be rematched in a few minutes by the previous procedure mentioned at point C in Fig. 6. It will usually not be necessary to repeat the entire negative tower combining and matching procedure, starting at the tower itself. A minor trim at point C should be all that is necessary in the great majority of cases.

Now that we have unmasked the negative resistance tower paradox to show that there is no paradox and no mystery at all and that negative towers are the easiest thing of all to tune in a directional array, we note again that 180-degree phase shift in the U-turn has absolutely nothing to do with it. This was proven about 15 years ago by plucking a phase monitor out of the rack cabinet. With two matched current sampling probes all of the phase shifts in an existing system were measured and tabulated in the same form as on the right-hand side of Fig. 5. Nowhere was a 180-degree phase offset found!

Finally, a word about the resistors used to pretune negative towers. The author uses specially made high-power and noninductive rheostats with the unique feature of being continuously variable. Readers may feel free to contact the author regarding these resistors or alternative ways of using fixed resistors to accomplish the same purpose. **BM/E**

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MANAGEMENT PROBLEM SOLVING

By P. Dale Ware, Ph.D.

A sound management science approach to problem-solving can go a long way toward avoiding "knee-jerk" decision-making. When a station is viewed as a total "system" rather than a collection of unrelated parts, reason can prevail.

JOHN Q. MANAGER has been in radio for a long time. His old ways are a part of his everyday management behavior. And when the ratings come in, it shows. They're down. So what does he do?

Like many other panicky general managers across the country facing heavy financial losses, he may resort to several last-resort, illogical activities. According to Quaal and Brown in *Broadcast Management*, he may accept any commercial client he can get, cut rates, clutter the air with poorly planned programming, cut personnel, and even try to get by with broadcast equipment in disrepair. In short, he may do anything to keep the station out of bankruptcy. That's when the serious mistakes are made. Irrationality runs rampant at a time when reason could provide some solutions.

A system of broadcast management problem-solving is needed. And that's what the author proposes — a systematic way to avert "knee-jerk" decision-making. It is an application of management science called general systems theory. The concept is derived from a book by C. West Churchman titled *The Systems Approach*.

Quite often, mistakes are made by managers because they engage in single cause-and-effect thinking rather than a multi-casual approach. That is, they think one single person or thing is directly responsible for each problem they encounter rather than examining a number of variables that could have contributed to their problem. What they need to do is "scope the system," or closely inspect the operations of a station methodically. "Scoping" is nothing more than looking closely at a system of interrelated, interdependent components. Each component or "mission" within the station (i.e., programming, sales, engineering, accounting) is measured independently to see how it's producing. A measure is taken of how each component is adding to or subtracting from the station's overall objective of profit-making.

Seeing the whole system

First, the general manager looks at the station as a whole system. Then he or she must remove each component to see how it performs. For example, does programming operate at a level of maximum output? If not, why? Is morale a problem? Perhaps poor morale from low pay is causing talent to perform at substandard levels. Also, poorly paid talent may be talking to other employees in the station and pulling their morale down. Sometimes low morale may be mistaken for a lack of competency. Either of these evils can result in low productivity.

As one component becomes less efficient in output, it affects the missions of other components. A problem with one component of a station usually influences the performance status of adjacent missions. The morale problem of talent, for instance, may spread to the sales department, causing disturbed relationships with clients. When people have problems, they usually like to unload them on anyone who'll listen. When in-house problems like this are taken outside the system, they affect sales and billing goes down. The outcome is poor performance.

A wise allocation of resources may prevent problems like the one with billing. Reallocation may provide a solution. Resources (money for salaries, equipment, person-hours, etc.) are manipulated for the optimum benefit of the station. An example of a minimal but effective reallocation of resources may be moving office desks around to improve employees' communication patterns. Perhaps an enterprising radio program director may have the control room painted a bright color to "zip up" the spirits of lackluster DJs. In a television station, a program manager may rotate anchorpersons periodically until the proper blend of on-air images is found.

The external environment

Another concern for the manager is a system's environment. A manager looking at the station and its components for internal problems needs to look at the external environment in which it operates. In this case, the environment includes those "fixed constraints" or "givens" that influence a station's operations. They are the business climate of a station's market, as well as its competition, among other things.

Next, it is the manager's job to survey the environment and keep the system "open" to change. If environmental data dictate new plans, the system must make internal adjustments to coexist with its environment. For example, if the FCC has its way, about 300 new radio stations may soon spring up in many areas of this country. If this occurs, existing stations must plan for the new competition.

Systems thinking is based on the notion that all things

P. Dale Ware is Associate Professor of Mass Communication at Eastern New Mexico University in Portales.

change over time. Most of all, forward-thinking managers must acknowledge that people's entertainment preferences change and their stations must meet audiences' changing needs.

Besides surveying the environment, a systems approach presupposes that a manager adopts an ongoing self-monitoring procedure. This activity involves regular assessing of feedback. Such feedback provides measures of a system's performance. Watching ratings or a station's profit and loss statement regularly are two obvious ways a manager can monitor a system.

A good general manager schedules regular meetings with top-level management to "tap" other aspects of the station's performance. When negative feedback such as low ratings indicates that changes need to be made, a manager can follow a systems approach to isolate the reason for the ratings drop. The manager can compare talent ratings on a quarter-hour by quarter-hour basis or, after looking at the overall rating figures, check to see if the composition of the target audience has changed. If it hasn't, some other feature of the system may be examined in finding a solution. The *last* thing a manager should do is fire talent without a program analysis.

New opportunities to look at

In looking at the performance of a system, a manager surveys its "lost opportunities." These include such things as low billing or low ratings periods — the time when the station has made operational mistakes. By studying profit trend charts and the factors contributing to past operational errors, a manager may make better use of present and future opportunities.

Three questions to ask in examining "lost opportunities" might be, "Where has the station been?" "Where is it now?" and "Where is it going?" One also might ask whether adequate learning from the mistakes of the past has been considered in forecasting for the future. A good method to discover the details of lost opportunities is employee interviews. Most likely, these lost-opportunity facts would not be shown in the operating statement of a station. An alert manager might inquire why various commercial clients were lost or why talented personnel resigned from the staff. Once these data are compiled, the manager can use the knowledge from past mistakes to better utilize present resources for maximum performance results.

When all the preceding steps have been followed in "scoping the system," the manager looks again at the entire system. If proper remedial actions have been carried out, immediate improvement should be apparent. Each component is viewed in its interrelated relationships with every other component. If everything works smoothly and all missions are performing at the expected levels, then one can be relatively confident that success has been achieved. A follow-up "scoping" should be made every three months to make sure components are producing efficiently.

Additional dimensions of general systems theory can be studied for greater understanding of its application to broadcast management. The enthusiastic manager will do well to pursue that study. It can mean fewer headaches from management problems in the future. **BM/E**

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LEAVING WITH MORE

By Mark E. Battersby

Broadcasters planning to "sell out" can make their properties more attractive to potential buyers with a little clever financial maneuvering. Installment sales and careful allocating of proceeds can make both buyer and seller happy – while still staying on the right side of the IRS.

THE CURRENT EXODUS from the field by many independent broadcasters can be attributed to retirement, the growing numbers who have simply gotten tired of dealing with the abundance of regulations, or simply our present economic situation. Generally, those wishing to sell out have been able to find a buyer and usually have been able to negotiate a reasonable price for their company and its assets.

Unfortunately, the Internal Revenue Service has thrown up the major roadblocks and in more than a few cases has managed to significantly reduce the sale proceeds through strict application of our voluminous tax laws.

Surprisingly, those same tax laws that can swallow such a large percentage of the sales price can also help the independent broadcaster or station owner make an operation much more valuable to a potential buyer. For instance, a buyer who must pay a flat price for the shares in your closely held corporation might be more agreeable to higher payments if a tax deduction could be guaranteed for some or all of the money paid out.

Naturally a higher price for your business would mean little to you if the added money all went to the tax collector. That is where tax planning comes into play. Tax planning before — not after — the sale.

We all know that a buyer and seller are free to label the proceeds from a sale pretty much as they choose. Thus, a seller who demands a flat price for a business will usually be able to report the gain at the favorable capital gains tax rate. The buyer, however, receives no tax deduction for payments.

A buyer might be willing to offer more money for your business if you were willing to label it consulting fees or some other type of expense that the buyer could claim an income tax deduction for. To accept this arrangement you would have to have some idea of how these fully taxable payments would affect your tax picture. Even the maximum tax of 50 percent on earned income is a bigger bite than the present capital gains rates.

For those who cannot see their way clear to accept anything less than capital gain, a willingness to accept payments over a number of years may make your business worth a much higher price. It will also benefit you to be allowed to spread your income over a number of years; thanks to a recent change to our tax law, installment reporting is easier than ever to use.

The Installment Sales Revision Act of 1980 substantially changes the rules for reporting gain under the installment method. What is more, these changes are effective for 1980 income tax returns. Among the major changes are:

- Elimination of the requirement that no more than 30 percent of the selling price be received in the tax year of sale in order to qualify for installment sale reporting for gain from that sale.
- Elimination of the requirement that a deferred payment sale be for two or more payments.
- Placement of the installment method on an automatic basis unless the taxpayer chooses not to have the sale so treated.
- Adoption of special rules for situations involving installment sales to certain related parties who subsequently sell or dispose of the property and for situations involving installment sales of depreciable property between a broadcaster or owner and spouse or certain 80-percent owned corporations or partnerships.

That's right, the long-standing requirement that, in order for gain to be reported in installments, no more than 30 percent of the selling price be received in the taxable year of sale has been eliminated. No more hassles over "inputed interest," "selling price," and "payments" such as those the IRS pressed in the past.

Although there is no requirement in the tax law that payments be periodic (i.e., monthly, annual, etc.), the IRS and even several courts have ruled that two or more installments payable in two or more tax years were required to qualify such sales for installment reporting. This informal rule has now been repealed for all tax years ending after the enactment of this new law. In other words, 1980 calendar year taxpayers are covered.

With the elimination of this rule, installment reporting becomes available to broadcasters who receive lump-sum payments in a taxable year subsequent to the year of sale. They may now report gain from these sales in the year payment is actually received rather than in the year that the sale is consummated.

Under this same new law, the installment method of reporting gain is automatic unless the broadcaster/taxpayer chooses to the contrary. The election for non-installment treatment must be made on or before the due

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date of the tax return (including filing extensions) for the tax year of the sale. This election may be accomplished merely by reporting the entire gain in your gross income for the tax year in which the sale occurs.

Under prior law, the installment method of reporting a sale was available only if the taxpayer made a timely election to report his or her gain on the installment method. By eliminating this requirement, the new law puts new rules regarding this "automatic" election into effect.

Despite the recent dearth of so-called "intra-family" sales (where the dealer sells the business to a family member for a sum of money that is to be paid over a number of years), Congress has seen fit to restrict a popular tax-saving device that centered around these transactions. Quite simply, the new law seeks to control the use of installment sales as a means of intra-family transfers of appreciable property and certain depreciable property.

Prior to the Installment Sales Revision Act, intra-family transactions derived distinct tax advantages through the use of the installment sales as a tax-planning device. All that was required was that the seller have no direct or indirect control of the proceeds received by the buyer when the property was resold.

The resale rule is directed toward situations in which a member of a family group makes an installment sale of property to a related person who, in turn, sells the property before the installment payments have been made in full. The person who made the first disposition must report gain on the installment sale in the year when the related purchaser sells the property, rather than as the related purchaser makes the installment payments.

In other words, selling your business to a family member on the installment basis is acceptable unless your relative, in turn, resells it. Should your relative resell it and you be unable to convince the ever-vigilant Internal Revenue Service that neither of the dispositions had as one of its purposes the avoidance of federal income taxes, you, as the first seller, must immediately report your entire gain even though you still haven't received the total sales price originally agreed upon.

This new rule is generally applicable for two years following the first disposition of property other than marketable securities. Thus, if the related purchaser sells the property (other than marketable securities) more than two years after the initial installment sale, this resale rule does not apply.

A related person, according to the law, includes a spouse, child, grandchild, parent (but not a brother or sister), controlled corporation, and partnership. Even trusts and estates can be considered to be related purchasers on occasion.

Since many sales cannot be consummated until the actual value of assets is confirmed, the new rules governing contingency sales may be quite important. This provision represents a significant expansion of the availability of installment reporting method of computing taxes for these "open" transactions.

With the addition of this deferred payment option to our tax law, the cost-recovery method formerly in use will no longer be permitted for sales at a fixed price; instead, only rare and extraordinary circumstances in which the fair market value of the buyer's obligation cannot be reasonably ascertained will warrant the cost-recovery method of reporting for sales subject to contingencies.

Installment method treatment normally results in reporting income from the sale on a *pro rata* basis for each installment payment received, using the maximum selling price to determine the total contract price and gross profit ratio. Remember, however, that incidental or remote contingency cannot be considered in determining whether there is a stated maximum selling price.

Should it subsequently become apparent that the contingency will not be satisfied in whole or in part, causing reduction of the maximum selling price, the taxpayer is to recompute his or her income from the sale after having taken this additional information into account. Then, reduced income, as adjusted, would be reported for each installment payment received in the year in which the information becomes available as well as in each subsequent tax year.

If the maximum selling price is reduced in more than one taxable year due to successive changes in the status of the contingency, each such year of reduction constitutes an adjustment year. Of course, if the taxpayer has reported more income from the installment payments received in the previous tax years than the total recomputed income, a loss deduction measured by the amount of the excess in reported income is permitted for the year of adjustment.

Finally, suppose that the business you want so badly to sell is not a corporation. Forming a corporation specifically to create capital gain from the sale is not acceptable to our tax enforcers. They can (and will) ignore the so-called "collapsible corporation" you formed.

When an unincorporated business is sold, the proceeds must be allocated to the various asset categories — capital assets, ordinary assets, and the ever-popular Section 1231 assets. The principal ordinary assets are inventories and your equipment. The seller will, without fail, want to allocate as little as possible of the sales price to this category of assets because the gain allocable to inventories will be taxed as ordinary income.

The principal capital asset of an unincorporated business is usually good will. For obvious reasons the seller generally prefers to allocate as much of the sale proceeds as possible to this item, rather than inventories. However, since good will is not depreciable, most buyers would prefer to allocate as little as possible of their investment to this asset.

Similarly, most buyers would prefer not to allocate any more than necessary to land, a Section 1231 asset, since this is also nondepreciable. From the buyer's standpoint, it is advantageous to allocate as much of the investment as possible to inventories and to depreciable assets, in that order.

Quite obviously there is a great deal that you can do in order to make your business worth more to a potential buyer. Maneuvering within the financial arena — with one eye on your own tax picture, of course — can often substantially increase the amount you will receive from the sale. Naturally, it is the after-tax bottom line you should be concerned with, so the first step in any sale should include putting your personal tax situation in order.

A realistic idea of what each concession will cost you should enable you to ask and get more for your business. It should also widen the number of potential buyers you will be able to attract. **BM/E**

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NAB'81: DIRECTIONS OF THE 59TH CONVENTION

The official theme is "Directions," and the direction that this year's NAB Convention seems to be looking is skyward. There will be numerous workshops and sessions dealing with new technology and techniques but the common thread that binds them together is the satellite.

IT HAS BECOME A CLICHE to begin previews of upcoming NAB Conventions with expressions like, "The largest ever. . .Biggest in history. . .Most comprehensive," etc. The problem with cliches is that there is usually some element of truth to them. This year's convention *is* the largest ever, the biggest in history, and the most comprehensive. As last year's convention came to a close, a foot-weary chief engineer was heard to mutter, "At least it can't get any bigger — there isn't any more room left in the Convention Center." He was wrong. Somehow they managed to find some more space in the Convention Center. As this is being written, the number of exhibitors is up by nearly 12 percent. More are expected. To accommodate the increased number of booths that everyone will be required to visit, the NAB has made several adjustments. There will be extended hours in the exhibition

hall on Tuesday night. The booths will be available until 8:00 p.m. instead of the usual closing time of 5:00 p.m. Workshops and sessions have been rearranged so that managers and engineers can attend the exhibits together. Radio managers and engineers will have Monday afternoon free. Television managers and engineers will have Tuesday afternoon set aside.

Sessions and workshops for engineers

There may be some changes in the schedule as final arrangements are made, but as we go to press, this is the tentative program.

For radio, the sessions will open with the panel on telephone talk shows. The discussion will center on interfacing stations with telco. What's new in telephone equipment, protection of the switched network, devices for converting to four-wire, hybrids, bridges, new automatic devices available, conferencing, and RFI will all be covered.

The satellite session will deal with the latest in high-quality audio transmission via satellite. Participants will look at stereo, noise reduction techniques, small dishes, and the sharing of earth stations; it promises to be a lively session.

Aside from the annual FCC panel, some of the other topics are: radio ENG, audio processing, the development of a high-quality receiver for AM stereo, the composite signal, audio recording for the broadcaster, auto switching systems, voltage transmission for audio systems, radio program automation system maintenance, and the elimination of stereo phase error.

For the television engineer there will be a concentration on the ramifications of satellites. There will be three workshops dealing with STV, MDS, and satellite distribution. The annual SMPTE workshop will focus on a number of areas; presumably an update on the digital videotape recorder demonstrated at the winter meeting. The EIA subcommittee will show the latest in teletext systems with the continued aim of coming up with one standard. All the various systems will be represented. For UHF stations, the latest on transmitter efficiency will be discussed. And based on *BM/E's* Panels of 100 Survey of Broadcast Industry Needs (February, 1981) one of the most sought-after items is earth stations. The session entitled "Practical Considerations in Satellite Earth Station Planning" will no doubt draw a considerable crowd.

Hilton Fire Won't Scorch NAB

February's fire at the Las Vegas Hilton caused serious damage, but its effect on the NAB Convention will be minimal, according to the Las Vegas Convention Bureau. Bureau director Robert A. Schmuck informed NAB president Vincent Wasilewski that the damage will be repaired by the time broadcasters reach Las Vegas, with little effect on the convention. The damage was caused mainly from smoke and water in the East Tower of the hotel; renovation work started as soon as the firefighters left.

Some of the other sessions scheduled include UHF TV measurements by helicopter, high-power RF systems, remote control for broadcasters, a vertical interval machine control system, a workshop on ENG batteries, and operational experience with automatic setup cameras. Another session which will likely draw a good house will be the one on facility design. The session is tailored to deal with designing a new or upgraded plant in the climate of complicated local, state, and federal regulations. Members of the panel will present case histories on the problems that arise when outside forces cause design engineers to consider other than straight engineering problems. Is the new tower in the path of migrating birds? Are there sufficient and readily available ramps and elevators for the handicapped? Is there compliance with ordinances on non-ionizing radiation?

Management and engineering sessions linked

There seems to be an attempt this year at the NAB Convention to have compatible sessions for managers and engineers. For example, television managers will also get a session on facility planning. Both radio and television managers will have sessions on satellite technology. In fact, the radio managers will get an entire morning session devoted to nothing but new technology. This is in addition to other technically oriented workshops.

The annual FCC session for managers promises to be packed as it will be the first time that broadcasters will have an opportunity to see the new Reagan appointees to the Commission. It will also be the first NAB for the new FCC chairman. It is expected that the chairman's speech will be the first clear indication to broadcasters of the direction of the Commission under the Reagan Administration.

The luncheon speakers for both radio and television seem to reflect the new conservative cast of the administration. Monday's television luncheon speaker will be syndicated columnist George Will, a noted conservative and early backer of Ronald Reagan.

Tuesday's speaker at the radio luncheon will be Howard Ruff, the noted iconoclastic economist who takes a very conservative approach to economic theory.

News will continue to occupy a key place in the planning of stations. Radio will have a session on improving ratings with news. Television will have two sessions on news. One, "Local News Isn't Local Any More," will discuss how the limits of local news have been stretched far outside what was possible several years ago. The panel will talk about satellites, helicopters, microwave, and other ways of bringing in news from a distance. The panel will feature *BM/E* senior editor Stephen Miller, considered one of the country's leading authorities on the application of news technology. The other members of the panel will be drawn from the ranks of broadcast news executives.

The other news session will deal with the emergence of news/informational programs such as *PM Magazine*. This new kind of program, in many stations, involves both the news and programming departments. How can the two departments work together to produce these kinds of programs without conflict?

To paraphrase the closing of a popular TV show, "These and other questions will be answered at the National Association of Broadcasters 59th Annual Convention and International Exposition." **BM/E**

SUNDAY, APRIL 12, 1981

JOINT SESSIONS

2:15	Doors Open
2:30	
2:45	Welcome, Opening Remarks by Sen. Cannon (at 3:00)
3:00	
3:15	Keynote Address — VTW
3:30	
3:45	Presentation of DSA
4:00	Rich Little & Company
4:15	
4:30	
4:45	
5:00	

WEDNESDAY, APRIL 15, 1981

JOINT SESSIONS

8:00	Round Tables — Radio Only
8:15	
8:30	
8:45	
9:00	
9:15	
9:30	FCC Commissioners' Panel (TENTATIVE!!)
9:45	
10:00	
10:15	
10:30	
10:45	
11:00	Grover Cobb Award
11:15	
11:30	FCC Chairman Address
11:45	
12 Noon	Luncheon and Bob Hope

MONDAY, APRIL 13, 1981

	RADIO		TELEVISION	ENGINEERING Radio	ENGINEERING Television
8:00 am				Telephone Talk Shows	SMPTE 'Workshop
8:15					
8:30					
8:45					
9:00	Opening Remarks & Welcome		Opening Remarks & Welcome		
9:15	Keynote Speaker (Dick DeVos)		"Speak Up"		
9:30				FCC Panel	EIA Teletext Workshop
9:45					
10:00					
10:15	Concurrent Workshops — Promotions that Make Money, Finding Money for Building, etc., Congress (Govt. Rel.), More Productivity	NEW TECHNOLOGIES FORUM			
10:30					
10:45					
11:00				Development of a High-Quality Receiver for AM Stereo	UHF Transmitter Efficiency
11:15				The Composite Signal	
11:30					
11:45					
12 Noon	Concurrent Workshops — 5 Reasons Why Sales People Fail, Selling AM in the '80s, Is Your PD a Pro? Regulatory Climate (Govt. Rel.)		Television Luncheon	Engineering Luncheon	
12:15 pm		SPANISH LANGUAGE FORUM			
12:30					
12:45					
1:00					
1:15					
1:30					
1:45					
2:00				Radio Engineers' Time Off	
2:15					High Power RF Systems
2:30			Concurrent Workshops — Government Relations (Part I), STV — Boom or Bust?, Local News Isn't Local Anymore, Smart Management for Small Markets, Effective Planning for Broadcast Facility (Part I)		
2:45					
3:00					Practical Considerations in Satellite Earth Station Planning
3:15					
3:30					Remote Control for Broadcasters
3:45					
4:00			Concurrent Workshops — MDS — A Million Dollar Baby?, Is The Sky Really Falling?, Newsroom Law, Effective Planning (Part II), Government Relations (Part II)		UHF TV Measurement by Helicopter
4:15					
4:30					A Vertical Interval Machine Control System
4:45					
5:00					
5:30	Ham Radio Operator's Reception				
9:00	Midnight — Small Market Legal Clinic				

TUESDAY, APRIL 14, 1981

	RADIO		TELEVISION	ENGINEERING Radio	ENGINEERING Television
8:00 am	Concurrent Workshops — 5 Reasons . . . (repeat), Manager Wears 5 Hats, Analyzing Arbitron, Promise vs. Performance (EEO)		Concurrent Workshops — Advocacy Advertising, Trends in Executive Compensation, Government Relations Roundtable, Slots open for 2 more	Satellites for Radio	Batteries — Do You Have A Battery Problem?
8:15					
8:30					
8:45					
9:00					
9:15					
9:30	Concurrent Workshops — Earth Stations, More Productivity (repeat), Analyzing Your Station's Image, 9kHz: What's the Real Story?	SALES FORUM (Part I)	TvB Presentation	Radio ENG	Regulator Problems in the New Broadcast Facilities
9:45					
10:00					
10:15					
10:30					
10:45					
11:00	FCC Panel		Concurrent Workshops — Satellite Distribution, The New Program/News Relationship, What's New in TV Promotion, Videotext or Teletext? Low Power, High Priority	Audio Processing	Operational Experience with Automatic Set-up Cameras
11:15					
11:30					
11:45					
12 Noon	Radio Luncheon		Television Managers' Time Off	Engineering Luncheon	
12:15 pm					
12:30					
12:45					
1:00					
1:15					
1:30					
1:45					
2:00					
2:15		SALES FORUM (Part II)			TV Engineers' Time Off
2:30				Audio Recording and the Broadcaster	
2:45	Concurrent Workshops — What's Your Station Worth, Do's & Don'ts for Changing Formats, Getting Numbers with News, FCC Rules & Regulations			Audio Switching Systems	
3:00					
3:15				Voltage Transmission for Audio Systems	
3:30					
3:45				Radio Program Automation System Maintenance	
4:00					
4:15				Eliminating Stereo Phase Error	
4:30					
4:45					

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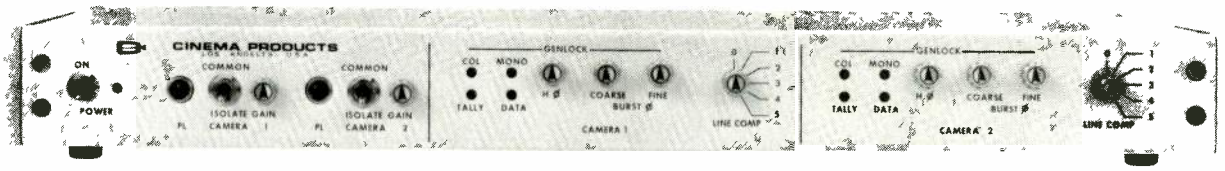

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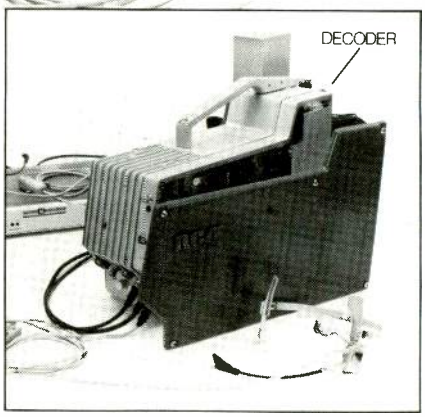
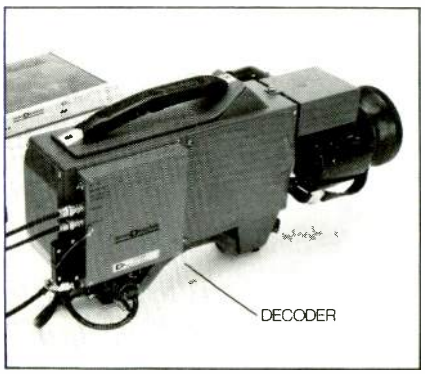
- ☐ System is ideal for all extended shooting situations such as sports events, live concerts, political rallies, etc.



RCA TK-76B shown with decoder neatly "sandwiched" between camera body and door.



Ikegami HL-77 shown with side-mounted decoder.

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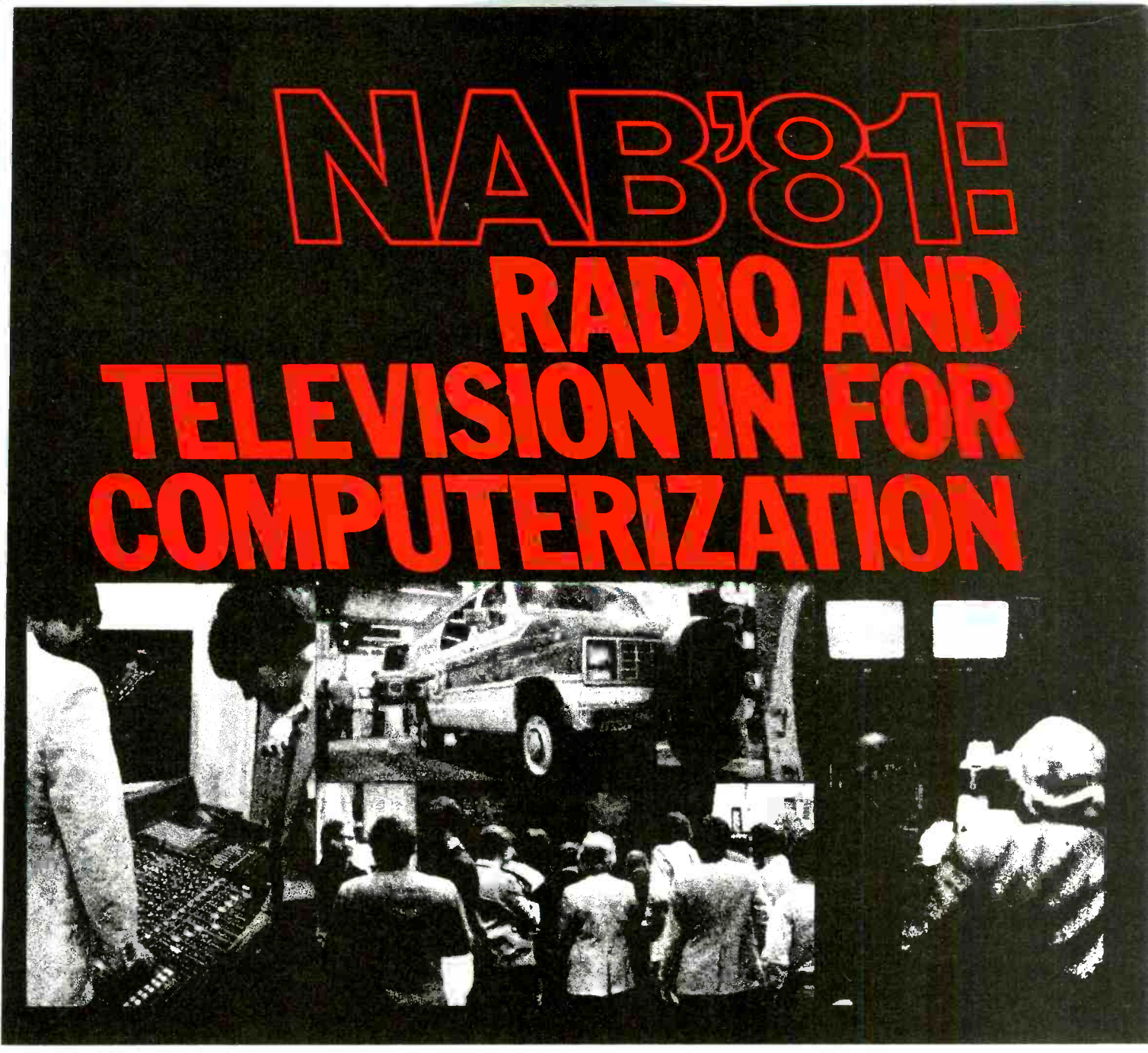
NAB'81: RADIO AND TELEVISION IN FOR COMPUTERIZATION



Whatever products broadcasters want most this year, chances are they will be computerized. You can count on it.

TV Trends

CARNAC THE MAGNIFICENT is holding the envelope to his forehead: "The answer is . . . *microprocessor!*" The envelope is torn open; he blows into it, withdraws a slip of paper, and reads the question: "What will practically every broadcast equipment manufacturer include in its new equipment design this year?"

Virtually every 1981 NAB edition of broadcast equipment will have turned to the microprocessor for greater control, flexibility, and efficiency. If the particular piece of equipment doesn't include a microprocessor, it will probably interface with some external computer control. There is no escaping it. Editing systems, lighting systems, videotape machines, production switchers, test equipment, and just about every other subsystem for teleproduction and broadcasting has turned to the microprocessor in order to offer the user a degree of compatibility and flexibility never before achieved in broadcast hardware.

Systems such as digital special effects, which have always relied on computer control and processing, will also extend their intelligence both to offer more effects and greater ease of access to those effects. Microprocessors have been dedicated to certain control aspects of these machines to help order the effects sequences and enhance the effective control the operator has over the effects repertoire. Moreover, communications between systems, such as might be needed between a production switcher, editing system, and associated record/playback machines, has been handed over largely to microprocessors able to "understand" the peculiarities of each machine and translate operator commands into language appropriate to each node in the system.

NAB'81

While great strides have been made in the area of machine communication and operator interface, expected economies and efficiencies still await standardization of machine language and communications channels. Industry committees are working hard on these problems and the intelligence of the microprocessor has made it possible to proceed in limited fashion while the ultimate breakthrough remains to be made.

Image pickup and recording trends

In cameras, the trends to smaller, lighter, less power-hungry designs continue but the single most notable trend is computerized setup. The object, of course, is to obtain consistent image quality with less time spent in manual setup. Image pickup is still based on tube technology, but many more cameras will offer diode gun Plumbicons™ this year. Saticons™ are in for significant improvements and one manufacturer plans to offer a single-tube design utilizing a newly designed Saticon-type tube. If the new single-tube design meets expectations, a whole new generation of small, inexpensive ENG type cameras could emerge.

One-inch VTRs will dominate recording technology. The question is settled. Few new wrinkles are expected beyond yet better operating control through further microprocessor application. Both Type B and Type C machines will be shown in extended play versions for use in pay TV or other "full length-feature film" applications. NEC/3M, Hitachi, RCA are likely to show their machines this year with all the promised variable speed and editing controls implied at earlier demos. 3M will no doubt show the TT-7000 VTR operating in SMPTE Time Code Lock with its own digital audio recorder. This demo drew impressive reviews at the recent SMPTE Winter Television Conference.

While videotape editing has competed heavily for NAB's spotlight each year since 1978, this year promises a more rational alignment of VTR capability with controller capability. The "super editors" (CMX's 340, Harris's EPIC, Fernseh's Mach One, Sony's BVE-5000, Datatron's 2000, and super upgradables like Convergence's ECS series) will continue to show enhanced capabilities, most likely in the area of audio post-production. The real news, however, is likely to come from the mid-range edit controllers, where newly applied microprocessing technology has granted "super-type" editing capability to machines in the under-$30,000 range. Off-line and news editing requirements continue to drive the development of lower-cost systems. There is simply no comparison between the capability of the "low-cost editors" of 1975 and the low-cost editors available in 1981.

One trend that will take place is yet another attempt at improving the operator/machine interface. CVC (Control Video Corp.) will show a unique edit controller (part of its modular control system) that will allow the operator to execute decisions by placing a finger on the appropriate part of a display. The menus are presented to the editor in a software-established sequence (i.e., a search menu, and edit menu). Each menu can be accessed randomly so the operator is never dictated to by the display.

Display and operator interface has drawn a lot of attention from manufacturers, and CVC's approach is not likely to be the only new direction taken. At least one major Type C/VTR manufacturer is known to be developing a CRT display interface along the same lines, while another will have a new editing system based on earlier models but with extended capabilities.

Plant equipment: switchers to transmitter

Once again, computers take the lead in new approaches to the teleproduction plant. Digital circuits and microprocessor-assisted task execution have been included in switchers large and small. Once again, integration and interconnection of subsystems appear to be a major objective.

Still stores and character generators are traveling in parallel tracks toward better memory management. Elaborate library systems are now available on the major mass still storage systems. Character generators continue to add storage and greater graphics capacity, while a new breed of "art system" begins to emerge. Ampex's AVA system has dazzled trade show delegates on both sides of the Atlantic in the recent past and will continue to be a major focus of the Ampex display. Vital, however, has recently entered into an agreement to market a digital art system and as many as two other art systems may appear in Las Vegas.

Microwave

Microwave systems for ENG will appear at the show in many places. The major microwave manufacturers will be showing new radio and antenna gear with many systems designed especially for airborne use. Nurad recently demonstrated its Mini-Pod for CBS in New York and achieved impressive results with its Clavin cavity antenna design. Microwave Associates has several new wrinkles in its approach to airborne microwave, including advances in tracking antennas.

The other major source of microwave systems will be displayed under the auspices of ENG vehicle outfitters, including helicopters as well as vans. A new company, Strike Systems, will show both an airborne system and an American Motors four-wheel drive vehicle equipped with specially selected microwave gear. The company's pitch is based on a systems approach to microwave operation pinpointed to the market served.

Wolf Coach, ENG Corp., Centro, Compact Video Systems, ENG Satellite Helicopter Systems, and others displaying mobile teleproduction systems

GLOBAL IX™

Now, from the new revolutionary GLOBAL IX series, Farinon Video introduces the only truly universal portable video microwave transmitter. For the first time there's a single portable transmitter capable of covering any 2-GHz frequency plan in the world.

With the unique GLOBAL IX wideband transmitter, you can select more channels than ever before—up to 55 channels in each of 16 different frequency plans. Standard plans or you name it. And RF channels can be selected locally or remotely. Now that's versatility.

You'll wonder how such a compact transmitter can provide 3 Watts of wideband power. But if that's not enough, there's an auxiliary 12-Watt power amplifier available too. And the transmitter interface can be either baseband video or true 70-MHz heterodyne.

Here's another first. Two audio channels with programmable subcarrier frequencies can be transmitted simultaneously. And you have the choice of line level or microphone level for either channel.

The Only Portable Video Microwave Transmitter You'll Need in All the World.

To simplify maintenance, the GLOBAL IX portable transmitter has built-in diagnostics. Problems can be quickly diagnosed by monitoring the indicators on a remote channel selector or a separate display unit.

You can power the transmitter from AC or a car battery—or even a standard power belt. What's more, you won't find a more rugged or environmentally reliable transmitter no matter where your crew takes it.

This unique portable video microwave transmitter is representative of the state-of-the-art products in the all-new GLOBAL IX series. Another example of Farinon Video's quest to provide superior video transmission equipment for use throughout the world.

For more information, contact HARRIS CORPORATION, Farinon Video, 1630 Bayport Avenue, San Carlos, CA 94070; (415) 595-3500; Telex 34-8491. In Canada, 657 Orly Avenue, Dorval, PQ H9P 1G1; (514) 636-0974; Telex 05-82-1893.

HARRIS
COMMUNICATION AND INFORMATION PROCESSING

See our complete product line at the NAB Exposition in Las Vegas; booth 301

Circle 188 on Reader Service Card

TV test equipment from the inventors of the Plumbicon® tube.

At long last a new, reliable source of TV test equipment. One that offers fast, predictable delivery. One with a name all the world trusts—Philips. Four quick examples:

PM5565 Waveform Monitor

Enjoy the luxury of examining one line and one field at a time. On top of this, there's a convenient front probe input so you can use the monitor as a troubleshooting oscilloscope.

PM5567 Vectorscope

If you want more accurate decoding and the ability to have an external reference from composite video signals, choose our vectorscope.

Both waveform monitor and vectorscope mount side by side, fit all existing hardware and use less power than the competition.

PM5539 Color Analyzer

Take it on a quick trip through your studio or control room and adjust all monitors to the same color temperature in a matter of minutes.

With four different memories, there's no problem in quickly calibrating four different phosphors.

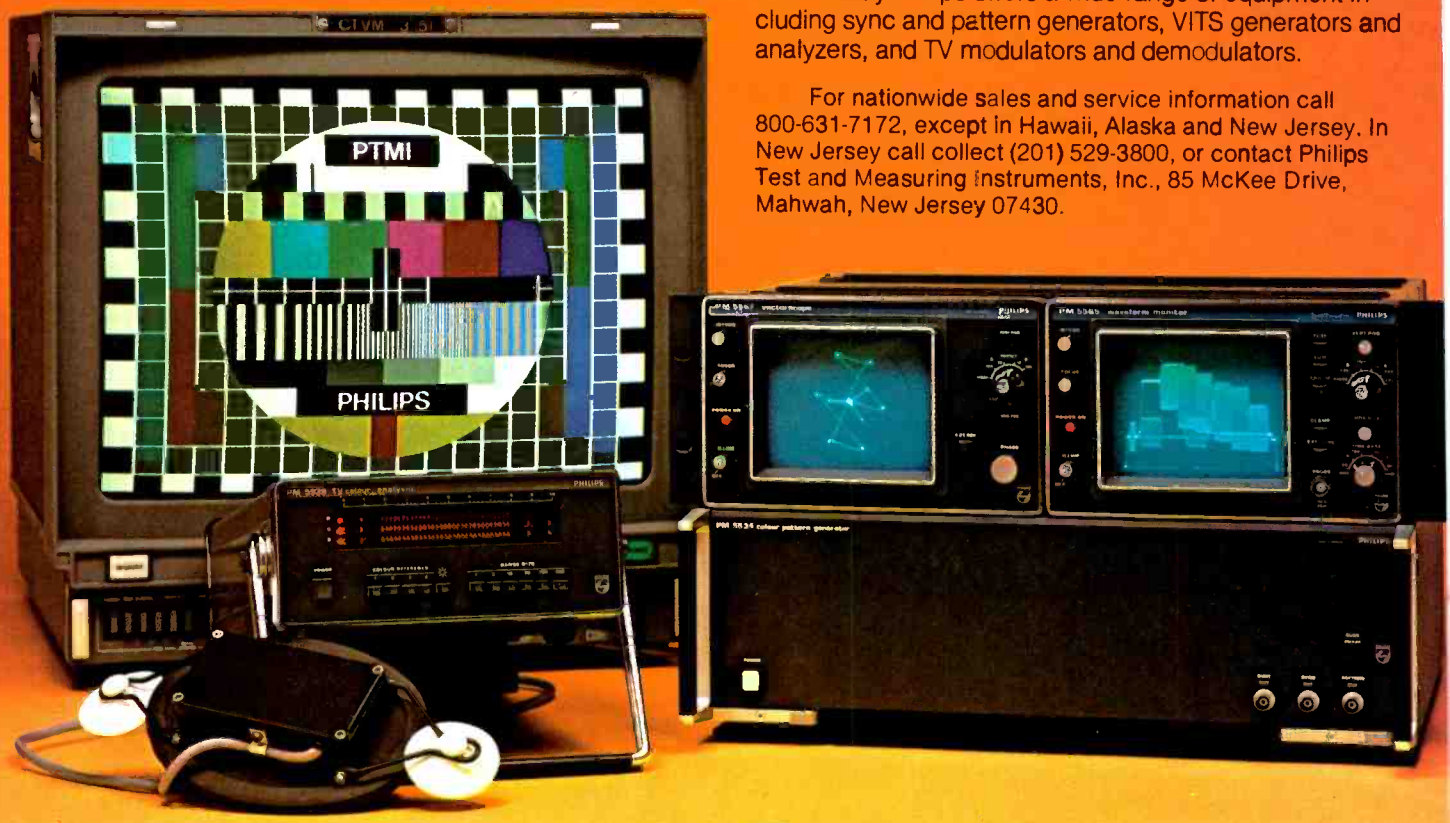
Variable full-scale, from less than set up to more than reference white, allows measurement of color tracking as a function of APL.

PM5534 Color Pattern Generator

Our universal pattern contains all the signals needed to verify overall system operation—directly from the picture. No wonder virtually every set manufacturer uses our pattern for their TV set alignment.

Of course our TV test equipment line doesn't end here. Today Philips offers a wide range of equipment including sync and pattern generators, VITS generators and analyzers, and TV modulators and demodulators.

For nationwide sales and service information call 800-631-7172, except in Hawaii, Alaska and New Jersey. In New Jersey call collect (201) 529-3800, or contact Philips Test and Measuring Instruments, Inc., 85 McKee Drive, Mahwah, New Jersey 07430.



Philips, of course.

PHILIPS Test & Measuring Instruments

PHILIPS

Circle 189 on Reader Service Card

will give the show the air of Transport-Expo. But mobile operations will not be limited to Earth's atmosphere any more as Wold Communications, Compact Video, United Video, and others are expected to point their mobile earth stations skyward.

Interest in satellite communications is running high throughout the broadcast industry and some 30 manufacturers will show up to demonstrate their approach to this heavenly channel. Some firms will be showing earth stations while others will explain their services, such as signal coordination, programming, and other related operations. With last month's Survey of Broadcast Industry Needs ranking earth station equipment in second place on TV broadcasters' wish lists, these exhibits could be among the most crowded.

Realizing that this greatly expanded exhibit cannot possibly be seen comprehensively in the time normally allotted, NAB has extended the exhibit hours to 8:00 p.m. on Tuesday. But an enhanced conference program promises to pull broadcasters to sessions in greater numbers this year, so delegates can expect to experience four of the busiest days in their lives at this NAB.

Radio: Advances On All Fronts

At press time the 1981 NAB radio show did not promise to put on stage any sweeping new developments in radio broadcasting, but rather to show a most vigorous industry supporting a host of moderate refinements and advances in technology. The manufacturers in the field look extremely active, with frequent expansion of lines long established. Every major sector of radio technology is gaining suppliers, many with more refined equipment than we have had in the past. But the suppliers who have been in each sector for more than a few years are also updating and improving their products. So the main trend is apparent to everyone: intensifying competition in a powerful industry.

This trend has obvious values for radio broadcasters: more for the money, more choices, more sophisticated operation (often more cost-effective). In sum, the 1981 NAB Convention will be a shopper's extravaganza for radio broadcasters.

All the items radio executives put high on their list in *BM/E's* Panels of 100 survey, as reported last month, will be plentiful to a very high degree on the exhibit floor. Consoles, as every year since the dawn of radio conventions, will appear in greater number than last year's greater number. Each old-line console maker has, almost without exception, redone at least parts of the line, and preliminary indications are that prices are well contained, another obvious result of the competition in the field. The company-by-company summary in this issue supplies all the detail available this far in advance of the show on this topic and the others covered here.

Up-to-the-minute reel-to-reel recorders are coming from all the manufacturers who have been supplying us with tape recorders in recent years, with a number of new machines to be shown. Test equipment continues strongly its trend of recent years toward greater accuracy and automation. Spectrum analyzers in particular are apparently on a no-end movement toward more sophistication. Audio processors, number four on the broadcaster's most-wanted list, are also on a no-end advance to easier operation and lower distortion.

Cart recorders and players are also abundant, and we have them now on about three levels of performance, with the recent introductions by International Tapetronics and Pacific Recorders of expensive, "all out" machines pacing a sharp upward trend. There may be more cart machines in this advance to appear at the show; the trend will be interesting to watch.

Satellite earth terminals, coming up from nowhere to make number seven on the most-wanted list this year, will be available from several firms with widely known lines, but, at least from the advance information, a rapidly spreading body of competitors is not apparent. Perhaps the exhibit floor will uncover a trend here.

Elaborate intercoms

A strong trend, which must be in response to market forces, is toward more elaborate intercom systems, sometimes overlapping with new wireless microphone systems. The most elaborate and resourceful systems have computer control with a microprocessor at each station for extreme flexibility based on software. Most of the systems described in advance allow interfacing to other kinds of intercoms. Among the companies already scheduled in this area and in wireless microphones, as the summaries show, are Cetec Vega, Ward-Beck, HM Electronics, R-Columbia, RF Technology, RTS Systems, and Swintek.

A trend opening new perspectives is toward the acquisition or development of business automation systems by companies already very strong in program automation. Harris has announced its purchase of Automation Electronics, Cetec of Automated Business Concepts; in both cases there will be live demonstrations of interface between the program and the business automation systems. IGM will also demonstrate such an interface, between the CBSI business system and IGM's own Basic A program system. Such total automation has been in the works for a number of years now, with a moderate number of realizations in broadcast stations. These corporate "interfaces" can only accelerate the trend.

Addressing the telco problem

Telephone-studio interfacing is another expansion area. This issue contains two comprehensive articles on the telephone interface problem, by G. Mark Durenberger and Harrison Klein. On the exhibit floor a number of companies will show equipment aimed at alleviating the problems of the telco interface. Comrex and Studer have probably the most-used equipment, but others will appear, including RTS Systems.

In the areas of remote control, STLs and remote pickup, the companies long serving the industry are virtually all active in improvements, extensions, and more flexible and cost-effective operation: Delta, Marti, Moseley, Time and Frequency Technology, Potomac Instruments, McMartin, and Harris are counted among them. There will be plenty of FM transmitters on the floor, too, with a couple of interesting realignments among suppliers: Continental Electronics, long near the top for super-power AM transmitters, will have the full Collins line, bought by Continental late last year; Elcom Specialty Products has taken over the transmitters formerly under the Cetec banner and originally from Sparta. Canadian General Electric, a newcomer to the show, will have a line of transmitters. Broadcast Electronics, with a strong start of the last couple of years in program automation, will have a greatly expanded transmitter line. Every other company strong in transmitters last year will be back stronger than ever.

In an entirely different area, radio program syndicators will be on the floor, but only in moderate numbers — about a dozen were signed up as this was written, in contrast to the more than 20 at the last NRBA Convention in Los Angeles. But in all the radio hardware sectors the 1981 NAB will be easily the biggest show in history. The radio broadcasters who come to shop will find more on the market shelves than has ever been assembled in one place before. **BM/E**

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Yours.

Energy conservation is much in the news these days. Like the weather, many talk about it but few do anything about it. We haven't figured how to change the weather, but we do have several systems specifically engineered for broadcasters that both conserve energy and add efficiency. The very latest (shown installed) is called STOR-MAX.™

Save energy (yours) by converting your overcrowded film and VTR libraries to the new "Instant Access" high-density systems engineered and distributed only by Storeel. Modular Rapid Transit Storage™ maximizes units stored per square foot of floor space, minimizes retrieval time, optimizes energy efficiency.

Our many years of design and engineering pay off in solutions to your storage problems.

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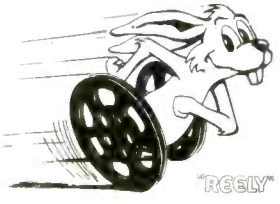

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NAB'81: EXHIBITORS LIST

An alphabetical guide to manufacturers and their products, organizations and their services appearing in Las Vegas. Booth numbers are noted in parentheses following the company name. Major new product introductions are boldfaced.

A

Accurate Sound Corp. (214)

Will introduce the AS-100, a dc servo-controlled **tape transport** for reel-to-reel recording and high-speed duplication that supplies speed reference for both master and slaves. Also showing the Starbird microphone boom and the AS-20600 and AS-100 recording systems.

Achro-Video International Sales (1503)

New to the line of lens and camera accessories will be the **Lite/Mike adapter** for ENG, **monopods** for ENG, **script lights** for studio cameras, complete **lens service and special adaptation,** and a four-speed **zoom control** for studio/field lenses. Also shown will be a long lens adapter for ENG cameras, studio and ENG lens controls and cables, color bar generators, and video and pulse DAs.

Acrodyne Industries (1103)

Will introduce a new 10 kW **VHF transmitter** with totally solid state drivers. Also showing a 5 kW UHF transmitter, a 6 kW VHF transmitter, and UHF translators.

ADC (181)

Will introduce new QCB **terminal blocks** and **broadcast jackfields** and show its broad range of audio connectors for the broadcast and professional audio industries, offering high reliability, total interchangeability, and complete compatibility with other audio connectors on the market.

A.F. Associates (1035)

Special feature will be a 45-foot mobile television production unit on view outside the convention center. The booth will feature one-inch VTRs, reconditioned two-inch quad VTRs, and

complete studio and mobile TV systems.

ADDA Corp. (1515)

Will introduce a new low-cost **video compressor** with TBC/frame synchronizer. The VIP-2 is aimed at news and commercial production. ADDA will also have its latest ESP **electronic graphics system,** the "C" series. Microcomputer control is added to the basic ADDA still-store digital graphics system. Will also show other configurations of its Electronic Still Processing system (ESP).

ADM Technology (1212A)

Showing its line of audio consoles for broadcast production.

Advance Industries (401S)

Will introduce new **generator buildings** to its line of towers and preassembled buildings.

Adwar Video Corp. (345S)

Will introduce two new products. The ARS 170 **frame synchronizer** converts an Apple computer to RS-170 type signal; a **special effects keyer** for postproduction can fade tape to black, colorize titles and key them on, fade key in and out, and perform key wipes. It features joystick operation and a pulse cross output.

AEG-Telefunken (130)

Will display a turntable-mounted HF transmitting antenna sold to Radio Vatican, plus FM transmitters, high-power transmitters, and Pantel PDM control.

Agfa-Gevaert (1223)

Will show its line of audio tape and videotape; information on new products not available at press time.

Allen Avionics (1633)

New items will include the VAR **delay trimmers.** The entire line of video delay lines and filters will be on view.

Allied Tower (115)

Will show its line of towers for broadcasting.

Allsop, Inc. (1814)

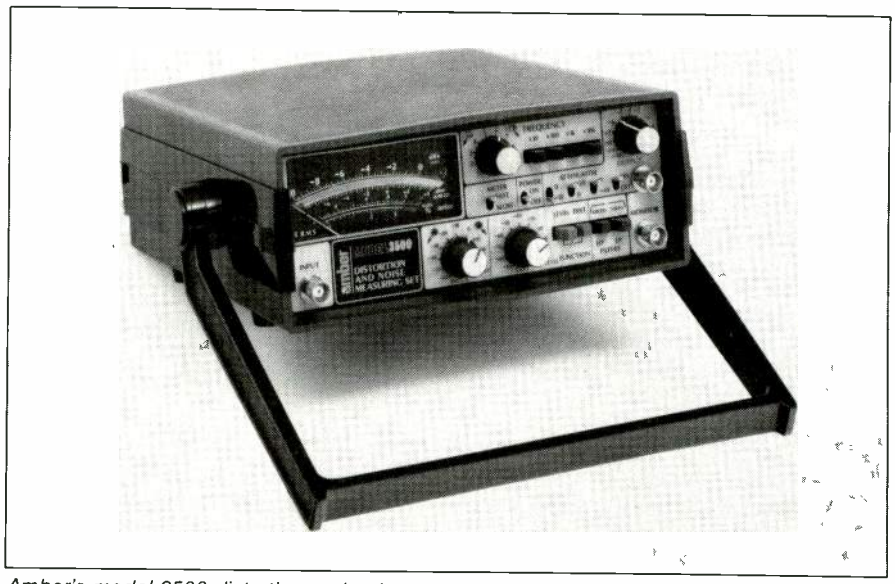
Will introduce **cleaning systems** for U-Matic and Beta format video recorders. They employ Allsop's "wet" system, which cleans the audio head, video head, erase head, capstan, and pinch roller. It's non-abrasive and completes the cycle in five seconds. Will also display the "Allsop 3" cassette deck cleaner and the "Allsop 3" VHS video recorder cleaner.

Alpha Audio (306S)

Will show for the first time the Sonex sound-absorbent **acoustic foam panels** for installation on walls, panels, ceilings, and other surfaces.

Amber Electro Design Ltd. (327)

Will introduce an **IMD measurement facility** for the Model 3500 Distortion Measurement Set and a **balanced input/output kit,** also for the 3500. Also showing the Model 4400A multipurpose audio test set and the Model 3500 distortion measurement set.



Amber's model 3500 distortion and noise measuring set will be introduced

Amco Engineering Co. (409)

Will introduce a **styled rack system** designed to meet specifications for FCC electrical interference problems. It features a glass door for visual ease in checking out systems in operation. Also on display will be styled modular cabinets and consoles in a complete selection of sizes and colors, data input and work desks, and interfacing with computer applications.

American Data Corp. (803)

Will introduce the 3100 Series of **production switchers,** four-channel video processors that allow for multiple functions on a single mix/effect amplifier. The series is designed to interface with digital effects systems. Also to be shown is the ACTS (Automated Control Television Switching) system and the 3200 Series machine control system.

American Image Productions (314)

Will introduce new Popshots **ID package** for radio and new **radio promotion spots** on television with storybook characters. Also new are the Marketmaker **sales and promo package** and the *You Make a Difference* 90-second **syndicated radio show.** Will also demonstrate the series of sales/production libraries and *Living the Music,* a television promotion campaign for radio stations.

Exhibit hours: Sunday, Monday, Wednesday, 9 a.m.–5 p.m.; Tuesday, 9 a.m.–8 p.m.

American Telephone & Telegraph Co. (1981)

Will demonstrate its abilities in end-to-end satellite transmission services for radio and television. Will also describe voice and data communication systems aimed at solving problems in all aspects of management, from spot inventory control to audience research.

Amperex Electronic Corp. (1032)

Stressing its "Dedication" theme, Amperex will show its Pumbicon® camera tubes, Diode Gun™ Plumbicons, Plumbicon low capacitance diode gun camera tubes, plus vidicons, CRTs, rectifier stacks, and transmitting tubes, including UHF klystrons.

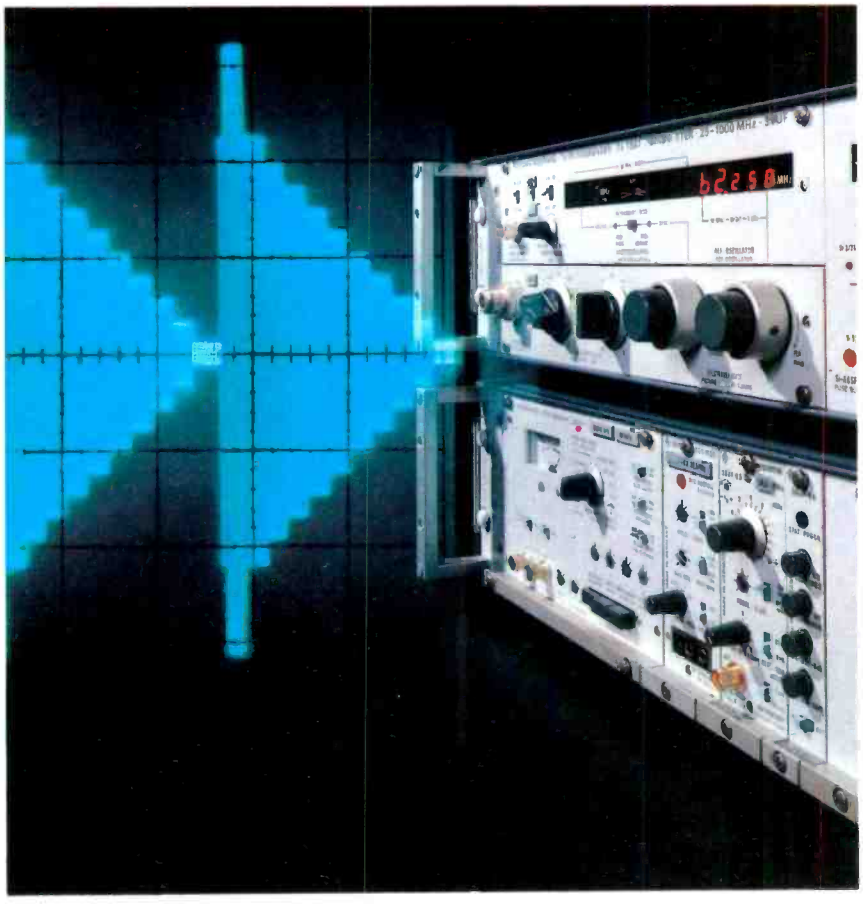
Ampex Corp. (702)

Celebrating its "VTR Silver Jubilee," will demonstrate its Ampex Video Art system, the VPR-2B helical scan videotape recorder, the VPR-20 portable one-inch VTR, and the BCC-20 portable color broadcast camera.

continued on page 161

TV test gear:
R&S signal success

TV test transmitter SBUF
25 to 1000 MHz (right)

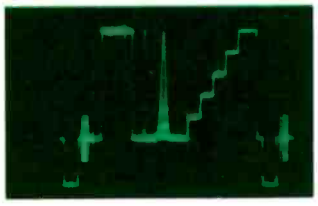


Video test signal generator SPF 2,
with test line insertion

Noise generator SUF 2
20 Hz to 50 MHz

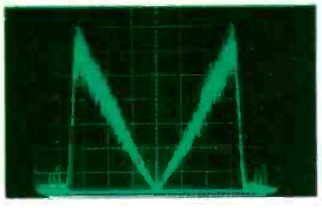
AF transmission measuring set
SUN 2, 10 Hz to 100 kHz

New audio, video, noise and RF signal generators for communications system testing



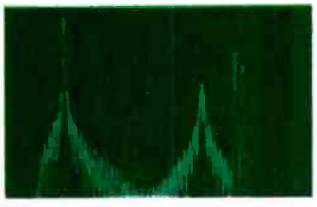
SPF 2

CCIR test line signal



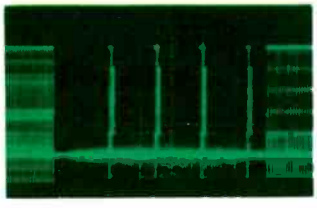
SUF 2

Triangular noise, 0 to 6 MHz



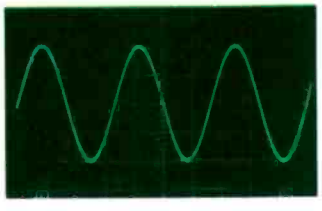
SBUF

TV dual-sound signal spectrum :



SPF 2

Special VTR test signal



SUN 2

High-precision AF sinewave test signal

SBUF

Vision carrier, colour subcarrier,
sound carriers 1 + 2

For more information see us at our booth No. 1110, at the NAB Show, Las Vegas (April 12 to 15)

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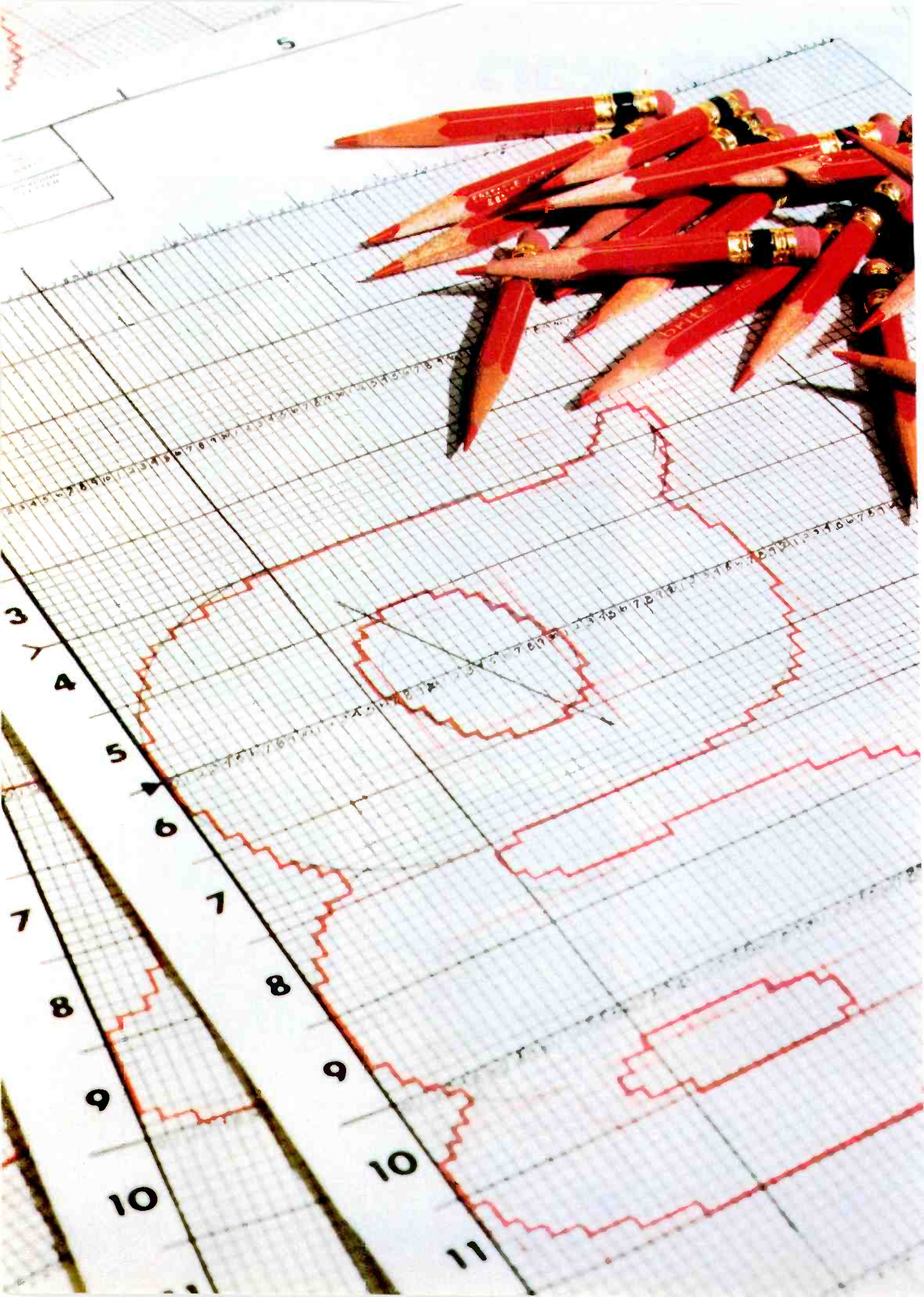

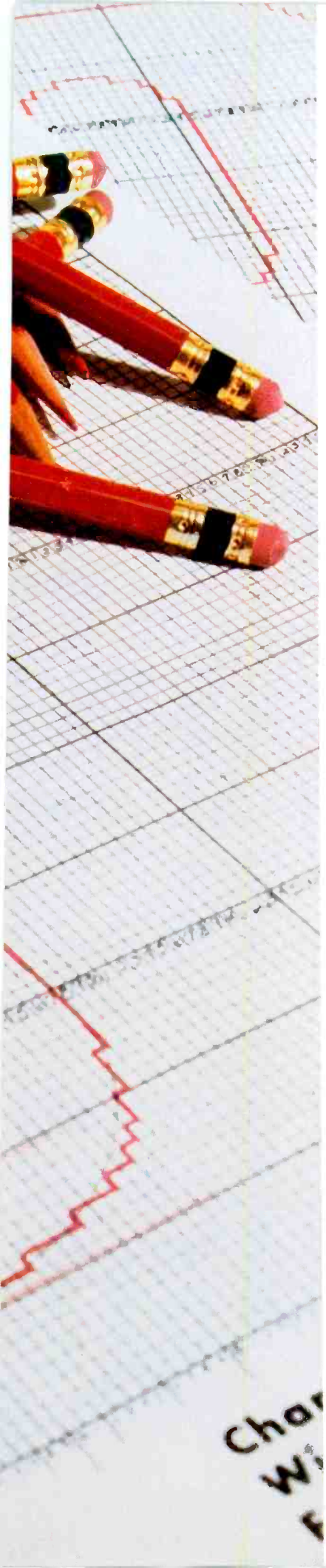

...to be letter perfect

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. . . we know the display shapes are as much a product *if not more* so than any operational feature.

This philosophy is "penciled" into each new generation of QUANTAFONT. Our devotion to designing more perfect graphics takes us to any length
. . . to be letter perfect.

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Circle 192 on Reader Service Card

The UREI Series 2000 Audio Analysis System

For the acoustician. The broadcast engineer. The recording and maintenance engineer. The audio educator/student. The audio manufacturer. The professional audio distributor. Literally anyone who needs precision audio instrumentation to do a myriad of jobs can benefit by owning U.R.E.I.'s 2000 Series instruments.

The foundation of the 2000 Series consists of two plug-in mainframes: The Model 200 X-Y Recorder for hard-copy graphs, and the Model 201 for use with scopes or existing X-Y recorders.

Add to either of these rugged mainframes the following plug-in test modules:

- Model 2000 Frequency Response Module (shown in 200 X-Y Recorder)
- Model 2010 Level & Frequency Detector Module
- Model 2020 D.C. Input Module and, these accessory modules:
- Model 20 Warble Generator
- Model 21 Mic Preamp/Warble Generator

With the proper combinations of these easily set-up components, the audio engineer can perform hundreds of vital technical evaluations.

To name just a few:

- Acoustical room analysis
- Loudspeaker measurements
- Tape recorder measurements
- Equalization and filter measurements
- Telephone line measurements
- Delay line, cartridge/stylus, optical/magnetic head and complete audio systems measurements

Check out the inexpensive, precision Series 2000 building-block audio analysis system. It could be handling the majority of your audio measurements and telling you things you need to know.

From One Pro To Another — Trust all your audio requirements to UREI.

UREI From One Pro To Another

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Worldwide: Gotham Export Corporation, New York; Canada: Gould Marketing, Montreal H47 1E5

For full technical information contact your professional audio products dealer.

Circle 193 on Reader Service Card

Ampro/Scully (102)

Showing the full line of Scully reel-to-reel recorders, Model 8300 triple-deck cart machine, Ampro consoles, and Ampro single-deck cart equipment.

Amtel (1327)

Will display its line of time code generators and readers; master clock and display clock; Q-generator; and timed event generator.

Amtron Corp. (1830)

Will introduce a new line of **high-resolution monitors.** Will also show a new **comb filter decoder** and a **waveform display monitor.** Will continue to feature its AM series of color monitors and the digital video analyzer introduced last year.

Andrew Corp. (917)

Will exhibit its line of heliax coaxial cables, rigid coaxial transmission lines, UHF TV transmitting antennas, STL microwave antenna systems, and earth station antennas.

Angenieux Corp. of America (904)

New are a 9–135 mm f/1.5 ultra-fast **all-weather ENG zoom** and a 15:1 **zoom** for 1¼-inch cameras, 18–270 mm, f/2 with 2.5X range extender and optional diascope. Full line of studio and field lenses and accessories will be on view.

Animation Video (407S)

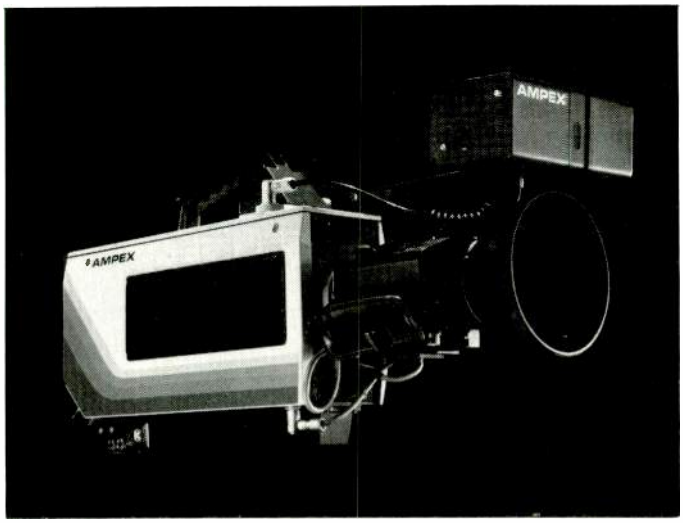
Will demonstrate its new AniVid **video animation system** for the first time at NAB.

Antiope Videotex Systems, Inc. (1421)

In addition to teletext and program captioning via the Antiope system, will demonstrate graphic extensions to the system and a method of controlling access to teletext information via a microprocessor-controlled credit card.

Anton/Bauer, Inc. (1617)

Showing for the first time the new LG-30 **lighting gun system,** a **portable lighting head,** and various **mounting brackets** to put light heads on top-grade cameras. Also introducing a new switching-type **slow charger.** The line of snap-on battery packs, diagnostic equipment, lighting belt packs, and Super "D" battery systems will be on display.



The Ampex BCC-20 has a microprocessor and memory mounted in the head

Anvil Cases, Inc. (1626)

Will stress new concepts in cases for broadcasting, especially cases for two-inch video systems rather than for single items. New this year is the Anvilite line of **tubular cases** for tripods, stands, and similar equipment, made of high density material and available in several sizes.

Arrakis Systems, Inc. (209)

Introducing four new series of **audio consoles.** The 250 Series, primarily for newsrooms or medium production, has five channels, 10 inputs, and single output mono or stereo. The 500SC Series adds a number of options, has eight or 12 channels, is expandable to four inputs per channel, may have remote start, 50 W monitor, other options. 500R Series is similar, but with remote electronics. The 2000R Series is modular with eight or 16 channels, can mix or match up to four inputs per channel, has three-band equalization, submaster buses, many options.

Arriflex Corp. (1835)

Will emphasize its products for the video industry. New this year is the Sachtler Studio 7+7 **fluid head tripod,** designed to handle larger and heavier cameras while retaining compact design. All controls for fully adjustable pan/tilt and center of gravity compensation are integrated into the head casting. The lines of Arri daylight HMI lights, Sachtler fluid head tripods, and Arriflex motion picture cameras and production accessories will be shown, along with the Arriflex Image Stabilizer.

Arvin/Echo (1001)

Updated for 1981 is the EES-2 **video discassette recorder,** now in production. Also on display will be the Slo-Mo instant replay video discassette recorder and the EFS-1A framestore video discassette recorder.

Athans Communications (307S)

Will show all types of towers for broadcasting.

Asaca/ShibaSoku (1219)

New this year are two **triple-standard color monitors** with high white balance stability and high resolution, available in 20-inch and 14-inch models; a **TV signal analyzer** that measures over 30 parameters; a **video sweep generator,** up to 30 MHz; a **portable production system** (details will be available at the show); a **safety area generator; a TV multiplex sound generator;** and a **TV signal modulator.** The line of monitors, video noise meters, white balance checkers, and other items will also be on view.

Audico, Inc. (1900)

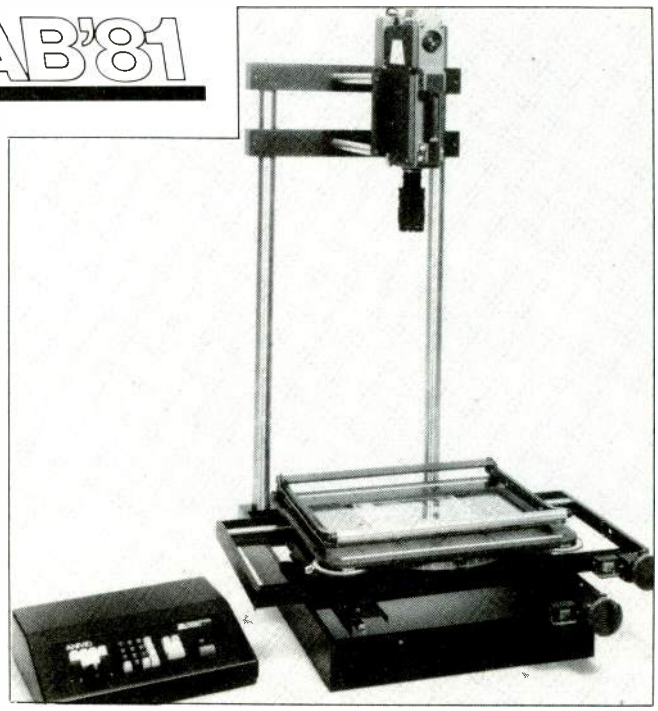
Will introduce new **system for loading tape** into U-Matic and Betamax cassettes and removing old tape from cassettes without dismantling them. Same system will load audio cassettes and eight-track and broadcast carts. Also showing line of other video and audio loading systems; cassette timer and rewinder; hockey-puck splicer for half-inch, ¾-inch, one-inch, two-inch tape; impulser producing 50 Hz, 150 Hz, and 1000 Hz cue pulses.

Audi-Cord Corp. (319)

Showing the line of cart machines, including the Modu-Cart 100 Series and the "A" Series, both with recent improvements.

Audio and Design Recording, Inc. (424)

Showing for the first time at NAB the new Transdynamic **tri-band processing system** for AM/FM/TV; also the Scamp S25 **de-esser module;** and the Easy Rider, new **compressor/limiter.** Also exhibiting line of other processing systems, including the Compex-Limiter, Vocal Stresser, Voice Over



Animation Video will show its computerized animation system

Limiter, FM Express Limiter, the Scamp line of card modular processing systems, and the Paragraphic equalizer, a parametric with graphic display.

Auditronics, Inc. (404)

Showing new **consoles** Models 206 (six inputs), 212 (12 inputs), and 218 (18 inputs), all mono or stereo, line or mic level. Also introducing the 1000-DA6 **distribution amplifiers** with one-in/six-out, or two-in/12-out. Introducing a complete line of broadcast **control room furniture.** Also on exhibit: 1.10 series of production consoles with up to 26 inputs.

Aurora Imaging Systems (622)

Will introduce a **digital video graphics and animation system.**

Autogram Corp. (415)

Showing its line of audio consoles: the AC-6, with six channels; AC-8, with eight channels; and IC-10, with 10 channels; also showing the RS-512 cartridge random select controller.

Automated Music (410)

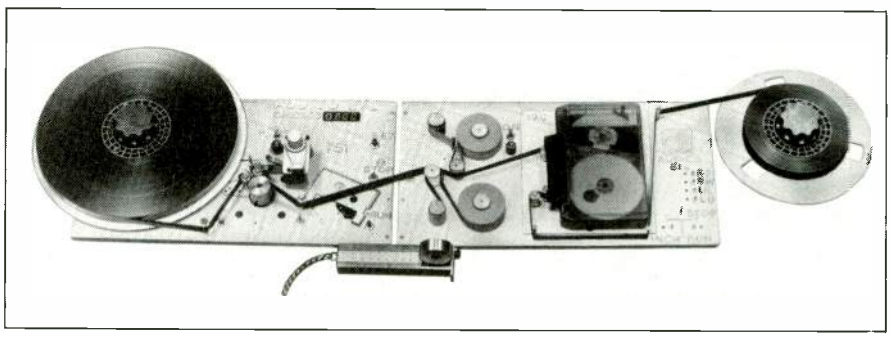
Will change name to Sound Communications, Inc. and introduce a new series of **jingles and IDs** for radio and a station **marketing and promotion consulting service.** Will also have information on the syndicated formats offered to radio stations over the past two years.

Avab America, Inc. (1600)

Introducing the Digital Dimmer and the Designer Light Controller (manual, two-scene pre-set, 12-channel) **light control systems.** Also introducing the FM 800 **production sound mixer.** Will also show the 2001 computer light controller, the HS-1 intercom system, and the IR-6 infrared wireless remote control.

Avantek, Ltd. (170)

Will show a new line of GAAS FET low-noise preamplifiers for satellite and point-to-point microwave systems. Also showing down converters, power splitters, and simultaneous multi-channel receivers for satellite systems. In addition will have a line of CATV test instruments.



Audico will introduce a new tape cassette loader for most formats

AVL Digital, Ltd. (booth not available)

Introducing new **audio and video routing switchers** and new **character generators.** Also showing line of video distribution amplifiers, video clamping amplifiers, and a 10-by-one audio-follow-video switcher.

B

BTX Corp. (1501)

Will introduce a fully **intelligent interface** for audio and video recording that provides the production and post-production industries with unprecedented capabilities for complete, economical, multi-machine control, according to the company. Featuring chase interlocking of machines in wind modes, play synchronization is precisely controlled — not only to the subframe, but the subbit. The system is compatible with all video/audio editing systems. Will also introduce a **user keypad** that allows extensive control over the entire interlocking process, providing a complementary alternative to direct external computer control.

Will also show a new **interface unit,** the Model 4600 tape controller/editor, the Model 4500 synchronizer, and the Series 5000 line, which includes Model 5100 time code generator and Model 5200 time code reader, both with digital display; Model 5300 time code video display; and the Model 5400 time code jam sync generator/reader with digital display.

BGW Systems, Inc. (403S)

Are showing for the first time the new Model 150 **power amplifier,** rated at 75 W per channel. In addition will have the extensive line of other power amplifiers. As exclusive U.S. distributor, will show Tannoy products, including broadcast monitor speakers.

Bankers Trust Co. (1961)

Will describe its financial services for the broadcast industry.

BASYS, Inc. (1701)

Exhibiting for the first time the Cart Fury, which **prints adhesive labels** for audio carts covering information fed from the wire services. Also introducing the Wire Fury, which **monitors the wire services,** displays stories on a computer terminal, and allows selected stories to be printed. Will also show from their line the News Fury and Mini Fury full-function newsroom computer systems.

Bayly Engineering (130)

New products this year include a remote stereo **camera control system,** a

Cherokee Studios, Hollywood, California

JBL 4313 Studio Monitor.
It flattens the competition.

Introducing the 4313.

Flat frequency response. It means accuracy. Naturalness. Reality.

JBL gives it to you without the bigger box that you'd expect along with it, since the 4313 only measures about 23" x 14" x 10"!

This new, compact professional monitor produces deep, distortion-free bass. And does it with a newly developed 10" driver. Its massive magnet structure and voice coil are equivalent to most 12" or 15" speakers. Yet it delivers heavy-duty power handling and a smoother transition to the midrange than most larger-cone speakers.

The 4313's edge-wound voice coil midrange accurately reproduces strong, natural vocals and powerful transients.

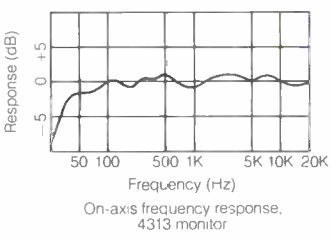
Up top, a dome radiator provides high acoustic output with extreme clarity and wide dispersion. A large 1" voice coil gives it the ruggedness needed in professional use.

Working together, these precision matched speakers offer superb stereo imaging, powerful sound levels and wide dynamic range.

Audition the 4313 soon.

We think you'll agree that its combination of flat response, power and moderate size flattens the competition.

Available in Canada through Gould Marketing, Montréal, Québec



On-axis frequency response, 4313 monitor

James B. Lansing Sound, Inc.,
8500 Balboa Blvd.,
Northridge, California 91329

JBL First with the pros.

Circle 194 on Reader Service Card

microwave **STL radio link,** UHF two-way radio portable mobile and base broadcast **transmitting antennas,** and a **radio telephone interface.** Also displayed will be FDM and PCM memo and stereo program channels (telco STLs), FM broadcast transmitters, wattmeters, dummy loads, reel-to-reel tape recorders, noise reduction systems, and a VHF two-way radio portable mobile and base portable audio mixer.

Beaveronics, Inc. (1041)

Will introduce improvements in its J&D 712, BI 154, and BI 156 **production switchers.** Will also show the J&D 705 portable "switcher in a suitcase" ENG switcher as well as Favag master clocks and A/V hum bucking coils.

Belar Electronics, Inc. (134)

Showing the line of FM, AM, and TV monitoring products. (**New items** will be unveiled at the show.)

Belden Communications, Inc. (172)

Will show Lee filters as exclusive U.S. distributor. Also exhibiting the 200 W hand-held HMI light.

Bell Helicopter (1905)

Will feature its JetRanger helicopter, with ENG equipment from various manufacturers and videotapes of ENG scenes at the booth.

Berkey Colortran, Inc. (1116)

On display will be the line of TV and motion picture lighting equipment, including lighting fixtures, dimmers, controls (manual and memory), lighting kits, portable controls for television and motion picture studio and location applications.

Best Audio (602S)

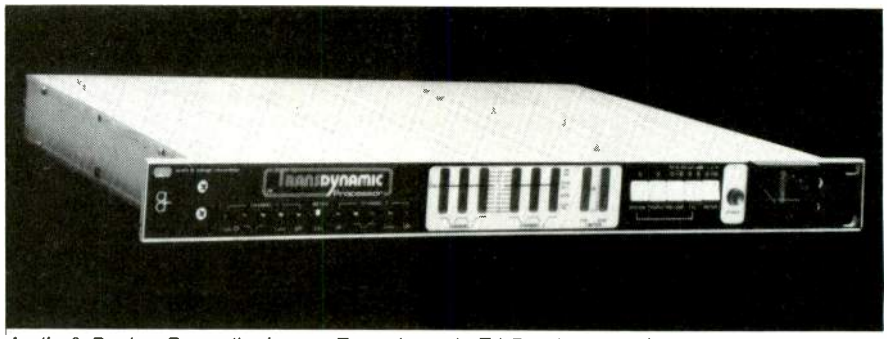
Will introduce their custom **audio remote pickup truck.** Also showing audio cabling systems.

Beston Electronics, Inc. (BEI) (801)

New this year are the Marquee 2000 high-resolution multifont **character generator** and the all-electronic Dataprompter **character generator teleprompter.** Also on view will be the CG-800 low-cost weather character generator and the regular line of telecine light controls and teleprompters.

Beyer Dynamic, Inc. (1906)

Will introduce new **microphones,** a studio condenser line: MCE5.1, MC715, CV710N, CV720N, CK701, CK702, CK703, 704, 707. Showing other dynamic and condenser microphones from the established line.



Audio & Design Recording's new Transdynamic Tri-Band processing system

Bird Electronic Corp. (915)

Will have a live demonstration of the new **digital directional RF wattmeters/power analyzers** for on-site or remote measurement via the IEEE-488 general purpose instrumentation bus. Will also introduce a new TV model **RF Power Analyst**™ for black level proof of performance; and self-cooled **calorimetric line terminations,** 10 kW to 80 kW. Will show units from the complete line of RF power meters, air-cooled and self-contained heat-exchanger loads to 80 kW; field replaceable water-cooled line terminations; digital calorimeters.

Blonder-Tongue, Inc. (1730)

Will introduce a new **addressable encoder and decoder system** for subscription television; also a new **channel elimination filter.** Will also show a new line of professional **antennas for CATV and MATV.** On display will be units from the line of "boost" and "super-boost" units, antenna amplifiers.

Bogner Broadcast Equipment Corp. (517)

Will show its full range of TV transmitting antennas, including a new **low-cost antenna for low-power TV stations.** Other items on display will include high-power UHF TV transmitting antennas (to 220 kW), low and medium power VHF and UHF slot and dipole transmitting antennas, circularly polarized FM transmitting antennas, and MDS and ITFS antennas.

Bonneville Broadcast Consultants (321)

Will have information on new **special series,** with demo in hospitality suite, *The Sounds of Sinatra*, weekly two-hour program of music plus interviews with Frank Sinatra and his friends, hosted by long-time friend Sid Mark. Also showing format syndication series: *Just Beautiful Music* in both matched flow and random-select forms; Adult Contemporary; plus Bonneville's special Playlist Management System.

Boston Insulated Wire & Cable (1011)

Will describe its line of broadcast TV camera cables, connectors, and cable assemblies, including multicore triaxial and fiber optic cable, and its complete repair services, available in Boston, Santa Rosa, Calif., Hamilton, Ontario, and England. New this year are Duraguide **fiber optic cables** for video transmission, free from electrical interference and rugged and lightweight enough for portable and studio applications; also a new line of precision quality **triaxial cable** for TV cameras.

Broadcast Audio Corp. (218)

Will have a new **console,** System 20, with up to 20 channels and many options, including seven-frequency graphic equalizers and pan pots. Also showing the line of eight, 12, and 16-channel modular consoles.

Broadcast Cartridge Service, Inc. (325)

Will show line of broadcast carts distributed — Aristocart, Capitol, Fidelipac — plus accessories including alignment tools, storage systems. Information also on cartridge reloading service.

Broadcast Center (211)

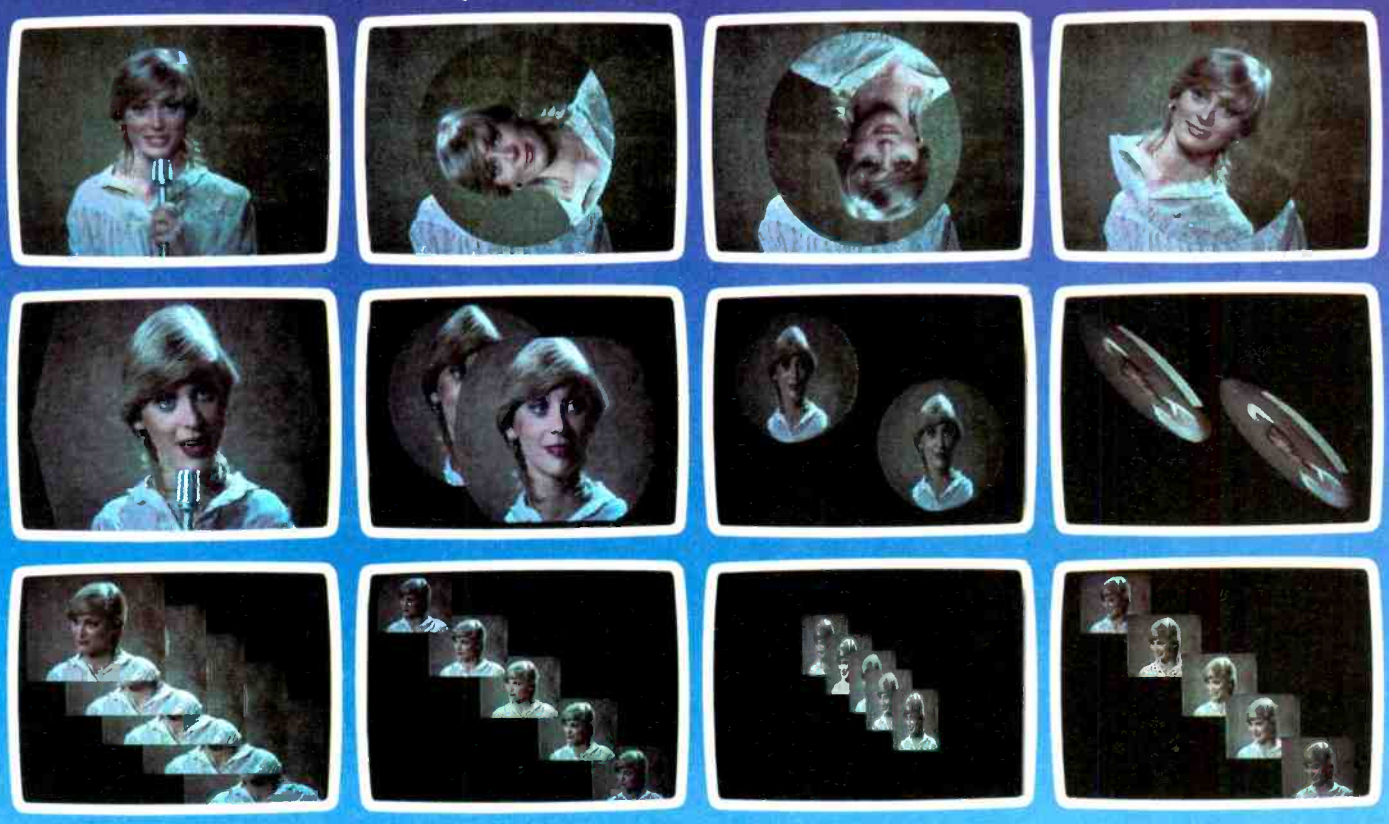
Will exhibit for the first time a **radio promotion game** with a scratch and match game card for audience promotion, and Amerithon, a Fourth of July **radio special** program. Also holding a series of radio sales seminars. Will have information in addition on Opus 81, a "top 100" special of the year, and Epic 81, a year-end countdown Country music special. Will offer radio management consulting.

Broadcast Controls (312)

Will demonstrate the new Model 1601 **sequence controller** with microprocessor control, primarily for live assist applications. Will also have the new RS50 **random selector** for multi-cart

continued on page 169

The Quantel DPE 5000.



The digital effects system that will turn your head around.

Rotate it 360 degrees.

Manipulate it into an infinity of forms.

Flip it. Tumble it. Spin it.

But because not every broadcaster needs all these capabilities now, we've built the DPE 5000 to grow. Endlessly.

You can buy the basic single channel system and generate an array of optical quality digital effects. Infinite compression. Variable picture positioning. Freeze. Border generation. Position, size, and transition rate preselect. Horizontal and vertical squeeze. Key tracking.

Later, as your requirements change, you can add to your basic system.

Zoom expansion to four times picture size.

"No-Blank" noise reduction with blanking correction.

"Autosequence" effects recall system.

"Digiflip" flip, tumble, and spin.

"Autoflex" effects package for special shapes.

Picture rotation.

And up to four additional channels to give you effects on five pictures simultaneously.

All these options can be added to your basic DPE 5000 at any time. And this goes for *any* DPE 5000—all the way back to serial number 1. We want your digital effects system to grow, not become obsolete.

Even if you don't want your head turned around this year, who knows about next year?

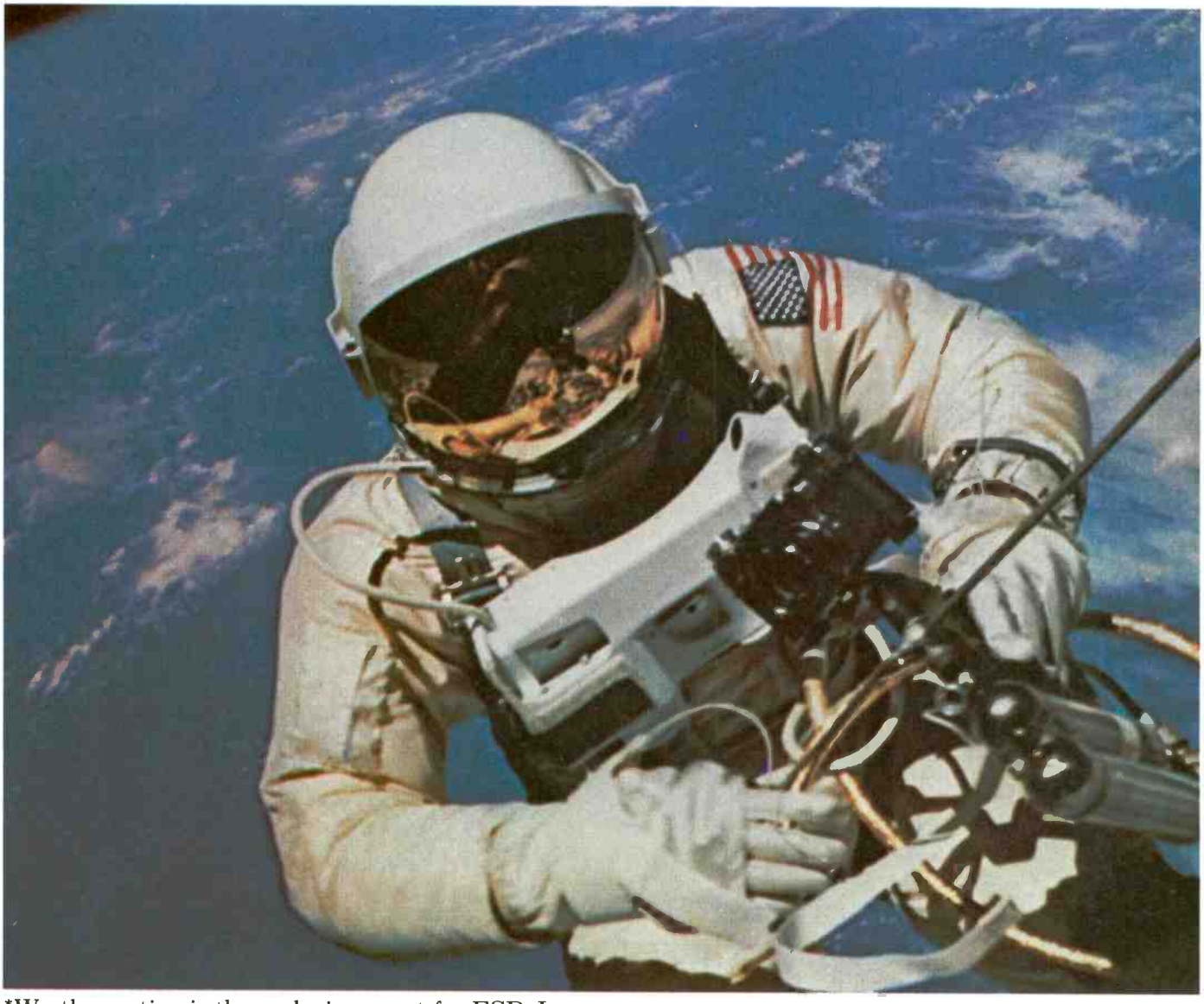
Call your nearest MCI/Quantel representative. Or get in touch with us directly. Micro Consultants, Inc., P.O. Box 50810, Palo Alto, California 94303, 415/856-6226.

MCI/QUANTEL

The digital video people.

See us at NAB Booth 1207

THIS MAY BE THE ONLY WAY TO GET A BETTER WEATHER PICTURE THAN OURS.



*Weathermation is the exclusive agent for ESD, Inc.

Our new Weathermation Satellite Digital Color System II* delivers a weather satellite picture unlike anything you've ever seen on broadcast TV.

In fact, it's such an incredible picture, the only way you're going to be able to get a better one is to go up into space and take one yourself.

Like most weather radar systems, (even our own industry-leading Color Radar System I) our Weathermation Digital System II translates GOES images of clouds into color digital display of selected geographical areas of North America.

Weathermation System II receives a fully digital signal more precise than any weather picture ever possible before.

It lets you acquire and display this more precise image of the weather in any area of North America within 15 minutes of when it happened.

Obviously this allows your local television station to produce weather reports at a technological level you've never been able to achieve before.

But System II also includes display options that can make the weather broadcast of any local station the equal of any network.

You'll have a choice of numerous colors and levels of shade, and different areas of North America that can be as large as the whole continent, or as small as your own county. There's also the capability for animation and a floating enlarger that will enable your weathercaster to pinpoint precise conditions.

But perhaps the best feature of the Weathermation System II is that all these capabilities can be accomplished in a local phone call that won't last more than 2½ to 3 minutes.

Yet, a system that can change the shape of your weather reporting forever is not all that expensive.

So call us at 312/263-6921 or write Weathermation, 190 North State Street, Chicago, Illinois 60601, for details. Or better yet, come by our Booth #1625 at the NAB Convention, and we'll show you a weather satellite picture unlike anything you've ever been able to see before.

The new Weathermation Digital Color System II.

It lets the folks at home see what only an astronaut could see before. Weathermation

INTRODUCING OUR DIGITAL COLOR SYSTEM II

The Harris 630 Frame Synchronizer.

Now with compressor/positioner & digital noise reducer options

Digital still store . . . digital graphics . . . real time picture analysis . . . whatever the future holds, the HVS-630, with its built-in digital I/O interface, is ready.

And, for today's needs, the 630 has both frame and field freeze, plus a built-in TBC that outperforms the best stand alone units. RGB (in and out) is also standard. Use it to do something special.

The key to the 630's performance is a unique system that processes the video signal in component—instead of composite—form. This technique is inherently immune to H-picture shift, cycle jump and color phasing. As a result, edits and hot switches are handled smoothly. Chroma and luma are processed separately to make maximum use of picture improvement technology.

An optional Compressor/Positioner/Effects unit provides even more versatility. Choose pushbutton and/or joystick controls. Also optional is a plug-in digital noise reducer that reduces noise by 12 dB, without motion artifacts and resolution loss.

So, for the best return on your synchronizer investment, invest in the synchronizer with a future: the HVS-630. For a demonstration, call or write.

HARRIS

COMMUNICATION AND INFORMATION PROCESSING

HARRIS CORPORATION Harris Video Systems
1255 East Arques Avenue Sunnyvale, CA 94086 (408) 737-2100

Circle 197 on Reader Service Card

machines and the new "Audiomate," a compact **single-channel unit for production studios** with all controls for gain, processing, equalization.

Broadcast Electronics, Inc. (304)

Introducing a new 1.5 kW **FM transmitter,** the FM-1.5; also the FS-30 **stereo generator** and the FC-30 **SCA generator**, plus a new **phono preamplifier.** Also showing 30 kW and 3.5 kW FM transmitters; FX-30 FM exciter; Control 16 program automation system; single-deck, triple-deck, and five-deck cart machines; Series 150, 250, and 350 five to 10-channel consoles; QRK turntables; Rek-O-Kut tone arms; audio and RF accessories.

Broadcast Music, Inc. (148)

Will have literature and other full information on licensing of BMI music, on rights, etc. Will answer any questions on operation of BMI.

Broadcast Marketing Association (437)

Manufacturer's representatives for video products.

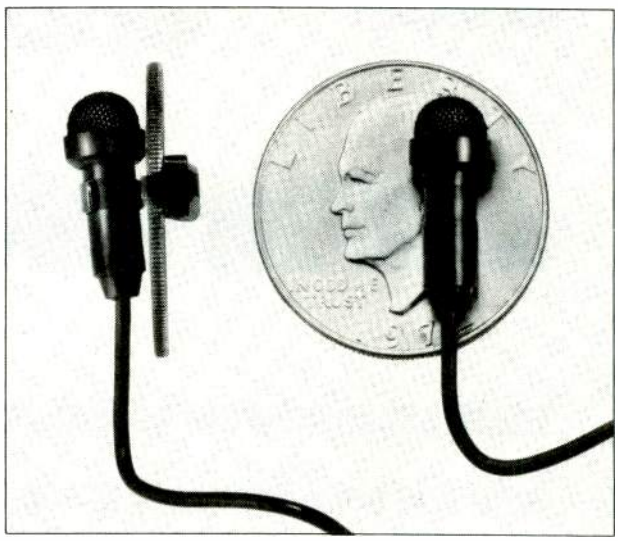
Broadcast Programming International (316)

Emphasizing (and demonstrating in its suite) the all-new, remastered and reprogrammed *Concert Overtures and Encores* **classical format,** back-announced by Bob Concie, available in three sizes, from a 1½-hour block each Saturday evening to a six-hour block for Sunday afternoon. Custom copy voicing allows stations to sell the program as a complete unit with program opens, institutional copy, and closes by the program announcer. There will be mini-booths with listening equipment and pushbutton panels allowing visitors to sample any of BPI's major formats. Each will be set up with spots, promos, etc. for an on-air sound. The main formats are Album Rock; Classic Rock; Adult Contemporary; Announced Contemporary MOR; Bright 'N Beautiful; Country Living; Easy Listening. Several are available announced or unannounced.

Broadcast Systems, Inc. (1701)

Will describe its services as a one-source supplier for vendor items from many major manufacturers and rep for over 50 major support lines of electronic equipment.

NAB program schedule on page 147



Beyer's MCE-5 is the world's smallest electret microphone

Broadcast Technology, Inc. (1023B)

Will show a series of audio processing modules, including three-band multi-frequency equalizers, mic preamps, switching modules, DAs, and audio routing.

Broadcast Video Systems Ltd. (1631)

Will introduce the Cox 339J **color balance corrector,** which provides a wide range of color correction to any encoded video. S/N is not impaired as video is not decoded. Joystick control provides direction and level of correction at both high and low luminance values. Built-in proc amp allows control of luminance and chroma levels as well as luminance set-up. Will also introduce the Electronic Visuals EV4060 **waveform/vector monitor** which combines both in single, 5¼-inch half-rack width case.

C

CCA Broadcast Transmitters (103)

Showing the line of transmitters, including the ST245 single-tube 25 kW FM transmitter; FM 20,000E; FM S5000R; CTU 55 55 kW UHF TV transmitter; and 10 kW AM transmitter.

CEI (1109)

The **Americam** will be shown at NAB for the first time. The camera is, according to CEI, the most practical alternative for high-performance, low-cost studio applications. Comes complete with tubes, lens, and VF at under $30,000. Options include a full line of lenses as well as triax. The regular product line will include the 310 series of modular television cameras and the 330 and single-piece 340 cameras, sporting new S/N characteristics as well as other improvements.

CMC Technology Corp. (1622)

Will highlight its extensive video head refurbishing service (company says it refurbishes more models of quad video heads than any other manufacturer in the industry). Will also show its line of video accessories, including a velocity error corrector, auto equalizer, and a DG channel amplifier.

CMX/Orrox (1209)

On display from the line of computer-assisted post-production gear will be the 340X editing system, "The Edge" videotape editing system, Motion Memory, and a film editor.

CSI Electronics, Inc. (106)

Will show the complete line of AM and FM broadcast transmitters.

Cablewave Systems, Inc. (1323)

Will introduce a new model in its **high-power transmission** line. Also showing the line of coaxial cables, connectors, elliptical waveguide, pressurizing equipment, accessories.

Cado (119)

Will show the Cado/Chase Media broadcast station computer system with music format control, traffic, billing, accounting, and all broadcast functions.

California Microwave, Inc. (156)

Will show Small Aperture Earth Terminals (SAT) for radio. Will have an operating satellite terminal on the parking lot outside the convention hall.

Cambridge Products Corp. (1614)

Will show the line of coaxial connectors.

The Camera Mart, Inc. (1406)

Will display its broad line of video equipment from many major manufacturers.

Canadian General Electric Co. (431)

Will show a new 30 kW **VHF TV transmitter** available in models for low and high channels, using only two tubes (one visual and one aural). The driver is a 1500 W solid state amplifier with built-in redundancy capability; unit is completely self-contained. Also new is a 2 kW **UHF transmitter**, completely self-contained in two racks. Will show a 30 kW high-channel transmitter and a 2 kW UHF transmitter from the general product line.

Candex Pacific, Inc. (1700)

Will introduce a **Source and Message System** (SAMS), **Vertical Interval Picture Source** (VIPS), and **Vertical Interval Source Encoder** (VISE) which will enhance VIMACS (Vertical Interval Machine Control). Will also introduce a new line of **lighting control systems** and six plus 12 output **video equalizing amplifiers.** Featuring the complete VIMACS line and its television distribution amplifiers.

Canon U.S.A., Inc. (902)

Will highlight its zoom lenses, including 25x and 18x lenses with diascope for microprocessing cameras, 12x lenses for microprocessing cameras, and 13x lenses with built-in extenders for ENG cameras.

Capitol Magnetic Products, Inc. (506)

To exhibit the Audio PAK A2 and AA3 audio carts for radio and television stations. Also showing the Q17 high-output, low-noise tape, on hubs and seven-inch reels.

CaVox/Tape-Athon Corp. (164)

Will introduce a new **cassette playback system,** Model 750, with 16-hour capacity and automatic program intermix; it has two speeds, 15/16 ips and 1⅞ ips. Also showing from the full line the Programmer IV, complete background music center in a compact cabinet (useful for SCA); the Model 702, a portable automatic reversing tape playback system; and the Messenger III, to insert messages in a background music system. In the hospitality suite will demonstrate eight syndicated formats, including Good Music, Conservative Tempo, Beautiful Music,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THE PROFESSIONAL SOURCE FOR RECORDING / BROADCAST & STUDIO EQUIPMENT DESIGN IN AMERICA.
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AUDIOARTS
BTX SYSTEMS
DELTA-LAB
EVENTIDE
LEXICON
MARSHALL ELECTRONICS
MXR
OMNI-CRAFT
ORBAN
PULTEC
SCAMP SYSTEM
VALLEY PEOPLE (ALLISON)
WHITE

PHONO

PHASE LINEAR
QRK
REVOX
SHURE SME
SHURE CARTRIDGES
STANTON PRE-AMPS
STANTON CARTRIDGES
TECHNICS

REVERB SYSTEMS

AKG
ECHO-PLATE
EMT
LAWSON INC.
LEXICON DIGITAL
MIC-MIX
ORBAN
TAPCO
THE PLATE

SPEAKER SYSTEMS

AURATONE
BIG RED / SUPER RED
DAHLQUIST
ELECTRO-VOICE
JBL
KLIPSCH
REVOX
SHURE
UREI
YAMAHA

MICROPHONES

AKG
AUDIO-TECHNICA
BEYER
CROWN PZM
ELECTRO-VOICE
HME WIRELESS
NEUMAN
SENNHEISER
SHURE

HEADPHONES

AKG
BEYER DYNAMIC
KOSS
SENNHEISER
TECHNICS
TELEX

STUDIO ACCESSORIES

ANNIS DEGAUSSER
ATLAS STANDS
AX-MAX DIRECT BOX
BEYER STANDS
CUSTOM CUE SYSTEMS
CUSTOM DIRECT BOXES
ROBINS
TABER
MRL ALIGNMENT TAPES
STL ALIGNMENT TAPES
XEDIT SPLICE BLOCKS
AMPEX TAPE
3M TAPE
REELS
BOXES
BULK PRODUCTS

POWER AMPS

BGW
CROWN
JBL
PHASE LINEAR
REVOX
TAPCO
TECHNICS
UREI
YAMAHA

LIMITERS

AUDIO & DESIGN RECORDING
DBX
EVENTIDE
ORBAN
SCAMP SYSTEM
UREI
VALLEY PEOPLE (ALLISON)

GRAPHIC EQUALIZERS AND FILTERS

AUDIOARTS
AUDIO & DESIGN RECORDING
CROWN
SCAMP SYSTEM
SOUNDCRAFT
TAPCO
UREI
WHITE
YAMAHA

NOISE REDUCTION

DBX
DOLBY
TTM-TELEFUNKEN

HARDWARE

WIRED PATCH BAYS
MICROPHONE PANELS
CUSTOM CABLING
SWITCHCRAFT PRODUCTS
WEST PENN WIRE
BELDEN WIRE
CUSTOM RACKS AND CONSOLES
OMNI-CRAFT CUSTOM DESIGNS
ITT CANNON CONNECTORS
RUSS LANG CONSOLES

THE CHOICE OF THE PROS SINCE 1967
FOR COMPLETE SALES, INSTALLATIONS AND SERVICE.

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CUT OUT AND KEEP FOR YOUR FILES.

Easy Listening, Contemporary MOR, Standard Pop, Adult MOR #1 and #2, CaVox Country. Also showing the CaVox Library with wide variety of selections; information on equipment/music for radio stations and background-music operators.

Ceco Communications, Inc. (1014)

Will feature its 24-hour-a-day, seven-day-a-week off-the-shelf supply service for power tubes for all transmitters, camera tubes, and solid state replacements, plus replacement parts for all RCA transmitters.

Central Dynamics Corp. (1015)

Will introduce a **one-bus quad unit** that can be fitted to any switcher and provides a wide range of patterns and soft color borders; the second stage of the APC 900 **automation system,** the APC 920, which increases the memory system to 300 events (from 40); a complete range of new **video and audio amplifiers;** and the latest addition to the CD480 family of **production switchers,** the model 10. Also featured will be CD's line of production switchers, including the VS 10 and VS 14 range and the 7-model CD480 series; the MC990 master control switcher; and the APC 910 automation system.

Centro Corp. (2147)

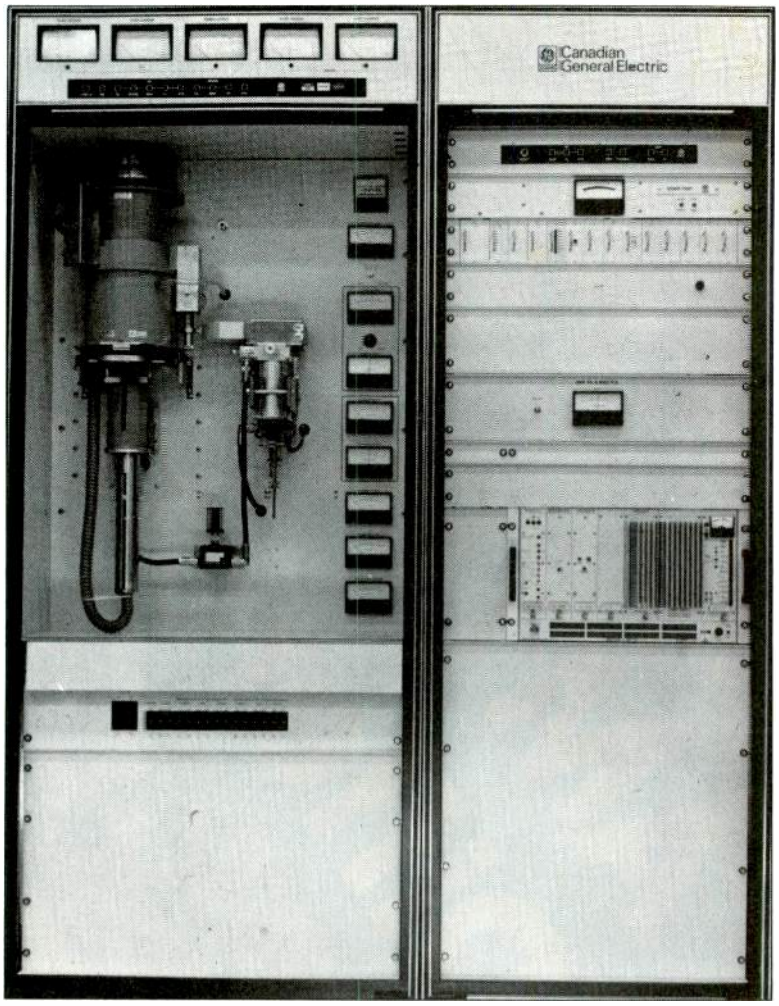
Will introduce an all-digital **test signal generator** and exhibit its line of EFP remote production vehicles.

Century 21 Programming, Inc. (313)

Will introduce new **"cross-country" programming** and new **custom-announcing features** on album-oriented rock. Also describing and demonstrating in hospitality suite the complete programming services for automation and live-assist radio operations.

Cetec Broadcast Group, Inc. (305)

Having purchased Automated Business Concepts, makers of business automation systems for radio, Cetec will show the latest version of the MAPS **automation system,** Model 1200R, totally interfaced with the Cetec Model 7000 program automation system. Will also introduce the "De Luxe" **console,** Model 8000, with 16 modules, three inputs per module, digital count-down clocks, etc. From the regular line showing the 2000 Series consoles, audio turntables and studio gear, and the AM and FM antennas.



Canadian General Electric will be showing a new 2 kW UHF transmitter

Cetec Vega (1621)

Will show for the first time the new QT-1 and QR-1 **wireless intercom systems.** Also new will be the QX-2 **wireless mic system,** supplying multiple duplex operation, with two stations supplied and up to four more optional, plus interface to all popular hard-wired systems.

Cezar International Ltd. (1718)

New to the editing product line is the EA-2X 1995 **microprocessor-based editor,** which will operate with most popular makes of ¾- and half-inch VTRs. Also new is the Editing Center, a **microprocessor-based editor** with such options as SMPTE time code reader/generator, auto fade to black, CRT display, decision lister, and perfect pitch. The EA-3X microprocessor-based editor will be on view with several new features, incorporating manual and auto animation plus an optional decision lister. All units are fully upgradable.

NAB program schedule on page 147

Chase Media, Inc. (119)

Will show the latest version of the Broadcasting Station System, a total in-house computer system that has traffic, billing and financial (including accounts payable, payroll, and general ledger) functions. The system also offers music format control with music library and rotation capabilities.

Christie Electric Corp. (1002)

Will bring Reflex-20, a 20-minute "burping" charger and Ni-cad battery, and an automatic sequencer for sequential charging of one to eight Reflex-20s.

Chyron Corp. (1407)

Will show its range of video computer graphics systems, including the RGU remote graphics unit (introduced last year), transportable in cases or small mobile vans, and the Chyron IV graphics/animation system with extensive editing capabilities.

Cine 60, Inc. (1037)

Will introduce new lightweight, compact universal four-channel **charging**

See us at NAB Booth#1327

Innovative Time Code Generators for the 80's

- Both Models 3700 and 3800 provide for the recording of old or discontinuous time code into user bits of new generator time code.
- Model 3700 features simultaneous display of user bits and time code.
- Model 3700 enables an NTSC color frame identification code to be recorded as part of SMPTE. This data can be read by either the Model 3700 or the 3800.
- Model 3700 incorporates an optional RS 232 I/O to allow for the insertion of alpha numerics in the user bits of the time code generator output.

Investigate the Amtel difference - the company to look to for high performance Time Code Generators/Readers that do twice the job in half the space, and at a considerable savings to you.

AMTEL systems inc.

101 Pine Mill Circle, Doylestown, PA 18901 215/345-0750
11001 Donneita Dr., Huntsville, AL 35810 205/852-0362

Circle 199 on Reader Service Card

Available on GSA Federal Supply Schedule.

systems, an inverterless car **fast charger,** on-camera **ac adaptors,** and expanded VTR and on-camera **batteries.** Cine 60's complete line of batteries, belts, lights, chargers, and other accessories will be shown.

Cinema Products Corp. (1417)

Will introduce the CP **Co-Ax Digital Remote Control system** for Thomson-CSF MC 601 and 701 ENG/EFP cameras and for Sony BVP 300 and 330 ENG/EFP cameras. Will also be showing the Newsmaker **video edit controller,** an editor that offers many of the features available on more expensive models and is aimed for newsroom edit needs. The company will also display its EFP Matte Box, a swing-away type **matte box** for EFP video cameras providing filter control for the "film look." CP will also show its complete line of video products and accessories.

Circuit Research Laboratories (126A)

Will introduce a new **FM audio processor and limiter.** Also showing the earlier AM audio processor/limiter.

Clear-Com's CS-200K rack-mount dual channel main station

Clear-Com Intercom Systems (174 & 176S)

Are introducing a new **four-channel studio intercom** and a new **belt-pack** for TV operating dynamic or carbon headsets for two-wire or balanced systems, with numerous options. Also new is a video camera operator's headset. Showing in addition the extensive lines of other intercom systems.

Cohu, Inc. Electronics Div. (900)

Will display the 1550B telecine film chain.

Colorado Video (1029)

New this year to the line of slow-scan video transmission equipment is the model 290 **slow-scan transceiver.**

Columbine Systems, Inc. (227, 229, 332, 334)

Will highlight development of traffic, billing, and accounting systems based on IBM computers. Other broadcast computer systems included film amortization, a music system, cart inventory, demographics, and a global data analysis system. Display will feature System 34 and four terminals.

Comark Communications, Inc. (515)

Will unveil new **remote control systems** for transmitters, **energy-saving devices,** and **automatic switching systems.** The general line of UHF transmitters, UHF exciters, and demodulators will be displayed.

Comex Corp. (217)

Company will describe its broad range of broadcast equipment sold to Latin American broadcasters. *Se hablara Espanol.*

Compact Video Sales, Inc. (1525)

Will display its mobile video units, including the Compact 42 transportable earth station, the Compact 27 television production truck, the Compact 17 and 19 ENG/EFP vans, and the Compact 40 top-of-the-line television production unit.

Compact Video Services, Inc. (1525)

Will highlight its new **satellite services;** the company's lease of a transponder on Satcom 1 will broaden the range of production and post-production services it can offer. Other services described will include production (with a mobile location fleet), post-production (computer-assisted editing); telecine, sound services, film sound transfer, and duplication and tape or film stock.

Cinema Products will be introducing a new matte box for EFP cameras

Comprehensive Video Systems (1910)

As exclusive distributor, will introduce several new products from Pag Power: on-board **Ni-cad replacement batteries** to replace Sony batteries; 250 W and 350 W **sun gun kits;** 12 V/12 amp-hour, 12 V/20 amp-hour, 30 V/12 amp-hour Ni-cad **power boxes**. Other new products will include a **video test center** for bench technicians or ENG/EFP crews, the VTC 100, for troubleshooting and analyzing video gear; the

"The Image System can make any 3/4" VTR look like 1", automatically!"

A strong statement for a strong system. The Image System™ is the most comprehensive system ever invented to correct predictable deficiencies in color under video tape formats and the first to do it automatically.

The Image System – Record 1 and Playback 1 - a bold new idea from Faroudja Laboratories, for ten years the pioneer and leader in processing technology for better television pictures.

Traditionally, image improvement systems have attempted to recover and rebuild information already lost or degraded in production and post-production stages. Further, these attempts have been based upon an operator's subjective judgements about picture quality on a particular, and not necessarily accurate, playback monitor.

The Image System is different. It consists of a pre-processor called Record 1™ and post-processor called Playback 1.™

Record 1 boosts small details which will be predictably degraded or lost in all color under VTR formats. Further, Record 1 encodes the original video signal with a non visible, fully compatible pilot signal which will later control Playback 1 to set detail levels *automatically* without operator error based upon monitor performance.

Portable
RECORD 1

Playback 1, the second part of the Image System, is utilized just before time base correction for broadcast. It reduces noise and ringing, eliminates chroma/luminance delay and sharpens details; *automatically*. The resulting picture does not have the cartoon effect or plastic appearance of color under formats – it looks as if it comes from a more expensive VTR.

FAROUDJA Laboratories

Faroudja Laboratories Inc.
946 Benicia Avenue
Sunnyvale, California 94086
Telephone 408/245-1492

Circle 210 on Reader Service Card

The Newsmaker is the new low-cost edit controller from Cinema Products

C41 and C42 ENG **cart/backpack combinations;** and an inexpensive **special effects keyer.** Will also feature the Bilora tripod line, the CVMM-15 ENG mic mixer, a reconfiguration of the Unicol line of dubbing, editing, and video playback centers with modular components, and the full line of cables, connectors, adapters, and general video supplies.

Compucon, Inc. (1902)

Will describe its communications engineering services, including new **low-power television engineering services.** Other services include satellite earth station frequency coordination from preliminary site evaluation to FCC filing; protection services; RFI field measurements; and many others, all with complete systems design capabilities and computer system software design.

Computer Concepts Corp. (168)

Will describe its ability to increase radio station profits with a proven, time-tested computer system. New this year is a **playlist control program** that controls up to 20,000 titles in up to 20 categories created by the program director. Company will also display the Broadcast System, a traffic/accounting minicomputer system based on Wang hardware.

Computer Graphics Lab (1982)

Will describe its computer animation services and introduce the Image Maker **electronic pallette system.**

Computer Management Systems (421)

Will have a new version of broadcast management system, BMIS II, for automated sales, traffic, and accounting for radio, TV, and network use.

Computer Video Systems (188S)

Will introduce the Compuvid series of **data display systems,** including a low-cost titler and a telephone public access system. The microprocessor-based systems feature bubble memory.

Comrex Corp. (105)

Will exhibit its telephone talk show interface system, low frequency extenders for telephone remotes, ENG van cue system, TV aural monitors, and ENG wireless microphones.

Comsearch (1604)

Will feature its new **channel selection and application preparation** service for low-power broadcast stations. Also described will be services for satellite earth station placement, frequency coordination, and RFI measurements; CARS band microwave assignment; point-to-point microwave frequency coordination; and computer systems software development.

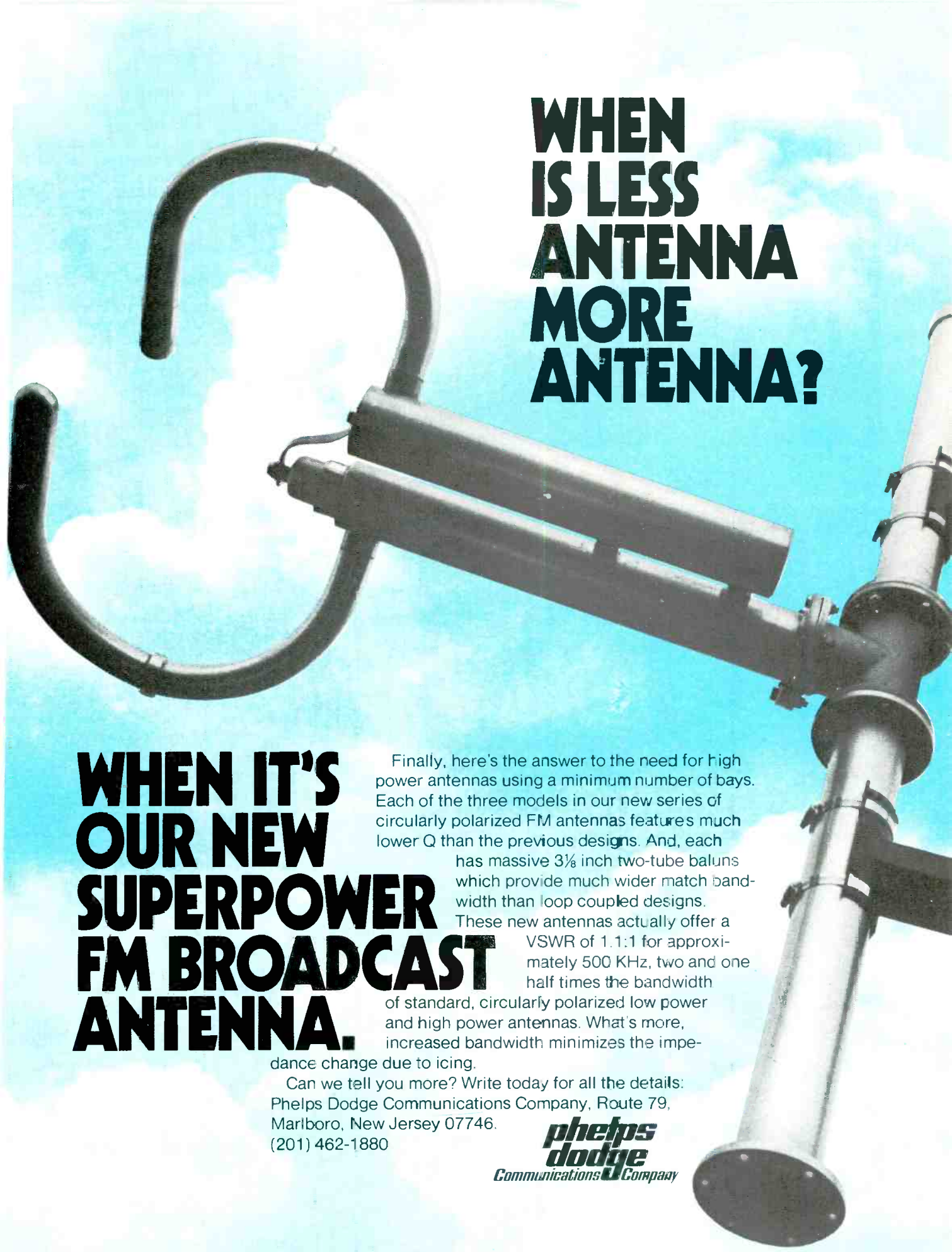
Concept Productions (326)

Will demonstrate their syndicated programs for automated and non-automated radio stations, including Adult Contemporary, Adult Rock, Album Rock, and Country.

Conrac Corp./Conrac Div. (809)

Will introduce a new line of **computer**

Cinema Products will also be showing its portable cueing system



WHEN IS LESS ANTENNA MORE ANTENNA?

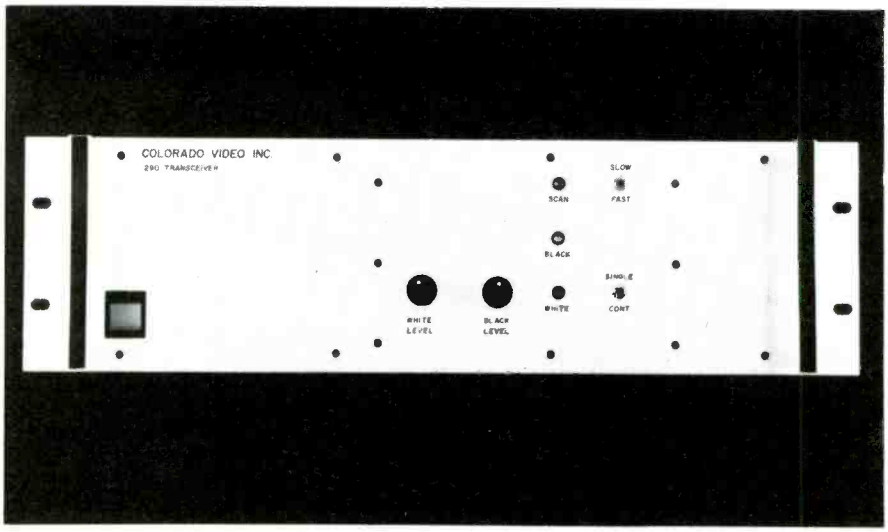
WHEN IT'S OUR NEW SUPERPOWER FM BROADCAST ANTENNA.

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 3⅛ 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.

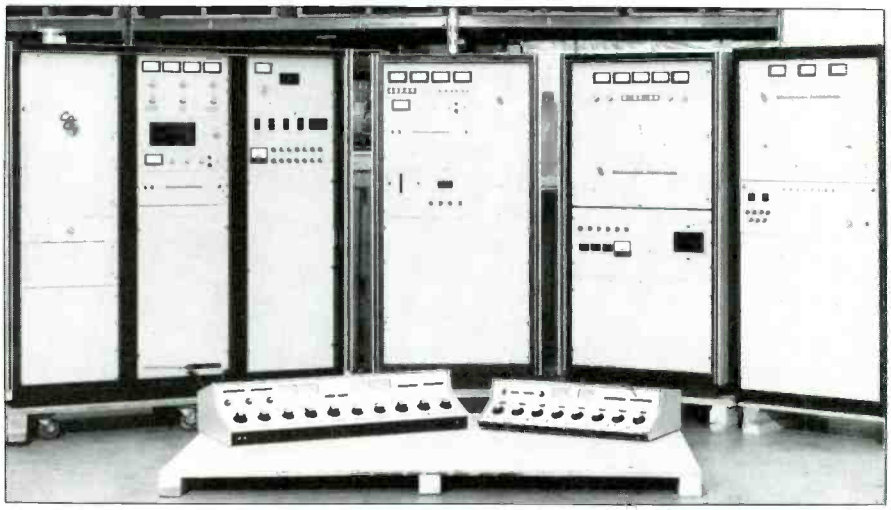
Can we tell you more? Write today for all the details: Phelps Dodge Communications Company, Route 79, Marlboro, New Jersey 07746. (201) 462-1880

phelps dodge Communications Company

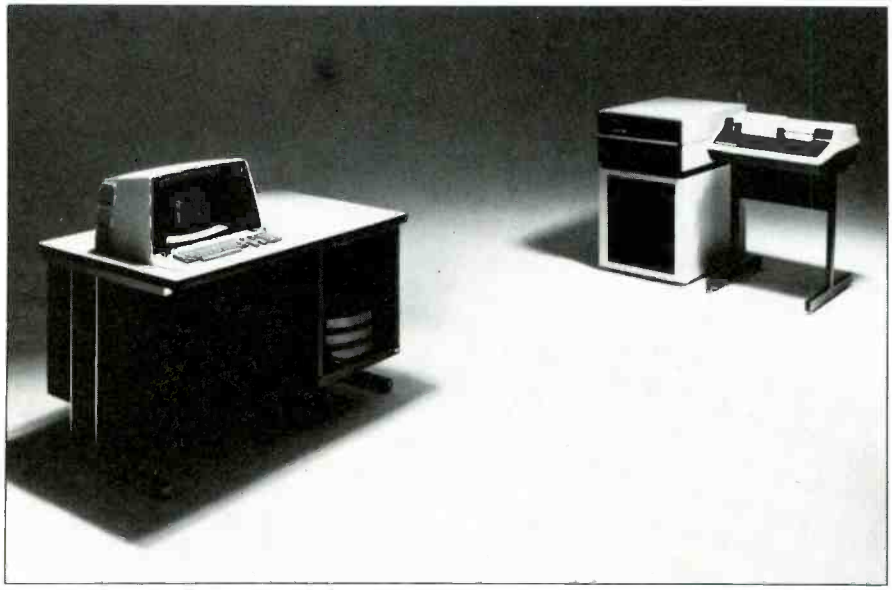
Circle 202 on Reader Service Card



Colorado Video will introduce its Model 290 slow-scan transceiver



Continental Electronics will show its line of transmitters and stereo consoles



Computer Concepts will show off the latest in business automation

graphic color monitors. Also on view will be a complete line of professional color monitors, including the 6142, a 19-inch modular master monitor with comb filter separator; the 5322, a moderately priced 19 V professional broadcasting-type monitor; and the 5742 compact high-resolution 13 V color monitor with comb filter separator for VTR over-console mounting. Monochrome monitors, including DZB and SNA series, will also be shown.

Continental Electronics (100)

Having bought the radio transmitter and console line of Collins from Rockwell International, Continental will display the following units now under Continental brand: 50 kW, 20 kW, and 2.5 kW FM transmitters; 510r-1 FM exciter; 5 kW AM transmitter; 10-channel stereo consoles; eight-channel stereo consoles. Will also show the 317C-2 50 kW AM transmitter and the 316F 10 kW AM transmitter.

Continental Plastic Card (179S)

Will show the line of plastic cards for broadcast promotion use.

Control Video (1733)

Will introduce the new Lightfinger **editing system,** which allows edit commands to be given by touching the appropriate section of the video screen. Will also introduce a two-machine **VTR synchronizer.** Will show the regular line of SMPTE readers, time code generators, and keyer generator.

Convergence Corp. (1101)

Will introduce a new model ECS-104 **list management system** that incorporates full list management capabilities including direct control over 600 edits internally. Will also show some new **interface products** for half-inch and one-inch VTRs. From the regular line, improvements in ECS-103B and ECS-103C microprocessor-based editing systems and the ECS-90 models.

Cool Light Co., Inc. (1831)

Will introduce the Starbrite **lighting system,** a 2000 W unit that operates both ac or dc and puts out 25 percent more light than a 5000 W fresnel unit. Also will introduce the **Mini-Cool,** which operates at 25 W 120 V, 200 W, 30 V, 100 or 50 W, 12 V by merely changing a bulb. The company says that Mini-Cool delivers 100 percent more illumination than any comparable system.

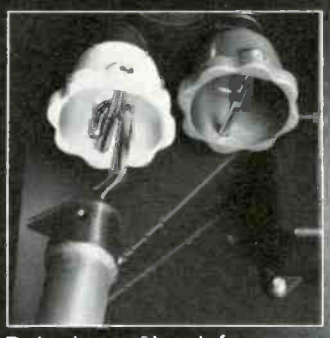
Coreco Research Corp. (158)

Showing a therapeutic vibrator and an FM wireless intercom set.

Today From IANIRO

Five on the Floor!

Now, from floor level, you can light your production with Strand Century/Ianiro pole operation system. Available on Fresnels, Cyc Lights, Softlights, Bambinos and HMI's.



Pole tip and hook for easy alignment—from the floor

1. Pan side to side—from the floor.
2. Tilt top to bottom—from the floor.
3. Focus—full range on all units
4. Rotate and adjust barndoors—and double lock.
5. Save time and money.

Fine tune your lights safely and efficiently from the floor. Overcome scenery obstructions. Poles are available in all lengths. You can update existing fixtures to Pole-Op tomorrow. And for the ultimate—optional motorized control of all Pole-Op functions. Inquire today the INFO-REQ way.

POLE-OP

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Strand Century Inc. 5432 West 102nd Street, Los Angeles, California 90045, Tel: (213) 776-4600, Telex: 653508
Strand Century Company, Ltd. 6520 Northam Drive, Mississauga, Ontario, Canada L4V 1H9, Tel: (416) 677-7130, Telex: 06968646

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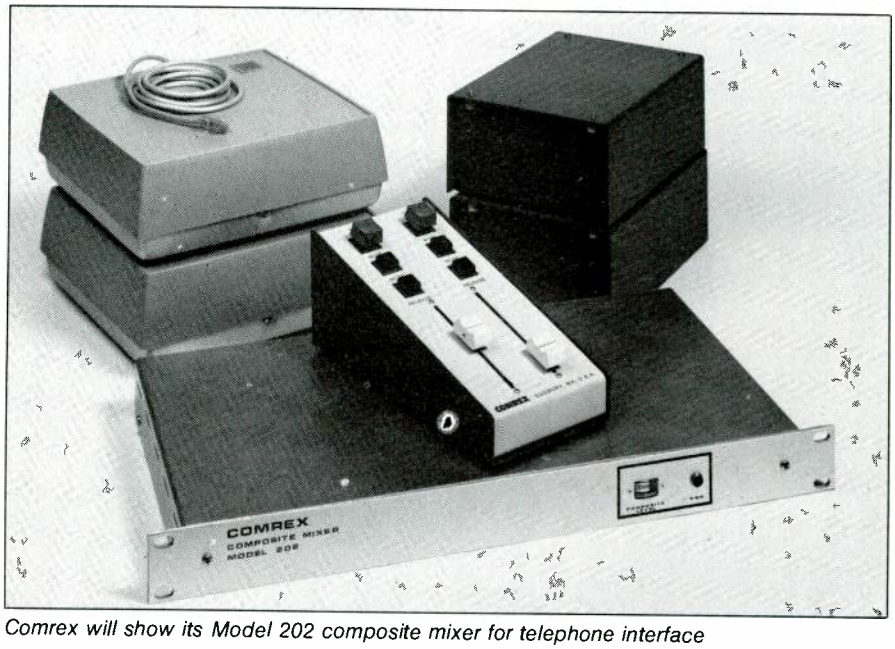


Comrex will show its Model 202 composite mixer for telephone interface

Corporate Communications Consultants (2009)

New products this year are the System 60 SL **color corrector** for Bosch's FDL 60 and a **tape-to-tape color corrector** with noise reduction. The general line of color correctors for various applications will also be shown.

Crosspoint Latch Corp. (2111)

New to the line of production switchers are an **editor-controlled video switcher** and an **editor-controlled audio switcher.** Also shown will be the 6112, 6114, 6124, and 6142 production switchers; the 6118 production switcher with automatic camera lock; and the 7200 Auto Drive™ computer controller for 6112 and 6124 switchers, sync generators, color bar generators, and chroma keyers.

Crown International, Inc. (190S)

Will show its line of **power amplifiers,** including some new ones to be unveiled at show. Also new will be a prototype of a **computerized system for audio measurements** to determine acoustic characteristics of spaces. Will show and demonstrate various applications of the line of pressure-zone microphones.

Custom Business Systems (308S)

Will demonstrate a new **custom software package** for its radio business computer systems. New model Wang computers will also be on view.

D

D-B Electronics, Inc. (140)

Will introduce new one- and three-deck **cart machines** with Hall Effect motor, fast forward, easy conversion of mono to stereo. Will also introduce a new **turntable preamplifier** with switchable phase correction and new **telephone answering interface** for use with the cart machines.

DBX, Inc. (416)

Will introduce the new Model 941 dual-channel encode only Type II and Model 942 dual channel decode only Type II **noise reduction modules**, both with +24 dBm drive capability and active balanced inputs; up to 16 channels of noise reduction can be assembled with the modules in a 5¼-inch high rack frame with switch-selectable decoding of DBX-encoded discs. Also introducing the Model 140 dual channel encode/decode Type II **noise reduction system** in 1¾-inch rack mount, with 24 dBm drive capability and switch-selectable decoding for DBX-encoded disc. Also on display will be the line of other signal processing and noise reduction equipment, including "over easy" compressor/limiters, signal enhancers, de-esser, parametric equalizer.

Delta Electronics, Inc. (400)

Will show for first time at NAB the new RCS-1 **remote control/ATS** for AM, FM, and TV, in a full working model. Also showing the line of other processing and control systems, including the power controller, modulation controller, coaxial transfer switches, antenna monitors (in a working demo), digital panel meters, and TCA RF ammeter system.

Bill Daniels Co., Inc. (1717)

Will announce a new total **in-house press capability,** operating through pre-press and all printing. Showing the line of illustrated trade references, broadcast equipment and services master lists, dealer and manufacturer custom catalogues, service and operation manuals, spec sheets, sales brochures, general printing and production services.

Data Communications Corp. (2145)

Will introduce the Network Control System™ for **station automation;** a central computer system manipulates local and remote information sources vital to station operation. Also new are the Feature Film™ **film inventory, amortization, and program management system;** the Master Control™ **program log automation system;** and Digifex, an inexpensive **digital special effects generator** that allows the station to use creative graphics for logos and trademarks in screen transitions. DCC will also highlight its BIAS™ traffic system and Buy Line™ system that links a station, its national rep, and other stations.

Datametrics, Inc. (1612, 1612A)

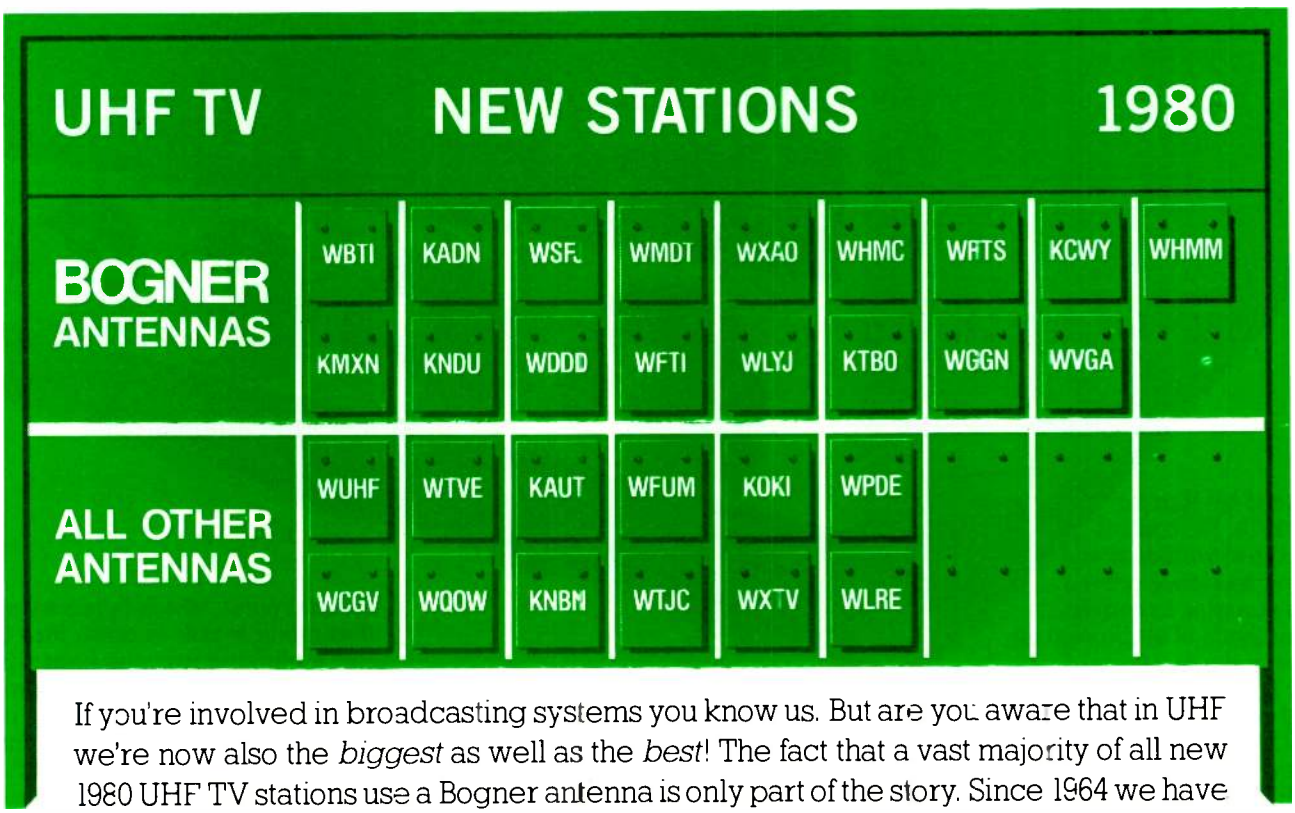
Will bring a new line of **SMPTE time code equipment,** including the low-cost SP-710 **reader,** a full-speed frame-accurate **decoder** with integral video character inserter, and the SP-710 **generator,** including jam sync functions. Also new will be the SP-760 **reader,** a multi-function state of the art reader and character generator with provisions for decoding and displaying time and user data simultaneously via LED display or video character insertion. The new SP-9000 series of **readers and generators** based on vertical interval time code will also be on view. Other products at the show will include the SP-722A SMPTE reader/generator/character generator, the SP-733 reader for ENG/EFP, the SP425 rackmount series, and the low-cost SP-700 character generator.

Datatex (1227)

Will display its line of video and audio distribution equipment, including the D-2000 video/audio routing switchers; the D-4300 video/audio switching units; the D-701 TV transmitter color phase equalizer; distribution amplifiers for video pulse, subcarrier, audio, and

continued on page 186

Do you know the score?



If you're involved in broadcasting systems you know us. But are you aware that in UHF we're now also the *biggest* as well as the *best*! The fact that a vast majority of all new 1980 UHF TV stations use a Bogner antenna is only part of the story. Since 1964 we have put into broadcast use more than 600 slot arrays, with over thirty 55kw to 200kw slot antennas during the past three years alone. Antennas that are all still meeting their promise — trouble-free, dependable operation with solid coverage.

Put together all the qualities you want in your antenna: exceptional performance, proven durability, economy and on-time delivery, and you'll know the score about Bogner. We have competitors but no equal.

Prove it to yourself. Talk to the stations listed above (or call Len King for the names of all TV stations using Bogner manufactured antennas). Find out first hand why Bogner is the champion of UHF antennas. Bogner Broadcast Equipment Corp., 401 Railroad Avenue, Westbury, New York 11590, (516) 997-7800.

BOGNER®

CHAMPIONSHIP BROADCAST ANTENNAS

WBTI-Cincinnati OH, KMXN-Albuquerque NM, KADN-Lafayette LA, KNDU-Yakima WA, WSFJ-Newark OH, WDDD-Marion IL, WMDT-Salisbury MD, WFTI-Poughkeepsie NY, WXAO-Jacksonville FL, WLYJ-Clarksburg WV, WHMC-Conway SC, KTBO-Oklahoma City OK, WRTS-Spartanburg SC, WGGN-Sandusky OH, KCWY-Casper WY, WVGA-Valdosta GA, WHMM-Washington DC, WUHF-Rochester NY, WCGV-Milwaukee WI, WTVE-Reading PA, WQOW-Eau Claire WI, KAUT-Oklahoma City OK, KNBN-Dallas TX, WFUM-Flint MI, WTJC-Springfield OH, KOKI-Tulsa OK, WXTV-Greenville MS, WPDE-Florence SC, WLRE-Green Bay WI

Circle 204 on Reader Service Card

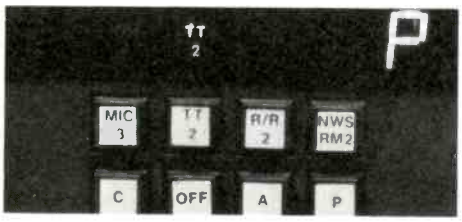
DC control and t

Introduced by Ramko in early 1975, DC control of all audio attenuation and switching has since proven itself so superior to conventional methods of audio control that most manufacturers of consoles are still trying to catch up.

The three major advantages are:

1. The DC controlled console exhibits far less susceptibility to RF pickup and external interference than conventional consoles that control audio directly. The conventional console must route all of its audio from the inputs to the various controlling elements (mixers, switches, etc.) and then finally to the console output. The DC controlled console, on the other hand, eliminates all of this audio wiring and thus reduces the pickup of outside interference.
2. It is also less prone to be affected by mechanical malfunctions or problems such as those from scratchy pots or noisy switches.
3. Since all audio switching is done through DC control (+6V or −6V), all internal and external functions (mute, on air lights, remote equip. start/stop) are programmed by simply setting internally located switches. Only one pot is needed to control both left & right channel audio simultaneously (stereo); thus the tracking error normally associated with dual ganged pots is eliminated.

No soldering or internal wiring is necessary to set up or change the "ON AIR" light relay, muting, or AUX MUTE relay. All of these functions are programmed through internally located switches, which can be changed at any time.



What's happening. At a glance.

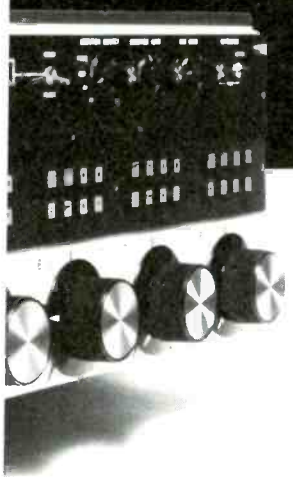
The labeled, computer-type, push-buttons and corresponding back-lighted displays afford the operator instant recognition of the next happening, which one to push, and what is happening now or what has already occurred. Although we automatically send you a form (at time of ordering) that enables you to tell us how you would like your console labeled, your unit comes with a full set of additional labeling so that you may easily change at any time desired.

The large LED output mode display has two separate functions. The lighted decimal point, which lights whenever that mixer is potted down into CUE, is also a blinking warning light whenever this channel has a live microphone activated. The second function of this display tells the operator whether he is in the Program (P), Audition (A), Cue (C) or Off (blank) mode. It is important to note here that the operator has 2 separate means of initiating the Cue mode. One in the normal fashion of potting down and one via the output mode select switch (C). Thus he may go directly to Cue by pushing (C) without having to change the mixer setting.

The exclusive patch panel for selecting input gain offers extraordinary flexibility. At any time, any input can be made to accept anything from a mic level through a line level signal. Not just mic or line level but anywhere in between. Thus on our 10 mixer model you have a minimum of 4,194,304 combinations of mic through line level inputs. And you can accommodate mics and high level inputs or the same mixer simultaneously. You simply plug in the prescribed resistor(s), which are included with your console, and that's it.

All the push-buttons on the console are super-quiet. Not the usual loud, clanking, short-lived mechanical switches. The push-buttons switch and route the audio through solid-state logic, error-free, in less than 2 tenths of 1 millionth of one second. No pops, clicks or momen

superior console.



Features

- Dual channel
- 5, 8, & 10 mixer versions
- 4 inputs per mixer
- Patch panel gain select inputs
- Back-lit status displays
- Built-in talk back
- Solid state led VU meters
- Mono/phase meter on stereo consoles
- Mono output on stereo consoles
- Custom lettered input push buttons
- Two cue modes (push button and/or pot down)
- Plug in electronics
- Differential balanced inputs and outputs
- DC control—no audio on front panel
- Zero tracking error on stereo consoles
- 3 power supplies w/AC line filtering
- High Z bridging inputs
- Switch selectable cue and mute on all inputs
- Optional digital clock and production timer
- Optional remote equipment start/stop
- 4 year parts and labor warranty
- 2 week trial period

tary feedback with partially actuated switches.

The pure clean difference.

It all comes down to a marked difference in reproduction.

FIRST, all inputs and outputs are solid-state balanced. Unlike transformers they are quite insensitive to impedance mismatches. In fact the mismatches can be millions of times. And can be more than the specified impedance without any noticeable effect on distortion or response. Not so with the average audio transformer as even a couple times mismatch can invalidate the console's performance.

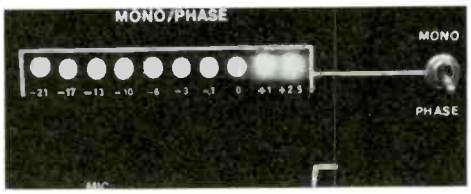
SECOND, our solid-state devices exhibit far less distortion and flatter response than even the finest transformer available today.

THIRD, since the solid-state devices are purely resistive they are much less susceptible to hum, RF and other external interference.

A FOURTH and very large consideration is the LED "VU" meter. This solid-state meter (SSM) has an exceptionally fast response and you can actually see overmodulation peaks. With a mechanical meter you can't. Couple this with the electronic circuit that gives the SSM "VU" ballistics on the decay and you end up with a tighter, cleaner sound than ever before. At the same time, your normal audio power level is still maintained. In addition, the bright red and yellow LED display is legible up to 30 feet away.

Although the mono DC-38's have a meter for each output, we took the stereo versions a step farther. In addition to the left meter and the right meter (switchable, Aud. or Prog.), we included a third to monitor the stereo mix (mono) output.

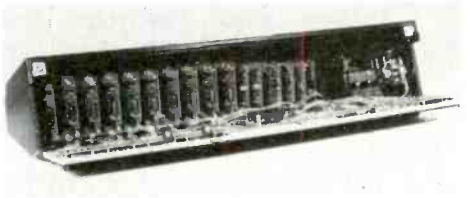
By throwing a switch located next to it, this meter is converted to a phase check meter and may be used to check the stereo phasing of any and all of the console input sources.



Reliability particulars.

All of the LED's and lamps have a life expectancy of 11 years. The push-button select switches are spec'd by the manufacturer at 20,000,000 operations (1 actuation every 30 seconds, 24 hours a day for over 19 years). The mixer pots are a custom design using glass-hard, conductive plastic. The mechanical construction of these pots is so sturdy that they tolerate even the heaviest handed operator.

In addition, all of the quad operational amplifiers are burned in for 3 days to insure reliability. Since the power supply is the backbone of your console, you will find not one, but three separate supplies! One for the main audio, one for the monitor amplifiers, and one for the displays. These supplies are fully protected against shorts and over-heating and utilize massive heat sinking rated much higher than necessary.



The two week trial.

Put the DC-38 on trial for a full 2 weeks. Put it through a battery of tests or on the air, or both. You'll find that with all that sophistication it's a breeze to use and amazingly rugged.

Write Ramko Research, 11355 Folsom Blvd., Rancho Cordova, CA 95670. Or if you can't wait for the mail, contact your nearest rep or call (916) 635-3600 collect and arrange for a 2 week free trial.

RAMKO

Circle 205 on Reader Service Card

SMPTE time code; and audio preamplifiers, line amplifiers, and monitor amps.

Datatron Inc./Video Systems Div. (1205)

Will introduce a redesigned and repackaged line of **SMPTE code instruments,** including generators, readers, jam-sync generators, and character generators. Also scheduled for introduction is the new **SmartScan option** for the Vanguard editor; this allows the editor to memorize and repeat complex edit motion sequences, including slow mo, fast motion, and freeze-frame edits. Also featured will be the Tempo three-VTR SMPTE/control track editing system, the Vanguard five-VTR SMPTE/control track editing system, Editt™ two-VTR microlock editing system, and a SMPTE synchronizer.

Datatronix (103S)

Will introduce new **audio patch field, 10-band graphic equalizer,** and self-powered **amplifier shells** to its automated processing line.

Delcom Corp. (1843)

Will introduce the AE-3 **interface** between the ISI 902 video production switcher and the Convergence ECS-103 editor, plus the VO-2860D **¾-inch recorder/player/editor** with audio monitor, pulse cross, tape shuttle, audio tone generator, power supply presence, easy access fuses, and head hour meter. Display will also feature editing systems consisting of Convergence ECS-103 and Hitachi one-inch VTRs, linked with the AE-3 and ISI 902 switcher.

Delta Electronics (400)

Will show the new RCS-1 **remote control system** in a working demonstration. Also showing power controller, modulation controller, coaxial transfer switches, antenna monitor, and TCA RF ammeter system.

DeWolfe Music Library (1618)

Has just released 20 new **production music albums** for the radio broadcast producer, with many openings and closings, that are easy to edit; also musical beds to support narration. In addition two new **sound effects albums** have interior and exterior crowd atmospheres.

Datametrics' SP-722A SMPTE time code reader/generator/character generator

Dictaphone Corp. (110)

Will show for the first time the Series 5600, a new **multiple-pass recorder** for radio station logging. Also introducing the Series 5000 microprocessor controlled high-channel capacity **voice logger** for users who need more than four channels.

Dielectric Communications (1507)

Showing the line of RF switches, RF loads and wattmeters, waveguide, coax transmission line.

Digital Video Systems (704)

Promises to introduce a completely **new line** of products. Will introduce some devices that do not exist yet in the marketplace. Will also show its present line, including the Phaser TBC/framestore/synchronizer systems.

Di-Tech, Inc. (1408)

Will introduce new **alphanumeric control panels.** Also showing the line of audio/video routing switchers, audio/video pulse distribution amplifiers, video detectors, video equalizers and clampers, seven-day computer controller, audio monitor amplifiers.

Dolby Laboratories (1031)

Will show the line of "A" type noise reduction units for recording on STLs, telco lines, etc. Also showing dual-channel "A" type noise reduction modules for one-inch Type C VTRs, and the Model 334 FM broadcast noise reduction unit.

Drake-Chenault (116)

Introducing the Silver Anniversary edition of the *History of Rock and Roll,* a 52-hour special. Also showing and demonstrating in a hospitality suite its syndicated formats: Contempo 300, Great American Country, XT-40, Contemporary MOR, SuperSoul, Beautiful Music, Big Band.

Victor Duncan (1110A)

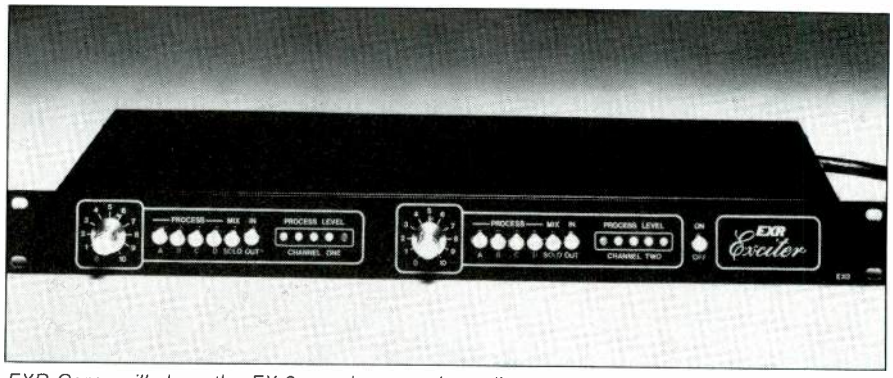
Will describe its full line of cameras, including models from Ikegami, NEC, Cinema Products, and JVC; the complete line of Bosch recorders; the Ampex VTR-20 one-inch C format recorder; and the full JVC line of cameras and ¾-inch editing equipment. Information will also be available on the line of production gear, a complete selection of lenses and optics for Duncan's camera lines, character generators, and other equipment.

Dynair Electronics, Inc. (813)

Will introduce new **machine control units** and **machine control switching.** Also showing the line of audio and video routing switchers and audio and video pulse distribution equipment.

Dynacom International (1134)

Will unveil a new addressable encode/decode scrambling system, addressable MDS system, and a multi-channel decode box. Also on view will be the Ticket Module decoder.



EXR Corp. will show the EX-3 psychoacoustic audio processor

E

EEG Enterprises (1837)

Will demonstrate the entire line 21 system, from captioning on up. New this year are a **smart encoder** for test service in line 21 and a **film encoder.** May demonstrate live captioning.

EEV Inc. (925)

Will introduce **diode gun versions** of the Leddicon and high-efficiency amplifier **klystron tubes** for UHF transmitter application. Will feature its regular line of electron tubes, including Leddicons and vidicons, character display tubes, tetrodes, and klystron power tubes.

NAB program schedule on page 147

EG&G (1710)

Will feature its LS 158 and 159 high-intensity obstruction lighting systems.

E-N-G Corp. (1637)

Will introduce a new **switcher** for ENG vans. The switcher will have eight inputs and eight outputs incorporating video DAs, audio mixer, source identifier, and color bar generator. Priced at $3800. Will also show a new version of the **ENG station wagon** which will feature all the equipment normally found in ENG vans.

ESE (208)

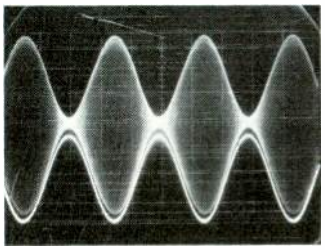
Will bring for the first time the ES790A 1000-event **programmable timer** with random entry of events, simultaneous outputs, keyboard programming, 32 output channels. Also introducing the ES254 **SMPTE code reader,** operating either forward and reverse at high, low, or *very* low speed; can be combined with thumbwheel comparators for search and cue applications. Also showing the line of digital clocks, master clock systems, audio level indicators, time code generators and readers.

EXR Corporation (booth not available)

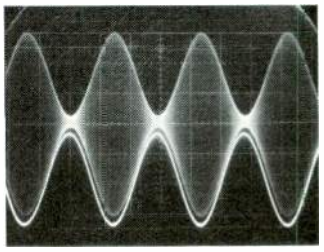
Will show the EX-2 enhancement system, which uses time and frequency domain manipulation, 180-degree

AM TRANSPARENCY

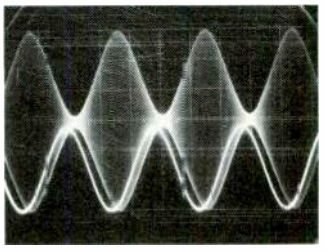
Typical phase and square wave performance: Continental's 317C-2



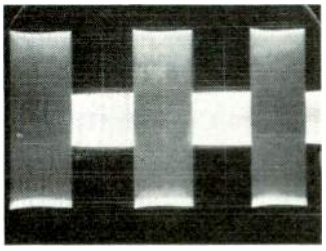
20 Hertz



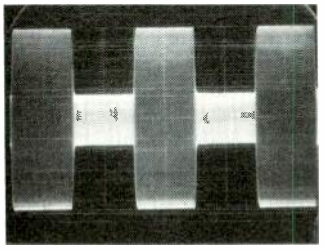
1000 Hertz



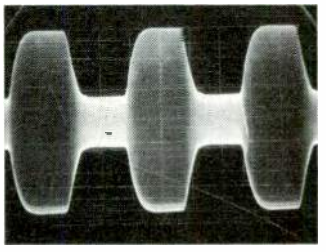
7500 Hertz



50 Hertz



1000 Hertz



7500 Hertz

Continental's 317C-2 50 kW AM transmitter gives broadcasters a new standard of performance. Here's why.

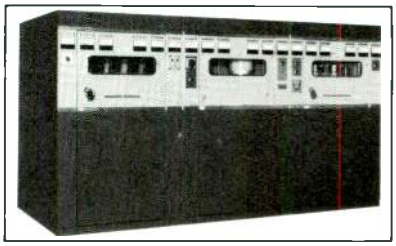
The 317C-2 offers broadcasters transparency and high efficiency.

Continental's 317C-2 is a 50 kW broadcast transmitter built for today's programming demands.

It delivers superb audio quality and faithfully reproduces the most complex audio processing. It is ready for AM stereo.

Continental's newest transmitter comes from a field-proven design and offers broadcasters excellent performance with unmatched efficiency, reliability, simplicity and maintainability.

Continental transmitters meet today's sophisticated programming requirements. And they'll be ready for the coming evolutions in AM broadcast programming.



For information and a brochure on the 317C-2, phone (214) 381-7161 or write to: Broadcast Marketing Dept. Continental Electronics Mfg. Co.; Box 270879 Dallas, Texas 75227; Telex: 73-398

Continental Electronics®

SEE US AT THE NAB SHOW - BOOTH 100

Circle 242 on Reader Service Card

phase notching, and other techniques to improve perceived qualities of music.

Eastman Kodak Co. (1118)

Will stress the theme of "film magic — the magic of film origination allows you to post-produce on any broadcast medium." The complete line of motion picture products for program origination, post-production, and distribution of TV programming will be on display.

Echolab (625S)

New this year is SE-3, the Designer Series, a microprocessor-controlled **special effects generator** that accommodates 10 synchronous or asynchronous video sources and is expandable to interface with editing systems via an RS-449 channel. Also on view will be the SE-2 color special effects generator, a self-contained model.

Edcor, Inc. (205S)

Will show a new **multiplex cable snake** that incorporates eight channels into one line of cable. Also showing the line of headphone distribution amplifiers, mixers, and wireless microphones.

Edutron (1815)

Will introduce a new **time base corrector** which the company says will set "a new standard." No details on the new TBC will be released until the first day of the convention. Will also feature two other TBCs, the ECD-1H and the ECD-2H. Options on the second model include enhancement, noise reduction, DOC, variable blanking, and RS-170A sync output.

The Eumig FL-1000 cassette deck is computer-interfaceable for automated systems

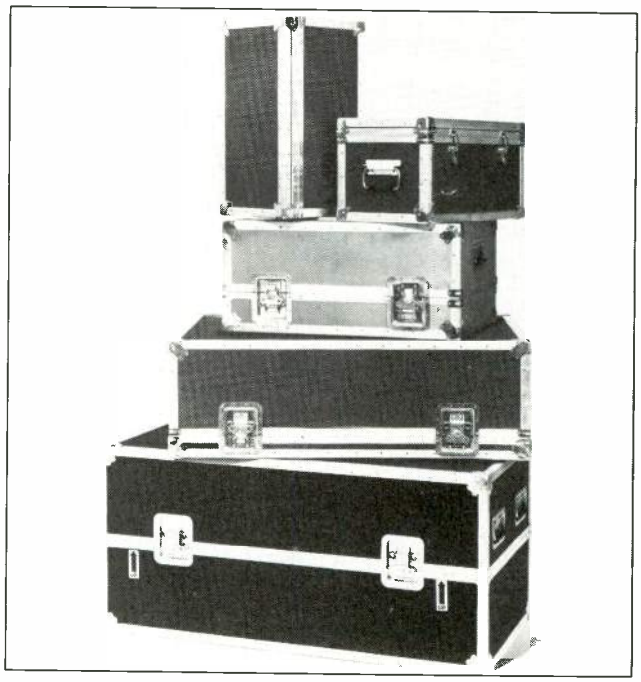
Eigen Video (1113)

Will exhibit its videodisc recorders for slides, slow mo, and animation, including the slide and slow mo version of the high-band color disc recorder.

Elcom Specialty Products, Inc. (419)

Will show new **AM and FM transmitter line,** including units bought from Cetec Broadcast Group. Among them are 250 W, 1 kW, 5 kW, and 25 kW FM transmitters and a 1 kW AM transmitter. Also showing the line of audio processing equipment, including the Level Guard AGC amplifier, Insta-Peak dual spectrum peak limiter, the WBL series of composite limiters, and the MP-12 AM audio processor.

Excalibur Industries will introduce a new line of custom cases



Electro Controls (1100)

Will feature its Lite Cue memory control system with radio remote control capability.

Electro Impulse, Inc. (1130)

Will show the full line of dummy loads, RF power meters, calorimeters.

Electrohome Ltd. (1003)

Will bring a new line of **monochrome monitors** (nine to 23 inches), new monochrome **rackmount monitors** (nine to 17 inches), and a new **color monitor.** The D2000 Series color studio monitor will be displayed in 19 and 25-inch versions.

Electro & Optical Systems Ltd. (1511)

Will feature a display of new high-resolution **industrial color monitors** from Barco. A **television production calculator** and a **time code synchronizer,** both shown in prototype last year, will be on hand in refined, production models. Alo new is a **vertical interval time code generator/reader.** The complete line of time code readers and generators will be shown.

The Electronic Engineering Association (1807)

Information not available at press time.

Be a double all-weather winner at the NAB.

1. See the state-of-the-art all-weather ENG lens.

2. Pick up your angenieux lens badge for a chance to win an all-weather prize.

Come to Booth 904 for details

Introducing the fastest, lightweight, all-weather ENG zoom lens

9-135mm, f/1.5

Once again, Angenieux has created the state-of-the-art lens with all the features you've asked for, in Electronic News Gathering

15 x 9

- FAST f/1.5, with a transmission factor of 1.1.
- Operates under extreme low light level conditions, where other lenses cannot.
- Sealed unit with waterproof switches—keeps the environment out.
- Built-in 2x range extender.
- Rocker switch zoom control.
- Close focusing to 32 inches with full zoom for extreme close-ups.

Specify the advanced angenieux 15 x 9 lens for your next lightweight camera and be the new ENG leader.

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NAB'81

Electro-Voice, Inc. (1816)

Will introduce two or more new **production mixers** from Tapco (related firm); also a new line of phantom-powered **lavaliere condenser mics.** Showing in addition the full line of studio microphones and monitor loudspeakers.

Emcee Broadcast Products (1017)

Will introduce a compact 1000 W high-gain **UHF amplifier** using existing tube type and solid state drivers, Model TOA 1000C. Also featured will be the line of translators and MDS translators.

English Electric Corp. (1018)

This newcomer to NAB will show its full range of studio and theater lamps, featuring compact source discharge metal halide types.

Enterprise Electronics Corp. (1820)

Featuring its line of color weather radar equipment.

Enterprise Radio, Inc. (120)

Will have full information on Enterprise satellite service for radio stations, with applications for affiliation, etc.

Eumig-U.S.A. Inc. (1841)

Will show the FL-1000 computer-interfaceable cassette deck for automated program control, production, and commercial insertions, with up to 16 cassette players operable as a single system.

Recordex is a low-cost record booster from Faroudja Laboratories

Eventide Clockworks, Inc. (177S)

Will introduce a new **time compression system** for altering the time of programs and commercials without altering pitch. Also showing the BD-955 digital delay and special effects unit, the H-499 Harmonizer special effects system, and the computer-based system for spectrum analysis using standard computers and oscilloscopes.

Excalibur (1628)

Will show its special design video cases.

F

Fairchild Camera & Instrument/ CCD Imaging (1315)

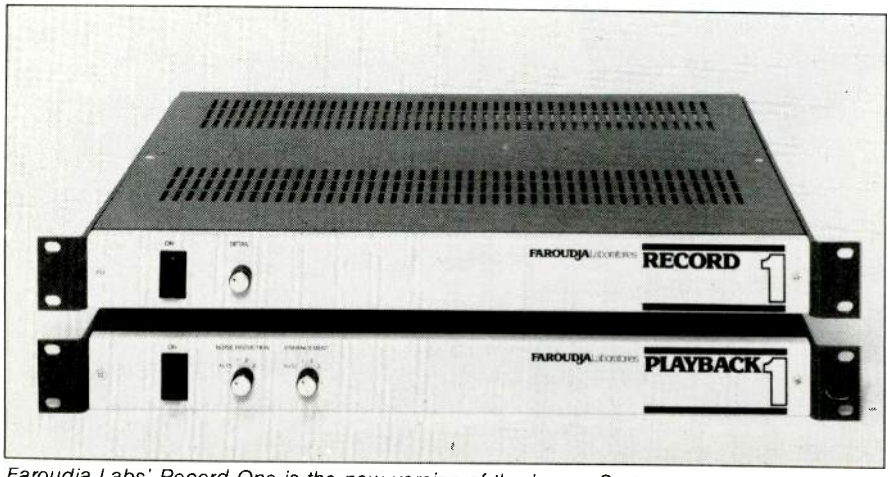
Will introduce a new **solid state color camera** using the CCD 221 device. Also on view will be the CCD 321 video delay lines, a line scan device (LIDS) for telecine applications; and CCD 221 solid state imaging devices.

Farinon Video

See Harris

Faroudja Labs, Inc. (1712)

Will feature the Image System, introduced last year. **Record One** is a new version of the Image System with higher chroma and luminance signal-to-noise reduction; Playback One will also be on view. New products include Recordex, a lightweight, low-cost **record booster,** and a new line of adaptive **comb filter separators.**



Faroudja Labs' Record One is the new version of the Image System

Farrtronics (1723)

New this year are **audio consoles,** with and without CMX computer editing system interface. Also at the show will be intercom systems and belt packs, audio distribution amplifiers, and audio patch fields.

Fernseh, Inc. (1208)

New this year are the FTP-4000 16/35 mm **telecine projector,** a frame-by-frame **telecine color correction system,** the **Pan Scan option** for the FDL-60 telecine system, and a full line of **video monitors.** Items from the general product line will include the Compositor I™ graphics system, the Mach One™ videotape editing system, the KCK and KCP-60 studio cameras, the KCA-100 ENG camera, the BCN-5 one-inch portable cassette VTR, the BCN-20 one-inch portable VTR, BCN-51 one-inch studio VTR, BCN-100 one-inch multicassette VTR, TMM-205 optical multiplexer, FDL-60 digital telecine system, TDF-2 digital noise filter, TCS-1 machine control system, Automax™ machine control and switching system, TVS/TAS 1000 video/audio distribution switcher, sync generators, and terminal equipment.

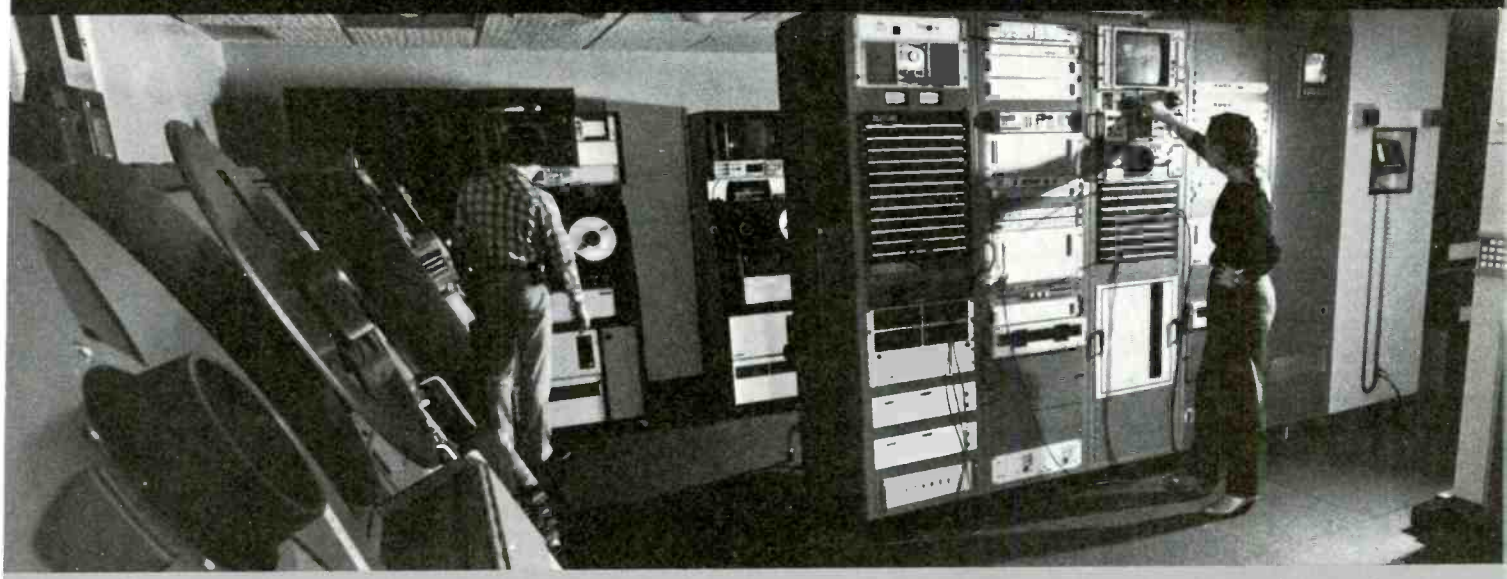
Fiberbilt (1817)

Will introduce a **new case** for the Apple small business computer system. Will also feature its regular line of carrying and shipping cases for all video and TV equipment.

Fidelipac, Inc. (204)

Will introduce Audio Technica line of professional **phono cartridges** as exclusive distributor. Also showing complete line of magnetic tape carts and

WE MADE TODAY VIDEO WORK LIKE TOMORROW!



Our assignment from Beverly Seeger, President, and David Seeger, general manager, of TODAY VIDEO—one of New York's newest video services facilities—was to design a system that would never become obsolete.

What we did was develop a modular, building-block concept that can expand, be added-to or upgraded within a basic structure.

Phases 1 and 2—the central equipment room and 2 color correction rooms—are now completed.

Phase 3—a fully-equipped post-production operation with 4 1" C-format VTR's, a CMX 340X editing system, a 3-channel Quantel digital effects system, a color Chyron IV and a CDL 480-8 switcher—is now under construction.

And Phase 4—a second editing facility—is now in the planning and design stages.

And that's how TODAY VIDEO works like tomorrow. And tomorrow and tomorrow and tomorrow!

AFA

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Better video systems by design.

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Circle 201 on Reader Service Card

accessories, flutter meter, test tape carts, etc.

Film/Video Equipment Service Co., Inc. (1818)

Will emphasize the line of Portable Energy Products, Inc. sealed lead acid battery belts and packs and chargers for cine cameras, video cameras and recorders, and portable lights, in 30 V, 16 V, 14 V, 12 V, and 8 V in 25 AH, 10 AH, 5 AH, and 2.5 AH ratings.

Imero Fiorentino Associates (523S)

Will feature a wide range of facility and production services, including TV studio and set design.

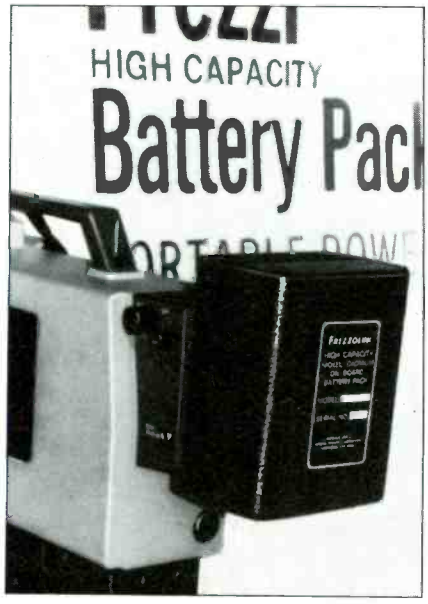
Fitz-Co Sound, Inc. (626S)

Will show for the first time a new **automation system** for radio, Model AAE-1. Also showing the line of production consoles for radio and television and for van use and the line of loudspeakers.

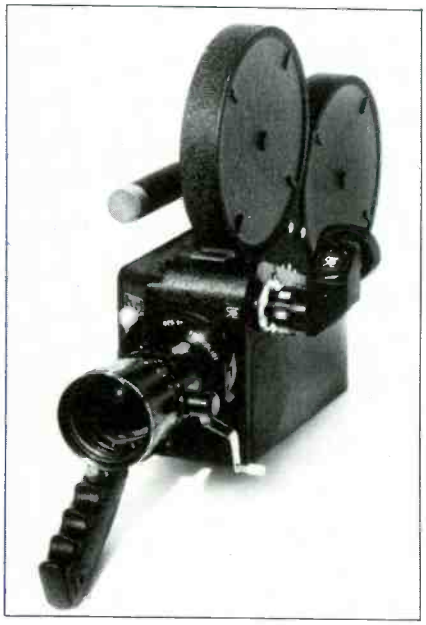
Flash Technology (931)

Will introduce the FTB 319, a **twi-night beacon.** Will also show the regular line of obstruction lights and lighting controllers.

Exhibit hours: Sunday, Monday, Wednesday, 9 a.m.–5 p.m.; Tuesday, 9 a.m.–8 p.m.



Frezzolini will show its line of on-board batteries for ENG/EFP cameras



The Frezzi-Flex® FR-16 is the latest 16 mm camera from Frezzolini

Master Control Automation™ takes the "excitement" out of Broadcasting. But it adds reliability.

From the people who brought you BIAS™ now comes Master Control Automation. It insures an accurate flow of event activity while simultaneously listing reports, reconciling aired spots, and preparing the log for subsequent billing.

And it's all possible through the most sophisticated software system on the market for on-air switching. Master Control Automation will control any on-air switcher regardless of manufacturer. It receives the program log and manages switching activity without operator intervention. You monitor the entire process at one or more control terminals with a minimum of effort. And you know it's working right.

Master Control Automation™ is a part of the total system umbrella .... Network Control System.™ Complete broadcast automation with BIAS,™ BUY LINE™ (Avail Submission and Electronic Mail), Feature Film,™ (Inventory and Amortization), and Financial Accounting Packages. Available together or separately. Call us today for a demonstration at (901) 345-3544.

The simplest, most efficient way to run a television station.

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DATA COMMUNICATIONS CORPORATION
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NAB'81

For-A Co. of America (1326)

Will unveil the VD-103 and VD-106 **distribution amplifiers,** the TSG-5000 **sync generator,** BC-5000 **back color generator,** CB-5000 **color bar generator,** TCG-3900 and TCR-3900 **VITC generator and reader,** CVF-6000 **quarter-inch VTR and remote control box,** and VTW-600 video typewriter. Also on view will be the FVW-910 and CC-910 video writers, the CCS-4200 color corrector, and the ALC-4100 automatic level controller.

Fort Worth Tower Co. (819)

Showing antenna towers, prefabricated equipment buildings, antennas for satellite earth stations.

Frezzolini Electronics, Inc. (1608)

Will introduce a new line of On-Board™ Frezzi™ **battery packs.** The power packs mount on the back of most current video cameras without cable connections (except for RCA TK-76 models). Frezzolini will also show its latest model Frezzi-Flex® lightweight portable 16 mm cameras, featuring a redesigned film gate of parallel, lapped steel balls to provide precise focus and scratch-free pictures without film emulsion pick-up. There are also some improvements in the Frezzi-Lite™ portable camera lights with a more efficiently cooled socket, a re-engineered contact design for longer bulb life and a completely redesigned rear control panel with a knurled-edge thumbwheel as well as the on-off toggle switch. The regular line of Frezzolini products will be shown: portable battery pack/belts for ENG/EFP cameras, in-board batteries for VTRs, fast charge systems for

Fuji Magnetic Tape will feature its entire line of videotapes

GO WITH THE BEST.

Feel confident. Feel secure. Feel that you can tackle any video location problem and come out looking better than ever before.

We've got the accessories to help. As a few examples will confirm!

The Power To Do As You Wish. Our sensational Pagbelts, considered the finest, safest and best engineered. Fast-charging, too—our Pag Speed Charge 4000 delivers a full-charge in a record-setting 40 minutes for the 4 A.H. model and only 70 minutes for the 7 A.H.

Pagbelts come loaded with innovative safety and performance features including our exclusive safety-lock. Unlike some other belts, you can't hurt yourself or your equipment by accidentally using your belt while charging. And Pagbelt's Nicad cells are specifically designed for video's heavy power-drain, so you're not powerless in any situation. Our advanced electronic charge systems prevent other kinds of problems too—by assuring a precise 100% charge everytime—automatically sensing temperature, pressure and voltage. Also available, the exceptional lightweight multi-feature Paglight complete with versatile accessories and rugged aluminum carry case.

Moral- and Equipment-Support. Who wouldn't feel confident with our light, compact Bilora professional tripods! These exceptional units feature heads with movement so smooth, you'd swear they were fluid. (And only the prices tell you they're not.)

Choose from a wide range of sizes and capacities—our little giant fold-away (just 20" compacted, with a surprising 18 lb. capacity) all the way to our heavy-duty combo workhorse for studio or location (100 lb. capacity).

All Biloras boast a number of refinements, including built-in bubble levels; extra-long 15" pan handles with left and right mounts; slot-mounted camera screws that guarantee perfect balance at all times. And more.

Gain Control. To complete your shooting gear, add our super-rugged CVMM-15 professional broadcast quality belt-mountable portable mixer. This little beauty puts all the control you need at your fingertips. Three microphone inputs, each with independent gain. Built-in phantom supply for shotgun microphones. Output level selectable for either microphone or line. Master output level control. Peak-reading LED meter. Monitor output. And more.

All in all, a mixer designed with the latest up-to-the-minute technology, the finest state-of-the-art components and built like a tank by Foundation Instruments.

All The Best. From Comprehensive. How can you help but feel secure when you use the best?

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VIDEO SUPPLY CORPORATION
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In Canada: 751 Wall Street, Winnipeg, Man., R3G 2T6

Circle 214 on Reader Service Card

Ni-cad batteries, and portable lighting systems.

Fuji Photo Film U.S.A., Inc., Magnetic Tape Div. (1307)

Under the theme of "the professional choice," will exhibit its two-inch and one-inch professional videotape, one-inch Beridox tape, U-Matic cassettes, Beta and VHS cassettes, and video head cleaners.

Fujinon Optical, Inc. (1117)

Will introduce a new A30x11 ESM **ENG lens,** an f/1.6 model with a built-in 2X extender to give it a range of 11 to 660 mm. There will also be a new line of **electronic cinematography lenses.** The regular line will include BCTV lenses for one-inch and 1¼-inch tubes, ENG/EFP lenses for ⅔-inch color cameras, and a complete line of ENG accessories.

G

Gardiner Communications Corp. (1828)

Will introduce its new 5.6 meter **fiberglass receiving antenna.** The dish is constructed from eight fiberglass petals that provide a better surface tolerance for improved reflector efficiency. The new design on the prime focus feed gives better cross-polarization isolation. Will also offer two new **satellite receivers.** The model 4100 is manually tunable with 24 channel synthesized circuitry, single input, equipped for four audio subcarriers, integral power supply for low noise amplifiers. Model 4200 is remotely controllable with 24 channel, synthesized tuning, dual input, automatic polarity switch, equipped to receive four audio subcarriers.

Garner Industries (1120)

Will have production models of Model 1100 **eraser** for one-inch videotape. Also showing its line of erasers for audio tape video cassettes and equipment for duplication of quarter-inch tape.

General Electric Co. Lighting Systems (1104)

Will show its line of incandescent, Quartzline, and tungsten-halogen lamps for TV and film.

The Gerstenslager Co. (526, 528)

No information available at press time. Company makes bodies for ENG/EFP vehicles.

Cliff Gill Enterprises (160)

Will feature Eumig cassette systems for radio program automation.

Glentronix (U.S.), Inc. (1824)

New products will include the 1605 Adam Smith **synchronizer,** low-cost **time code equipment,** a **transmitter and monitoring fault report system;** an encoded **machine control system,** a **digital thermometer,** and a **time and temperature display unit.** Will also show its general line of Telcom Research time code equipment, Torpey Controls & Engineering clock systems, Scientel sideband analyzers, and the Pentronics logic analyzer board for ACR25.

Allan Gordon Enterprises, Inc. (1917)

Will introduce the Elemack **camera dolly** and the MAC **video animation system.** Also showing the line of audio and video systems and accessories, in-

EMCEE translators offer advantages from hill top to bottom line

On site, the EMCEE solution to TV translator requirements is quite uncomplicated. A translator must go on the air quickly. Stay on the air continuously. And require a minimum of time and attention to accomplish both.

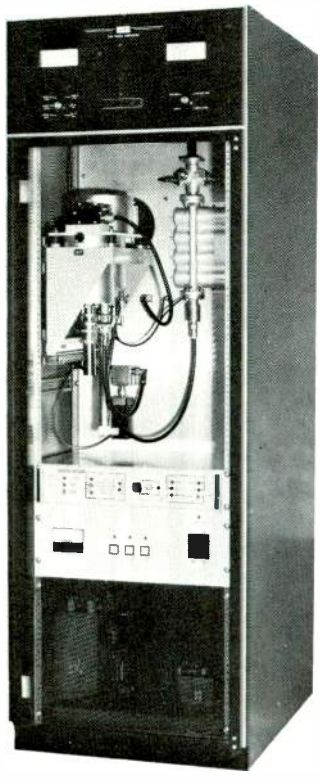
An approach you probably share.

With that in mind, EMCEE developed the new TUA1000C amplifier.* A one-thousand watt unit that shares the high gain, efficiency and reliability of the entire EMCEE line. And introduces further improvements like compact single bay construction. Solid-state control circuitry. LED status indicator. A slide out RF cavity and more. Which makes the TUA1000C amplifier the perfect solution for either conventional or new low power TV applications.

EMCEE also offers an uncomplicated approach to complete turnkey services, contract installation and maintenance and system design applications.

And that's where the bottom line advantage lies. Because no matter what your translator requirements may be, EMCEE can help you reach all of your market. All of your broadcast day.

* Type acceptance applied for



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cluding Swintek wireless mic systems and Spectra light meters.

Gorman-Redlich Mfg. Co. (173)

Will introduce a new **digital AM antenna monitor.** Also showing the line of NOAA weather receivers for the 160 MHz band, and complete EBS equipment.

Grass Valley Group (1210)

Will introduce the new 440 series **routing systems** with complete alphanumeric control panels, a **fiber optic video link,** and the 3430 V **video delay DA.** Will also show, from its regular product line, the 1600 and 300 series production and post-production switchers with Mark 2 digital video effects system and E-MEM II effects memory system; the Model 200 modular automation system; the 4S master control switcher; the 400 series routing switcher system; the 3250 series SC/H phased sync generator system; and other signal distribution processing and synchronizing equipment for audio and video.

The Great American Market (1628)

Will unveil new RDS/HMI portable battery-operated and fresnel **lens lights,** a diamond **light curtain,** and the Lighthesizer 212 **programmable sequencer.** Will also display lights, control equipment, Excalibur custom cases, projection systems, patterns, special effects, and custom projection services.

NAB program schedule on page 147

David Green Broadcast Consultants (125)

Exhibiting for the first time the Excalibur AC-6 **stereo console.** Will have a complete radio studio with components from companies represented, including Electro-Voice Sentry speakers, Technics turntables, Stanton phono cartridges, Otari recorders.

Gregg Laboratories (403)

Will introduce a **turntable preamplifier,** multiband **television audio processing system** with loudness controller; multiband **AM audio processing amplifier** with broadband gain controller, five-band compressor, and five-band distortion-cancelling peak limiter; also Telemix, a completely self-contained hands-free **on-air telephone system.** Showing in addition the Model 2531 Triband FM audio processing amplifier.

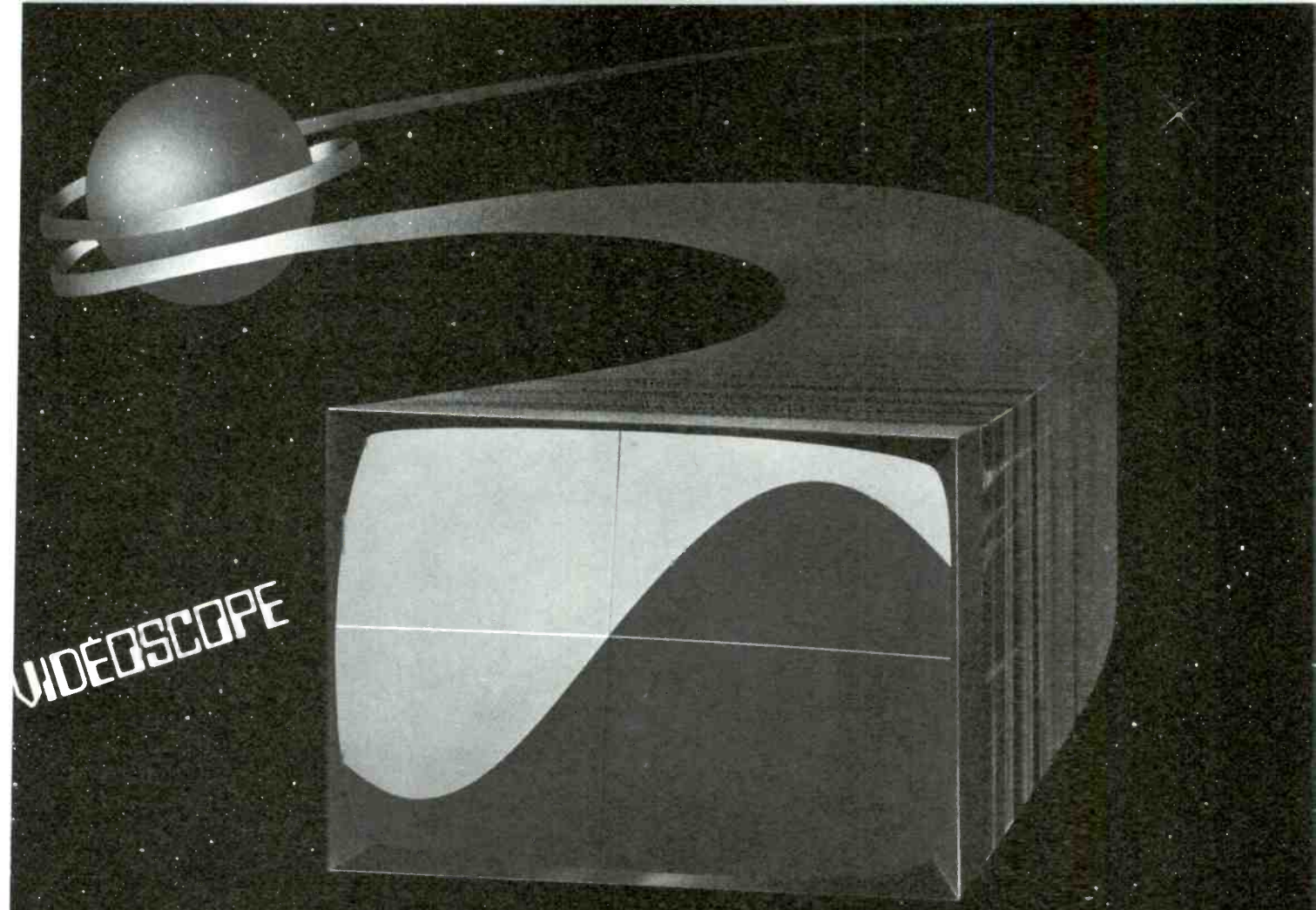
Groton Computer (118)

Will have full information on nationwide business automation system for traffic, billing, and general ledger, available with color in terminal display and on printed reports. New feature is availability of **interface for standard small computers** to act as "smart terminals" for system. A new operation of the Groton Radio Network, subsidiary, is a series of entertainment and instructional "featurettes" offered as **syndicated programs.** The Radio Network is continuing its activity in buying radio time from broadcasters and selling it to advertisers.

H

HM Electronics, Inc. (1509)

Introducing a new **wireless intercom** allowing up to five stations to function in full duplex, or as many as wanted in push-to-talk. Can be interfaced with any RTS or Clear-Com hard-wired intercom. Also showing the complete line of hand-held and body-pack wire-



Verify your RS-170A with a dynamic, easy to read video display that's light years ahead.

The new RS-170A Video Line Output specifications are designed to insure a consistent relationship between video burst and sync phase, particularly during tape record and playback.

The specifications are relatively easy to achieve; however certifying and timing the signals is a different story.

We at Lenco have taken a careful, thoughtful approach to the challenge. We have developed the Videoscope.

The Videoscope will display a full cycle of sub-carrier and will tell you when correct SC/H phase is (or isn't) on the mark.

In addition to certifying, you can phase compare sync and burst of two video signals. Now you have a truly usable system analysis device.

Another plus. The Videoscope can give equally accurate results in source-to-source timing in a Non "A" System.

And because it is viewed on a standard video monitor—any monitor—you can look at the Videoscope display and quickly relate it to what is actually happening in your system. No more looking at faint lines on scopes in dark corners. To certify your RS-170A, all you need is Videoscope. Anywhere in your plant. Light years ahead.

Want to know more about the Videoscope? Write on your letterhead for a complimentary copy of "An Accurate Method for Certifying Timing, and Analysis of RS-170A."

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The vidicon tube is going the way of the vacuum tube.

CCD semiconductor technology is now giving us smaller, lighter, faster, more rugged cameras for television, surveillance, industrial measurement and control, and a host of scientific applications.

As a pioneer in CCD development, Fairchild offers both the CCD221 Area Imaging Array Semiconductor Sensor and the CCD2000C Camera System. And we're not talking about samples. We're talking about volume. Fairchild is the world's largest manufacturer of CCD Imaging products.

The 488 x 380 Matrix Array CCD221 meets all NTSC resolution requirements for television with no lag or geometric distortion. And its specs are spectacular. Including a gamma of unity, high dynamic range, low-light-level capability, high frame rates and low power requirements.

The CCD2000C Camera we built around the single-chip CCD221 is truly 100% solid-state and provides NTSC-compatible composite video signals.

For complete information and specifications on either the CCD221 Array or the sensational CCD2000C Camera, contact CCD Imaging, Fairchild Advanced Technology Group, 4001 Miranda Ave., Palo Alto, CA 94304. Telephone: (415) 493-8001. TWX: 910-373-1227.

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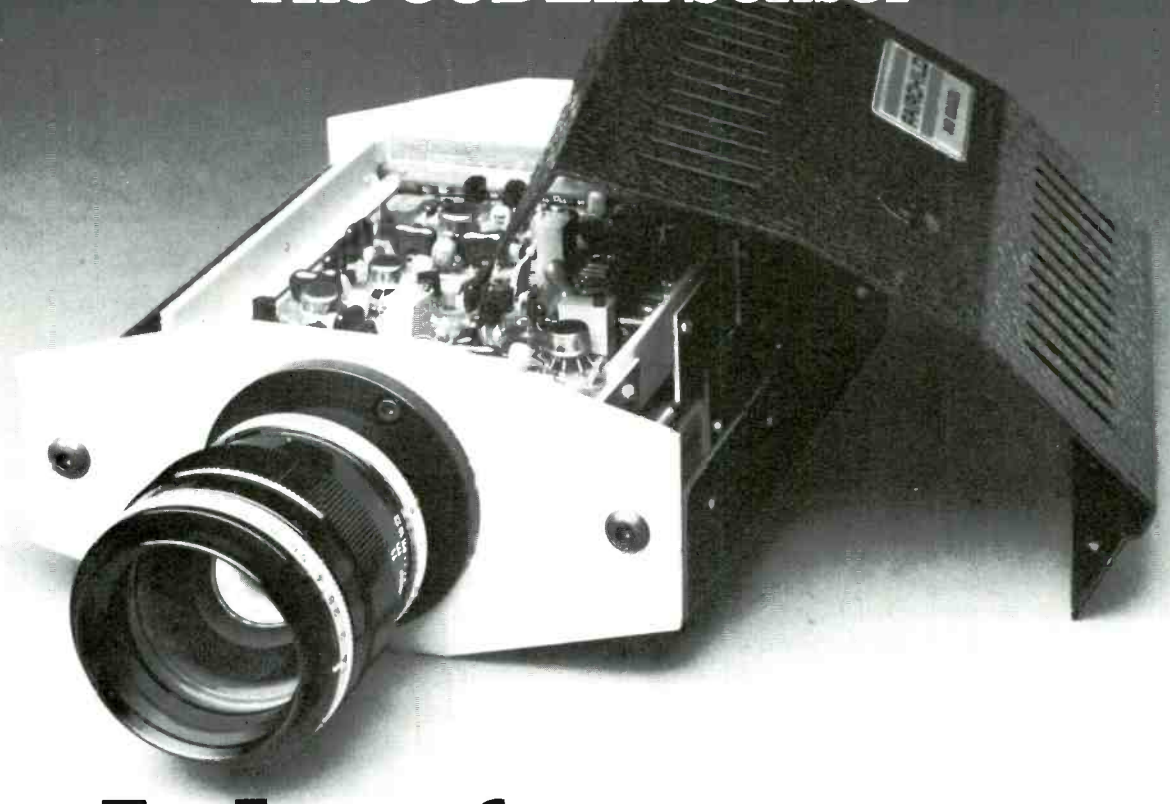
The CCD221 Sensor



It does for cameras what the transistor did for computers.

Fairchild Camera and Instrument Corp.

Circle 220 on Reader Service Card

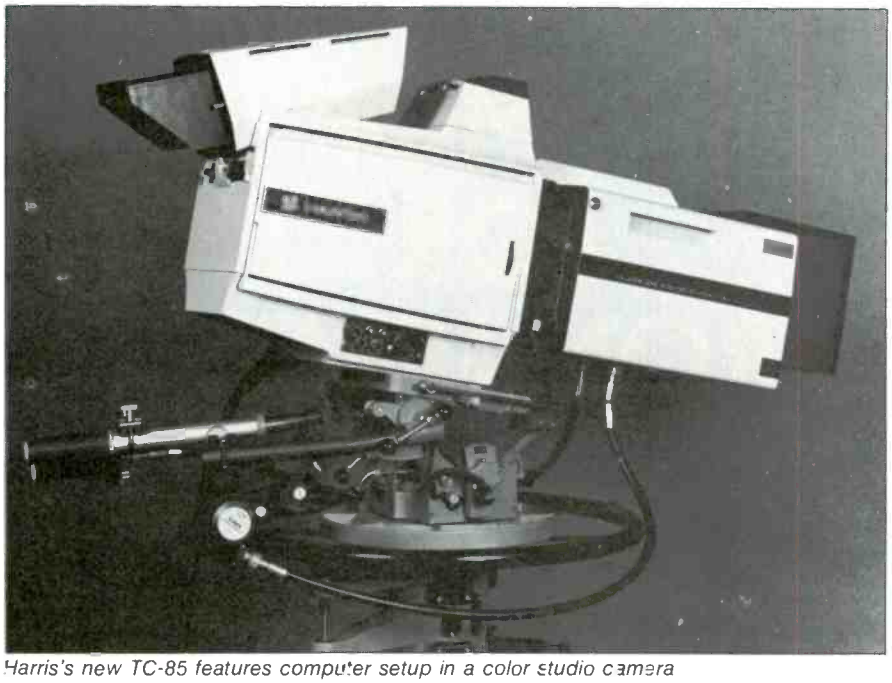
less intercom receivers and transmitters and field pack four-channel receiver with triple diversity.

Hallikainen and Friends, Inc. (514)

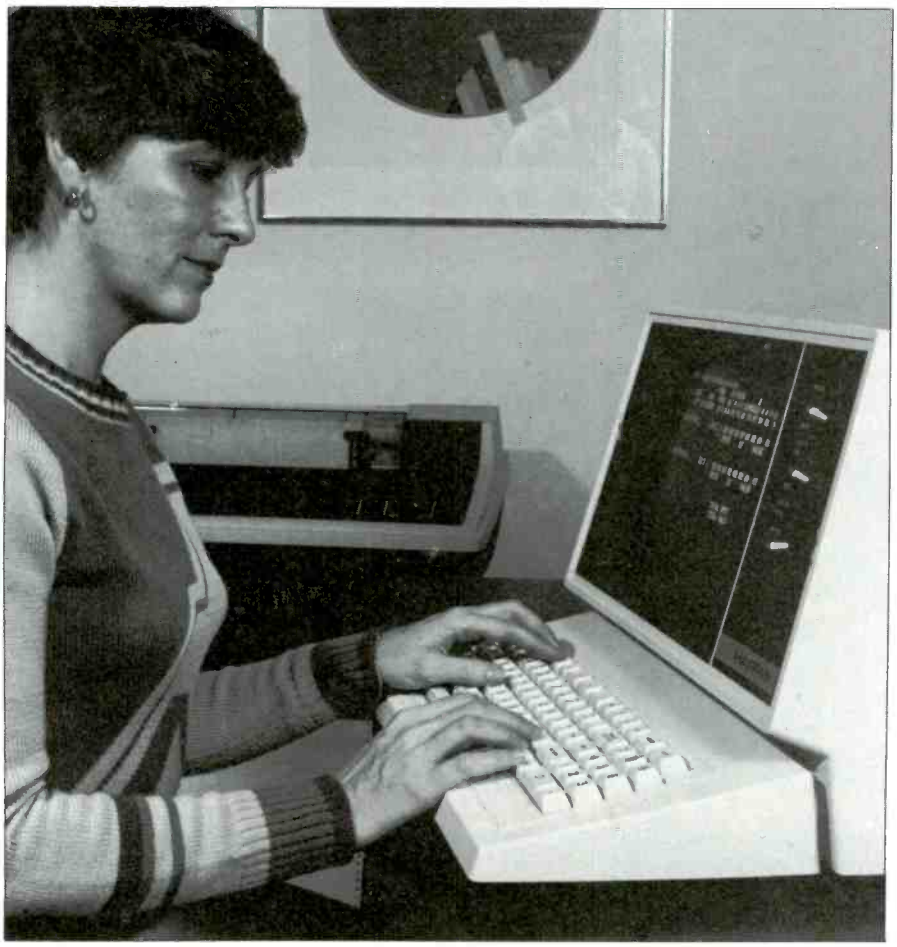
Showing the new PCC series of **transmitter control computer systems,** which use a standard high-level language allowing user to tailor system operation easily; it also works through existing digital remote control system for economy in purchase. Interface with Moseley PBR-30 will be shown as an example. Also showing the TVA series of audio mixers with AFV; the LOG series of program logging systems; the TAX161 time announce controller.

Harris Corp., Broadcast Products Div. (301)

Will introduce a new **live color camera,** the TC-85, with computer setup system that allows preproduction setup of any number of TC-85 cameras in 45 seconds or less. A microcomputer is used for each camera to eliminate camera interdependence. The auto setup allows a video operator to override computer settings and dial in artistic tinting characteristics in individual cameras. A new 16-channel modular digital control **audio console** offering programmable keyboard entry, digital controlled linear attenuators, and software-oriented control will also be seen. The booth will feature the TV-L line of low band VHF TV transmitters, featuring ultra-linear driver that uses a single, conservatively rated tetrode and broadband Class A solid-state IPAs to drive the final visual amplifier, with new 20 kW, 30 kW, and dual 40 kW models. Also three medium wave transmitters: the MW-5B 5 kW; MW-10A 10 kW; and MW-50B 50 kW. The MW-50B features a new high-speed op-amp audio input state for improved audio transient response.



Harris's new TC-85 features computer setup in a color studio camera



The Autotron Star is a new business automation system from Harris

Harris Farinon Video (301)

Will display its line of fixed and portable systems operating in the 2, 7, and 13 GHz bands for STLs, intercity relay, and temporary networks. Also on view will be frequency-agile portable and "mini-portable" equipment for ENG, remote pickup and relay systems, and emergency services. A **new product** introduction is possible, but no details are available yet.

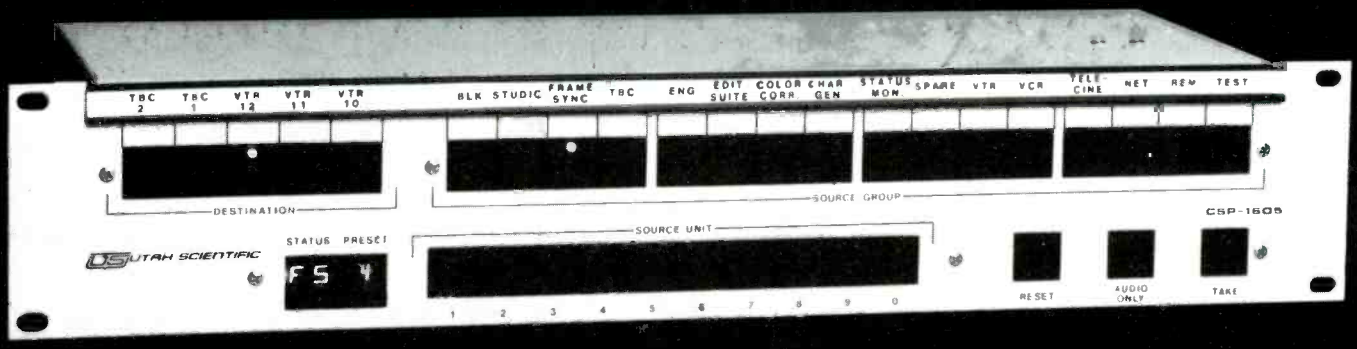
Harrison Systems, Inc. (507)

Will introduce the MR-3 series of **audio consoles** with up to 36 inputs, particularly suited to video sweetening and post-production. Also showing the MR-2 series of larger consoles.

Karl Heitz, Inc. (1809)

New items in the Gitzo line of camera support equipment will include **light stands,** video **tripods** with counterbalanced heads, **leveling balls** with sliding or gearlift column for height adjustment, and **fluid heads.** Also on view will be Gitzo dollies, monopods, mic booms, and projection stands and platforms; Pathe 16 mm and Double Super 8 mm cine cameras, 15X6-90

MORE BANG FOR THE BUCK FROM UTAH SCIENTIFIC



CSP-1605 FIVE-BUS ALPHANUMERIC PARTY LINE CONTROLLER - $1,700

The CSP-1605 panel is one of a new series of routing switcher controllers from Utah Scientific. Each of these new models features alphanumeric **Preset/Status** displays with up to 1600 assignable name/number combinations to let your operator address sources by their actual name — VT 14, CM 3, etc.

The CSP-1605 model pictured here can control five matrix busses and provides current status readout instantaneously as busses are addressed. Input selection is made by either one, two, or three keystrokes. Separate audio switching and statusing is standard and, as with all Utah Scientific party line panels, connection to the matrix is via a single coax.

ALPHANUMERIC DISPLAY — 1600 NAME/NUMBER — SINGLE COAX CONNECTION

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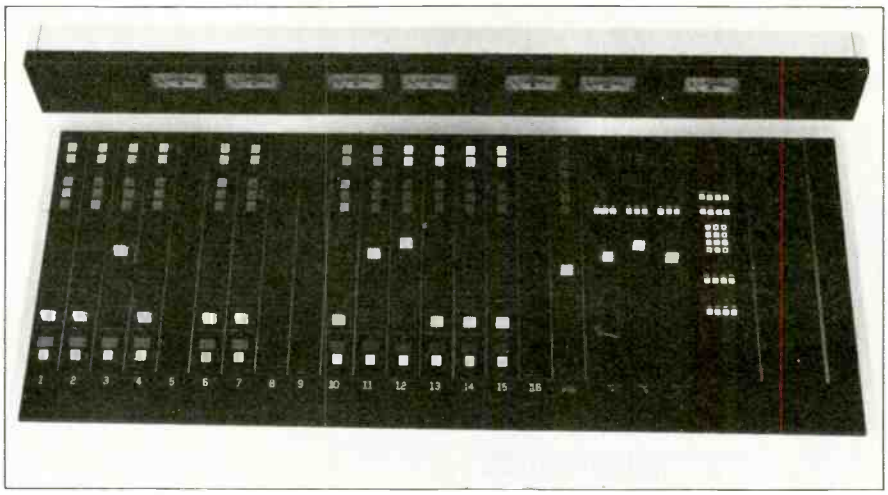
mm f/1.2 zoom lens, interchangeable C-mount lenses, and 400-foot magazine; and Kinoptik Apochromats 16 and 35 mm cine/video lenses.

Hitachi Denshi America Ltd. (1404)

Will bring its complete line of one-inch Type C VTRs, including HR 200 studio, HF 100 portable, and slow mo one-inch machines; plus the entire camera line, featuring a fully computerized studio camera with full automatic setup and the SK 91 high-performance ENG camera. Information on **new products** was not available for release at press time.

The latest in Gitzo heads and tripods will be shown at the show by Karl Heitz

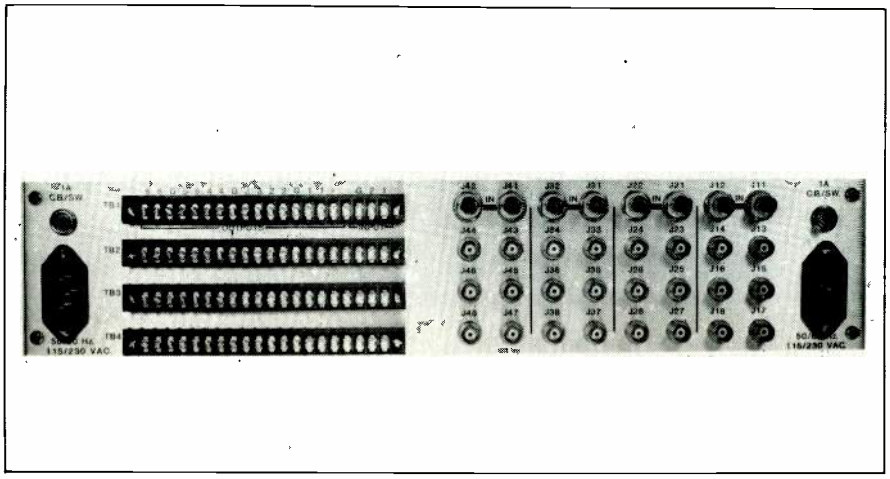


The Micro-Mac™ is a new modular audio board from Harris

Howe Audio/BCP (438)

Introducing a new 8000 series of **audio consoles;** also showing the 7000 series of consoles and the line of broadcast equipment from many manufacturers. FM station KFMS, Las Vegas, will originate programming from the booth four hours each day in studio set up with equipment handled for sale.

Exhibit hours: Sunday, Monday, Wednesday, 9 a.m.–5 p.m.; Tuesday, 9 a.m.–8 p.m.



The AVF-150 connector panel will be introduced by Hughes

Hughes Electronic Devices Corp. (Hedco) (1635)

New items on display will be 8/1 and 16/1 audio and video **routing switchers** in one RU frame; combined **audio and video distribution frame; pulse distribution amplifiers; equalizing distribution amplifiers.** Also showing compact multibus audio and video routing switchers; audio and video distribution amplifiers; 75-ohm 0.1 percent terminations.

Hughes Helicopter (booth not assigned)

Will display a fully equipped Hughes 300-C ENG helicopter.

I

I and B Tower Construction Co., Inc. (320)

Will introduce new **tower lighting systems.** Will also show the line of towers and tower lights.

IGM Communications (101)

Will introduce an **interface for CBSI accounting and traffic automation** to the Basic A program automation system. Also showing the line of Instacarts, Go-Carts 24, 42, and 78, the Basic A program system, and the CBSI business system.

Ikegami Electronics (USA), Inc. (817)

Will introduce a new **ENG/EFP 2/3-inch prism camera** with capability for attachable VCR, a new high-quality, medium priced **studio/field camera,** and a sophisticated **digital control studio/field camera** with full automatic setup and triax capability. A new high-resolution **color monitor line** utilizing in-line gun CRTs will also be introduced. Ikegami's regular line of products will be shown: HK-357 studio/field camera with triax/multicore interface, HK-312 studio camera, HL-79DA ENG/EFP camera, ITC-350 ENG/EFP production CCTV camera, EC-35 electronic cinematography camera, TKC-970 telecine camera, and the TM series of monitors.

Illinois Wire and Cable (2015)

Distributors of electric and electronic wire and cable of many manufacturers.

Image Video Ltd. (1822)

New products will include a programmable microprocessor-based **master control automation switcher system** with 32 audio/video inputs; a microprocessor-controlled **machine assignment system** capable of assigning and controlling up to 160 machines; a new-generation, high-performance **routing switcher** featuring large expandable matrices and single-wire control; a standalone **border generator** for graphics and character generators; and a microprocessor-based **voltage monitor** capable of monitoring up to 128 individual dc voltage sources. Also on view will be custom-made control panels, a routing switcher, a 10 by one AFV switcher with remote control, and a status generator display.

Impact Case Sales (1724)

New this year are **shock-mounted cases** for broadcast equipment. The regular line of custom shipping cases will also be displayed.

Industrial Sciences, Inc. (1115)

New to NAB are the 200 Series **video production switchers.** The 200-1, 200-2, and 200-3 feature 20 inputs and one to three PolyKey Effects (PKE) systems, plus a downstream transition unit that includes "flip-flop" mixer, auto transition, fade-to-black, pulse processor, pointer generator, and downstream keyer with edging. The 200 EdiFex is a compact 10-input unit with a full PKE. Also new will be the 559 genlock **sync generator** and 560 SMPTE alignment standard **color bar generator.** Other products on display will include the 902 and 1200 Series video production switchers and 931 and 921 master control systems.

NAB program schedule on page 147

Informational Processing System (1908)

Will feature weather satellite recorders and color computer graphics system to enhance satellite weather pictures.

Inmark Corp. (329)

Will feature the Comet Ltd. line of fixed and variable vacuum capacitors, including a new compact **high-voltage tester.**

Innovative Television Equipment (1405)

Will demonstrate three new **fluid heads,** two new **tripods,** and a new **portable counterbalance pedestal** for EFP applications. Also featured will be the complete line of ENG/EFP/studio camera support dollies, tripods, pedestals, pan/tilt heads, and accessories for all camera sizes and applications, demonstrated in actual use under 32 cameras at the booth. ITE equipment will also be found in the exhibits of camera and lens manufacturers.

Integrated Sound Systems (2013)

Will introduce the TDM 8000 **time compressor** for music and speech, which alters total program time without change in pitch. Companion unit is the TBM 8002 for FM and stereo program material.

Interand Corp., Telestrator Div. (929)

Will introduce new model Telestrator™ **electronic animation and video art systems** with Auto Probe™ electronic trajectory system for moving and coloring all video sources via stylus. Also new will be the Telestrator **Model 300,** a low-cost, high-performance system for sports and news. The Telestrator/

9100 Digital Video Processor

NoiseReducerFrameSynchronizerTimeBaseCorrector.

The new Thomson-CSF 9100 Digital Video Processor gives you all three capabilities—yet costs only slightly more than ordinary systems.

We developed noise reduction technology that delivers up to 15 dB of S/N improvement in four presettable settings. So satellite signals become clearer. Film-to-tape transfers are less noisy, less grainy. And for ENG applications, signals come out sharper, without the excessive low-frequency chroma noise identified with ¾-inch VTR's.

But here's what makes the 9100 such a wise investment.

We've added a frame synchronizer that gives you the added feature of freeze-frame capability. A built-in line-by-line time base corrector for ¾" VTR's. And, a convenient 4 x 1 switcher frees valuable cross-points while a processing amplifier provides complete output signal control.

Only Thomson-CSF gives you so much versatility and signal improvement in a single video processor.

The new Thomson-CSF 9100 Digital Video Processor. A lot more than noise reduction. For just a little more money.

Call or write today for complete specifications and/or a demonstration at your facility.

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Frank Benson
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Tom Lorenzen
(312) 356-5575

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Ⓑ THE EQUALIZER IS A LIFE EXTENDING SYSTEM FOR SILVER CELLS PROVIDING 4 TO 6 MONTHS ADDITIONAL LIFE FOR THE BATTERIES.

Ⓒ THE POPULAR NEW KWIK-KLIP™ SILVER AND NICKEL CADMIUM PACKS GUARANTEE MORE FLEXIBILITY IN THE FIELD.

Ⓓ PERROTT'S VTR BATTERIES ARE PROVIDED IN 3 AH LEAD ACID, 4 AH NICKEL CADMIUM OR 8 AH SILVER ZINC PACKS.

Ⓔ PERROTT'S 4 AH AND 7 AH NICKEL CADMIUM BELTS FOR FILM AND VIDEO CAMERAS CONTINUE TO PROVIDE PROVEN RELIABILITY.

Ⓕ THE CHOSEN FAVORITE! THIS LIGHTWEIGHT 12 AH BATTERY PACK DELIVERS THE POWER AND RUNNING TIME REQUIRED FOR ENG. EQUIPMENT.

Ⓖ PERROTT'S 30 VOLT SUN GUN BELT PROVIDES POWER FOR A 250 WATT LIGHTING SYSTEM OR A VIDEO CAMERA.

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POWER

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TAPAS automatic programmable animation systems and slide art sources will also be exhibited.

International Tapetronics Corp. (501)

Will show for the first time a new series of **reel-to-reel tape recorders,** the 770 Series. Also showing the full line of reel-to-reel and cart recorder/players, including the new Series 99 cart machines, and the 1000-unit multicart system.

J

Jam Creative Productions, Inc. (121)

Will introduce several new **jingle packages** for radio stations. Will also introduce a **production music library** and a **"drive module TV spot,"** a commercial for television to be used in radio promotion. Also showing the line of jingles, promotional IDs, and related materials.

Jatex, Inc. (1639)

Will emphasize its theme of "cost-effective editing" by introducing an A-B roll **editing controller** capable of fully automatic operation with search dials to allow speeds from zero to five times forward and reverse and optional expandable edit memory, printer, and video list display; a rack-mounted **color bar generator** with full and split-field display; and a rack-mounted **black burst generator.** Also on line will be the VSEC 42TD editing control unit and the VGEN IV time code character generator.

Jefferson Data Systems (1613)

Will introduce its ENP **Electronic News Processing** system, an in-station computer for television and radio news departments that connects to AP and UPI wire services, includes complete text entry and editing facility, prepares news script and produces rundown sheets, connects to a teleprompter or character generator for on-air presentation, and offers complete storage and retrieval of any news story. Also new will be the **System 90** in-station sales/traffic and general accounting system that runs on an IBM/34 computer.

Jenel Consultants Corp. (1813)

Consulting engineering services for broadcasters.

Jensen Tools, Inc. (3210)

Will introduce new **electronic tool kits,** plus its line of electronic tool kits, test equipment, and hand tools.

K

KalaMusic (128B)

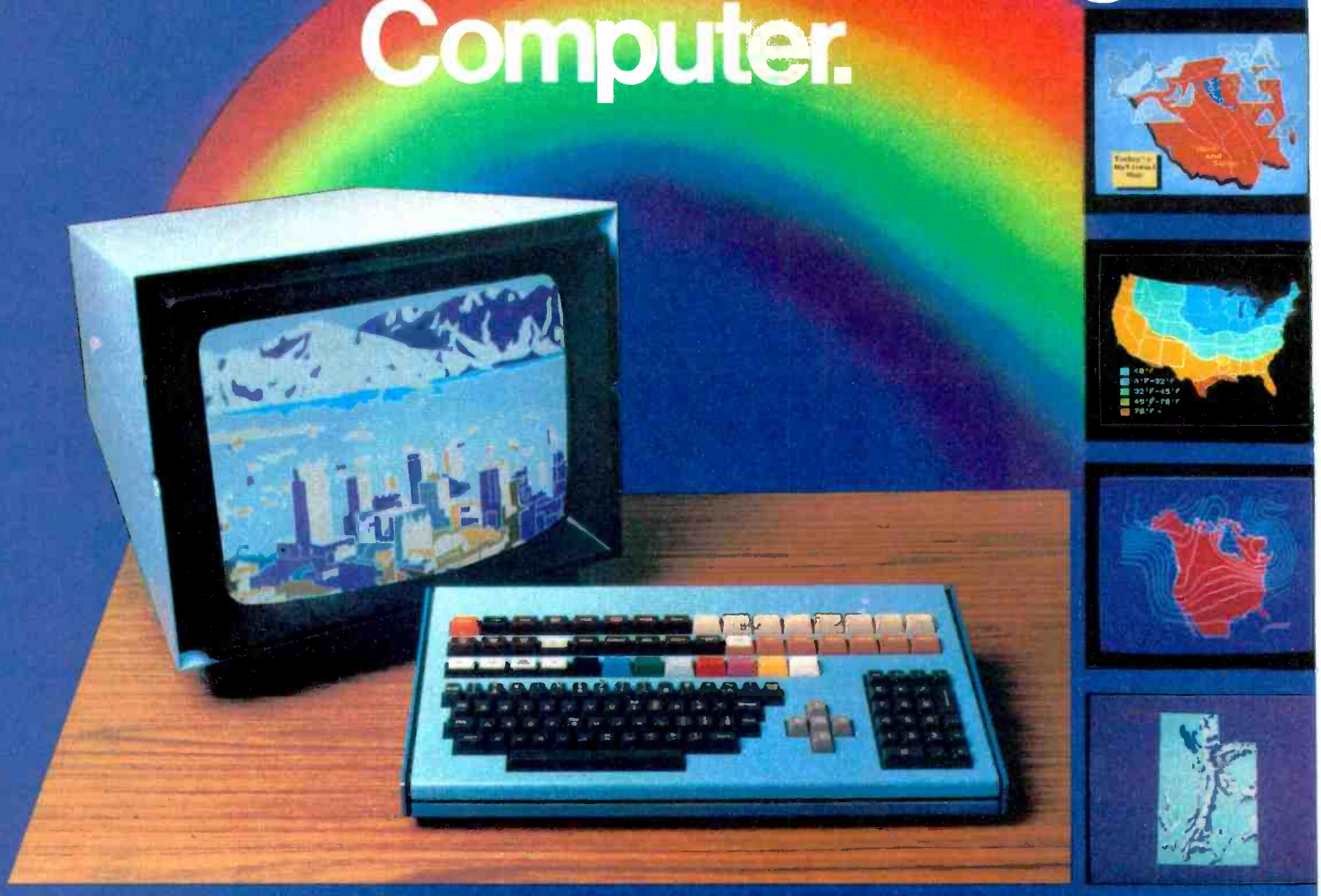
Will demonstrate syndicated programming in three main formats: KalaMusic Matched Flow is Beautiful Music targeted to 25 to 54 listeners in quarter-hour sweeps for live or automated stations; KalaMusic Category is the same in individual selections on 10-inch reels for four hours of unattended operation; KalaMusic Lite Contemporary combines some of Matched Flow with Adult Contemporary for 70 percent vocal content, bridging gap between the two.

Kaman Sciences/BCS (1419)

Emphasizing itself as the single computer company for all broadcast computer needs, Kaman will be introducing its latest **in-house demographics/sales proposal computer package.** Also displayed will be complete traffic/billing systems for TV and radio stations, with inventory control packages for

UNDER THE WEATHER TOW
SOUTH HALL...525

Here. Now!
The world's first and only Weather Forecasting Computer.



WEATHERCASTER CT-1000

Real-time local weather forecasting...animated weather presentations...weather graphics... whatever the weather occurance, Weathercaster CT-1000 is ready.

The CT-1000 creates lives "weather character" animations of its weather forecasts and other weather simulations; also time-sequenced weather map presentations showing present, past and future weather locations and conditions.

The CT-1000 will also create news graphics.

Weathercaster's NTSC video output permits full-screen personalized chromakey presentations.

For a live demonstration come to NAB...Booth 525...South Exhibit Hall. Hospitality Suite at Landmark Hotel.

WEATHERCASTER

The Pioneer in environmental and weather forecasting computers

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films, news and cartridges accounting and amortization programs, and computerized interface to auto switchers.

Kappa Systems (202S)

Will unveil the Communicator line of software-controlled **plant and studio intercoms** and **audio routing systems** customized for station communications and on-site work, such as political conventions.

Kings Electronics Co., Inc. (1026)

Showing line of video patch panels and coaxial and triaxial connectors.

Kliegl Brothers (923)

Will feature among its lighting and control equipment the new Performer II and Command Performance **memory lighting control systems,** plus portable lighting kits, 1550 Series Klieglights, Kliegpac 9 portable dimming system, fresnels, and the Performer memory lighting control system.

Knox Video Products (1033)

Will display its character generators, stressing the theme of "quality at moderate prices."

L

LPB, Inc. (402)

Will introduce the Citation Series of eight and 10-channel **stereo consoles** with mono mixdown, clock, timer, and reference oscillator. Also showing a new series of **AM transmitters** with outputs from 50 to 250 W, frequency synthesizer, dual-standby operation, and remote control options. Will show also the line of Signature and Monogram consoles with five to 10 channels in mono and stereo; audio distribution amplifiers; turntable preamps; compressor/limiters; studio furniture; limited-area AM and FM transmitters and accessories.

LTM Corp. of America (1016)

Will introduce the A97 **audio mixer** for addition to video recorders (Sony BVU-50, etc.), battery-powered with two mic inputs, one mic or line input, phantom power, equalization. Also introducing the small Luxarc and Ambiarc 200 W **lights** and a new compact **light source,** ac or dc operated, all voltages 12 to 220, for mount on any video camera. Also showing line of other lights and lighting accessories, microphone booms, and suspensions.

L-W International (939)

Will bring a production model of the new Athena 6000 slow mo, freeze frame **telecine projector.** The Athena 4000 telecine will also be exhibited.

Laird Telemedia, Inc. (901)

Will introduce the 7200 high-resolution **character generator** and the 1060 **video pointer.** Display will also feature the line of film chains and character generators.

Landy Associates (1102)

Will introduce the new Dubner **character generator.** Also showing line of audio and video accessories.

James B. Lansing Sound Co. (203)

Will introduce a new **automated microphone mixer** with digital control to switch mics on and off, and discriminate against background noise. Also introducing the Model 4301 broadcast **monitor loudspeaker,** available with or without built-in amplifier. Will show in addition other monitor speakers in

line, including the Model 4313.

LeBlanc and Royle Communications Towers Ltd. (1319)

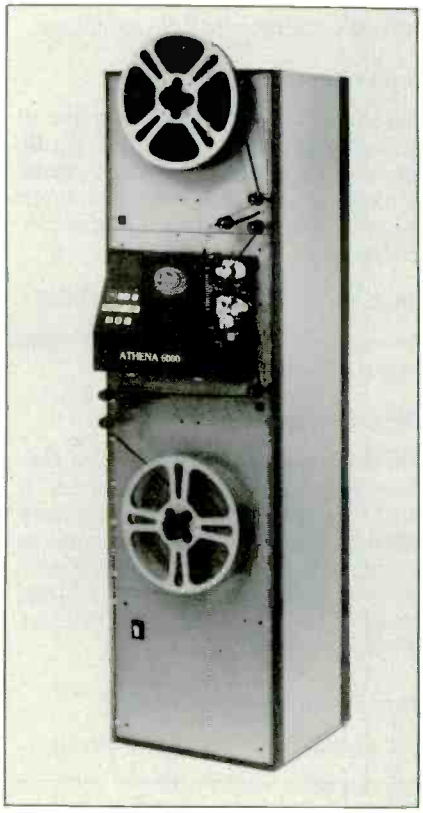
Will show its line of tower sections, and describe services in the engineering, fabrication, installation, and commissioning of communications towers and related products.

Lee-Ray Industries, Inc. (1707)

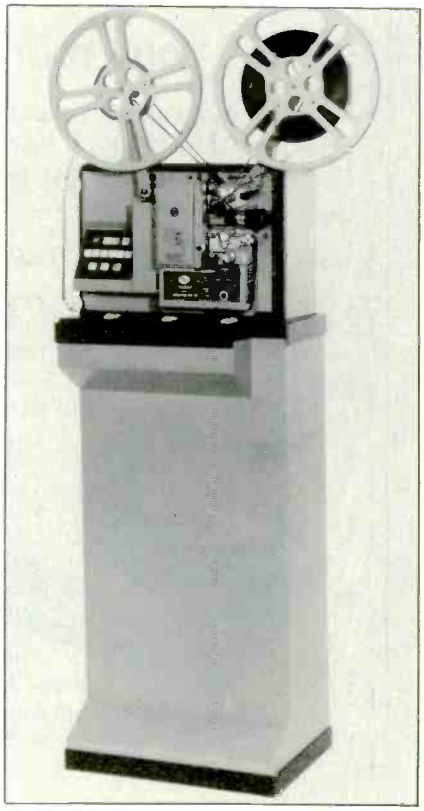
Showing a new **tape cartridge system** for recording and new **monitor** for classroom use. Also showing standard line of audio units.

Leitch Video Ltd. (1212)

New this year will be the DTG 100 NTSC **digital test signal generator,** the VPA 330 NTSC **video processing amplifier,** the SPG 140P PAL **sync generator,** the APU 170 PAL **automatic phasing unit,** and the FR 660 and FR 661 six-output **DA mounting frame and DAs.** The booth will also feature sync/subcarrier phase monitors, sync generators, video processing amplifiers, master clocks, and digital and impulse clocks from the general product line.



The Athena 6000 projector is the latest from L-W International



L-W International's Athena 4000 projector will also be displayed

Maxell gives you the professional advantage.

If your professional or business requirements call for the regular use of blank audio or video recording tape, you can't afford to lose production time because of inferior products. As a matter of fact, you need the kind of tape that consistently provides you with *all the advantages* of performance and durability you depend on for professional results. We call it *The Professional Advantage*, and at Maxell we are dedicated to giving you *just that*, with every audio and video tape we make.

Our magnetic tape products employ highly sophisticated formulations that reproduce original source material with exceptional accuracy, whatever the application. Our binder system and processing techniques assure that what you record, you keep—without dropouts, shedding, print-through or distortion.

Our superior cassette shell technology provides the precision necessary for smooth and quiet tape transport without slipping or jamming.

We make it our business to manufacture high quality products that give you every advantage. You'll get the professional results you demand, the first time and every time you use a Maxell audio or video tape. To discover more about Maxell's professional advantages, call one of our Regional Sales Offices: Eastern Office, Moonachie, NJ (201) 440-8020 ▪ Midwestern Office, Glenellyn, IL (312) 469-3615 ▪ Western Office, San Jose, CA (408) 238-2900

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PRODUCTS

The Professional Advantage

Maxell Corporation of America
60 Oxford Drive, Moonachie, NJ 07074

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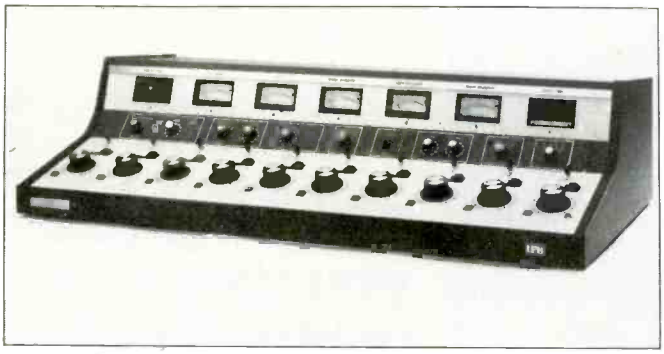
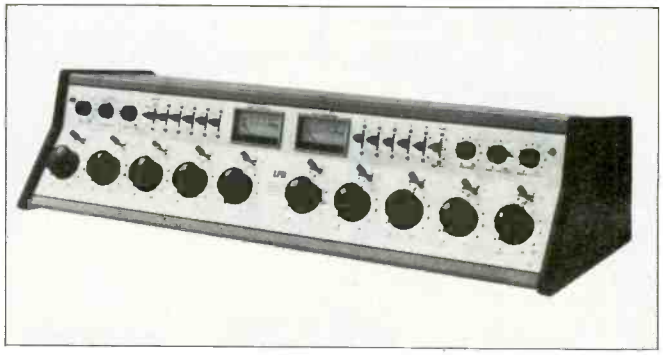


The Citation series C-10S is a 10-mix dual stereo audio console



The LPB Signature II model S-21 stereo console will also be shown

Lemo, USA, Inc. (1000)

Will exhibit the line of multicontact, coaxial and triaxial connectors, television camera connectors, and stereo and mono audio patch panels.

Lenco, Inc. (1206)

Will introduce the PVS 430 **Videoscope,** which certifies RF 170A subcarrier to horizontal phase relationship, and a new **broadcast encoder.** The PCM 514 VTR bridge and teleproduction **color monitor,** seen last year in prototype, will also be on view. Will also display the complete line of terminal equipment.

Lexicon, Inc. (206)

Will show for the first time at NAB the Model 1200 **audio time compressor,** allowing playback of audio or videotape faster or slower than original recording without change of pitch. Will also show from its product line the Model 93 Prime Time digital audio delay processor/mixer for special effects and the Model 224 digital reverberation system with stored programs simulating a variety of acoustical characters.

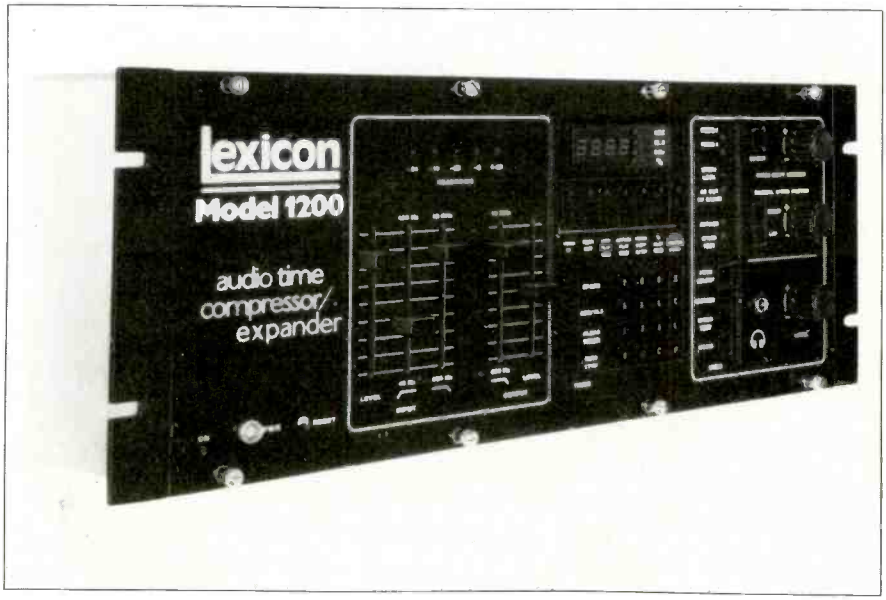
Libin and Associates (339S)

Distributing Sanyo electrical products and Tri-flex indoor equipment.

Lightning Elimination Associates, Inc. (317)

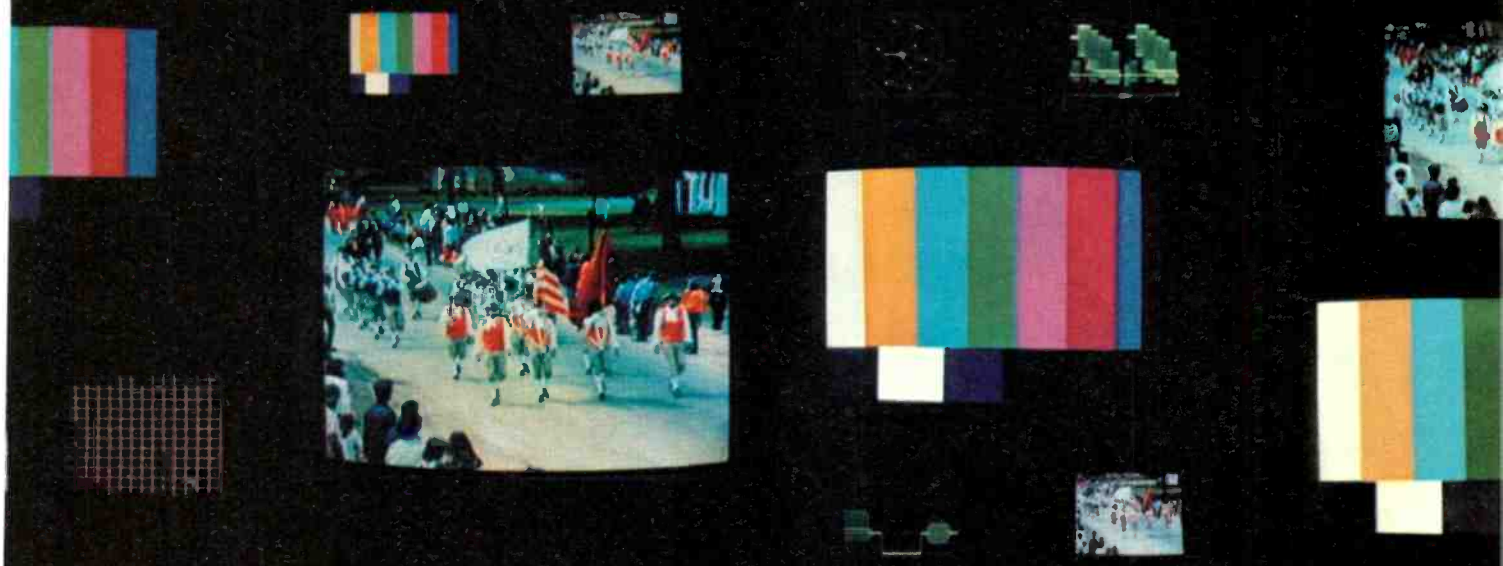
Will introduce new **surge eliminators** for coaxial transmission line. Also showing the line of dissipation arrays for lightning protection; surge eliminators for power lines to sensitive solid state equipment; choke-insulators for guy wires. Will have information on consulting service for lightning-proof

The A97 audio mixer for portable VTRs will be introduced by LTM



Lexicon will introduce the model 1200 audio time compressor/expander

BANK ON US.

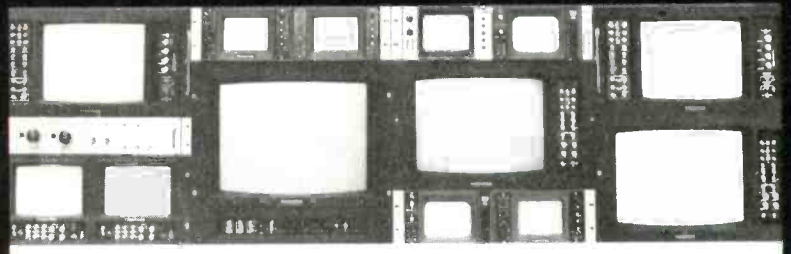


In the Rack or out of the Rack, Videotek products are a wise investment.

And for good reason. Videotek concentrates only on monitors; the most comprehensive line of rackmount and tabletop professional color monitors. In addition, Videotek is emerging as a leading manufacturer of Broadcast Test Equipment.

We are committed to provide quality products, personalized service and excellence in field back-up. Large impersonal corporations sometimes forget the Human Factors in conducting customer relations on a day to day basis. We don't!

Videotek products represent a solid capital investment. One you can bank on year after year.



The same Videotek monitor bank whose color pictures are shown in the photograph above.

Videotek

125 North York Street, Pottstown, Pennsylvania 19464 • 215/327-2292
9625 North 21st Drive, Phoenix, Arizona 85021 • 602/997-7523

Circle 230 on Reader Service Card

system design, including proper grounding.

Listec Television Equipment Corp. (1027)

New in the line of "camera support equipment for the '80s" will be the Vinten Raven **studio pedestal** for lightweight film production cameras, the Vinten Plover **remote pedestal** with constant pressure operation, and the Vinten ENG/EFP **pan and tilt heads.** Also new will be the Digivision enhanced **monitor prompting system** with bypass switch. The full Vinten line of broadcast-quality camera mounting equipment and full Digivision line of monitor prompting systems will be on display.

Live Sound, Inc. (127)

Will demonstrate a new **syndicated format,** *Country Beautiful*, unannounced music service designed for a "different" sound in competitive markets. Also showing the ongoing series, *Big Country*, 24-hour voice-tracked format with new track for every day, customized for the station; and *Big Country II*, for older or simpler automation systems, also localized to the station.

Logica (175S)

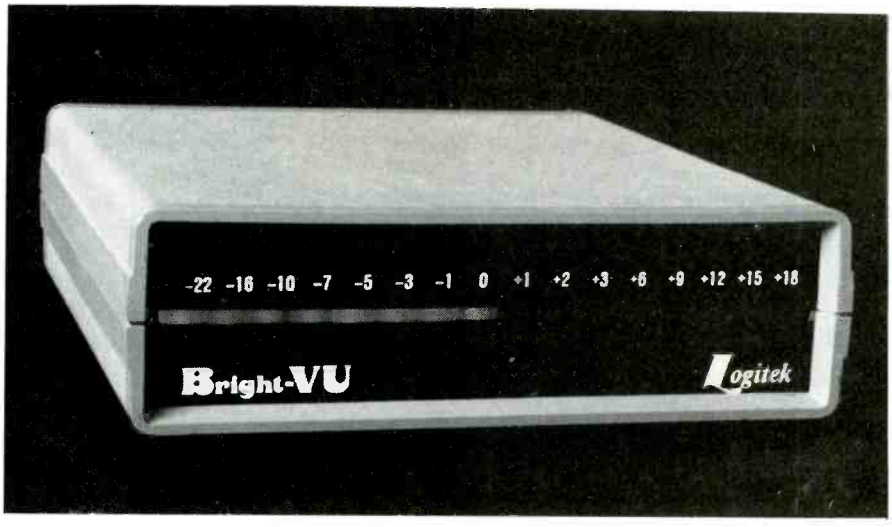
Will unveil the Flair microprocessor-based **graphic art system** with digitizing tablet. Also shown will be a teletext system described as the latest version of CEEFAX and the Context teletext system.

Logitek Electronic Systems, Inc. (136)

Will introduce a new line of **audio distribution amplifiers** aimed at high-performance applications; DAs will be optional build-ins for console line. Also introducing the Bright-VU LED audio level indicator, using 16 bar-type LEDs to cover a 40 dB range. Will also show the line of custom audio consoles; balanced input phono preamps; power amplifiers; presettable up/down program timers; and accessories.

Lowel-Light will show a new series of mounting devices, including the Space-Clamp

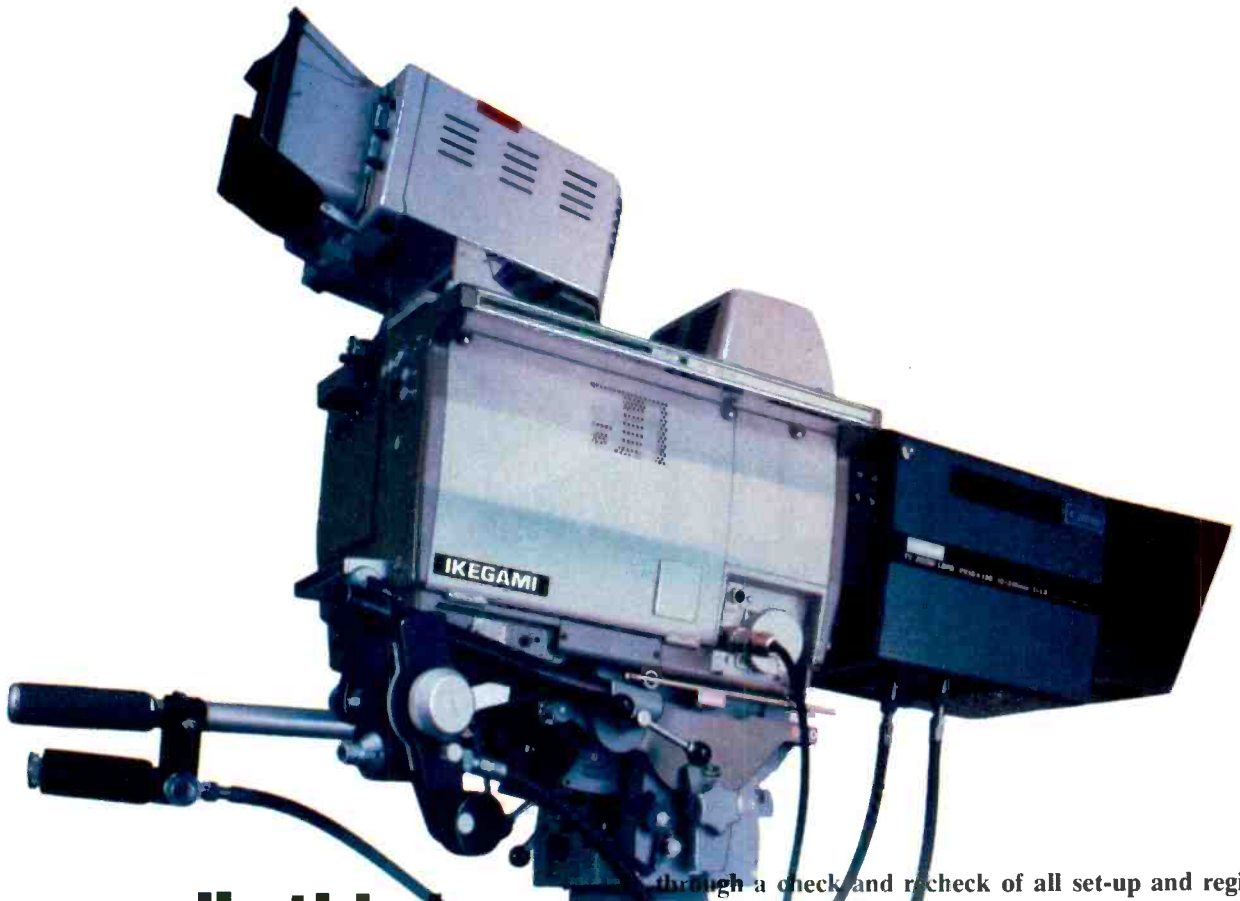
Lowel will also be showing a new line of portable light stands



◄ *Logitek will introduce its Bright-VU LED VU indicator*

Lowel-Light Mfg., Inc. (1004)

New products in the line of location lighting equipment will include the Grand Stand heavy-duty, **lightweight stand** for large lights, reflectors, booms, and devices; the Screw-In Stud **mounting device** for lightweight lights



Ikegami's third microprocessor-controlled camera reduces registration set-up time and cost

The ideal camera for field broadcast television assignments must meet three major criteria. It must be air-ready moments after arrival at the camera site. It must deliver pictures of studio-quality color, crispness, and clarity. And it must be consistently reliable.

The Ikegami HK-357A meets those criteria in the field and is equally suitable as a studio camera. And it allows the camera crew to concentrate on creative aspects of their assignment instead of on time-consuming set-up and readjustment tasks.

Once on-site, the HK-357A requires hook-up to only three cables and power source. Then, a push of the microprocessor activate button automatically cycles it through a check and recheck of all set-up and registration adjustments. This takes approximately 45 seconds per camera (up to six cameras can be handled). No external registration and chip charts are necessary because a test pattern projector (diascope) is built into the lens. Camera distance from the compact base station can be nearly a mile with triax, or 2,000 feet with TV-81 multicore cable.

Because the HK-357A optimizes the capabilities of the newly developed Diode Gun Plumbicon®, the picture output is of very high resolution, low lag, low noise and wide dynamic range. Dynamic Beam Stretch to reduce comet tailing; Geometric Correction for near-perfect registration; auto iris and auto white balance — all contribute to the superior color picture program output of this camera.

The HK-357A is notably versatile too. It offers selectable contrast compression levels; built-in chroma keyer; gen-lock to Sync and SC or VBS/BBS; and several other features, including an unusually compact CCU, optional RCU, tiltable and rotatable 7-inch high-resolution electronic viewfinder.

The performance record of Ikegami cameras at the major networks in the United States and around the world attests to their consistent reliability and long, trouble-free service life.

If you are upgrading, a demonstration may well reveal that the other cameras you've considered may already be obsolete when compared against the HK-357A.

Ikegami HK-357A

Broadcast Products Division, Ikegami Electronics (USA) Inc., 37 Brook Avenue, Maywood, N.J. 07607; (201) 368-9171. **West Coast:** 19164 Van Ness Ave., Torrance, CA 90501; (213) 328-2814; **Southwest:** 330 North Belt East, Suite 228, Houston, TX 77060; (713) 445-0100; **Southeast:** 522 So. Lee Street, Americus, GA 31709; (912) 924-0061.

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The Saturn Series

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Vital Industries manufactures the SQUEEZOOM ... the only multiple channel video manipulation unit in use throughout the world which will accept non-syncronous signals without external syncronizers?

The SQUEEZOOM is the easiest VMU to operate in live production?

SQUEEZOOM has been in operation for 3 years with over 100 units delivered world-wide?

We can deliver a multi-channel SQUEEZOOM immediately?

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If you are interested in purchasing Vital equipment, write for PRICES and be surprised. Please include your title and name of company.

VITAL NEWS

Visit our Florida facility in Gainesville and put your hands on our equipment operating in our new Showroom, Production Studio and Control Room. Equipped with RCA TK46 color cameras and TH200 and TR600 VTR's you can see and try out the VIX-114 Production Switcher, the PSAS, a 115 Master Control Switcher with Automation, a 4 channel Squee-Zoom, and the exciting new 250 P/N Production Switcher.

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VITAL INDUSTRIES, INC.

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3700 NE 53rd Ave. Gainesville, FL 32601

PHONE: 904/378-1581
TWX: 810-825-2370 TLX: 80-8572-Vital-A-Gain

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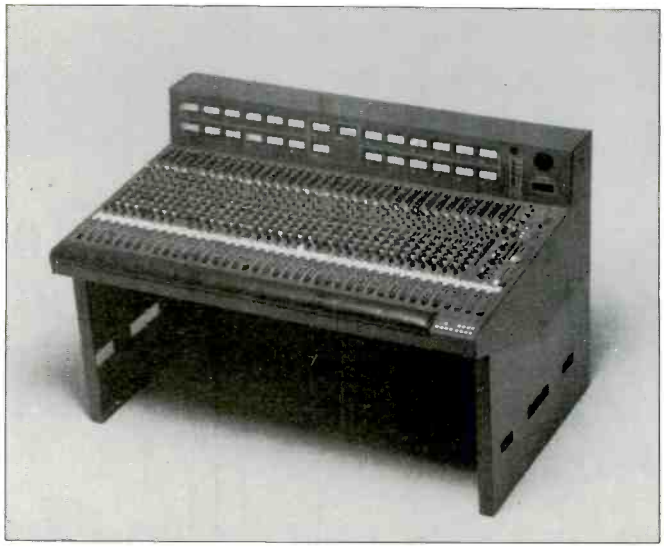
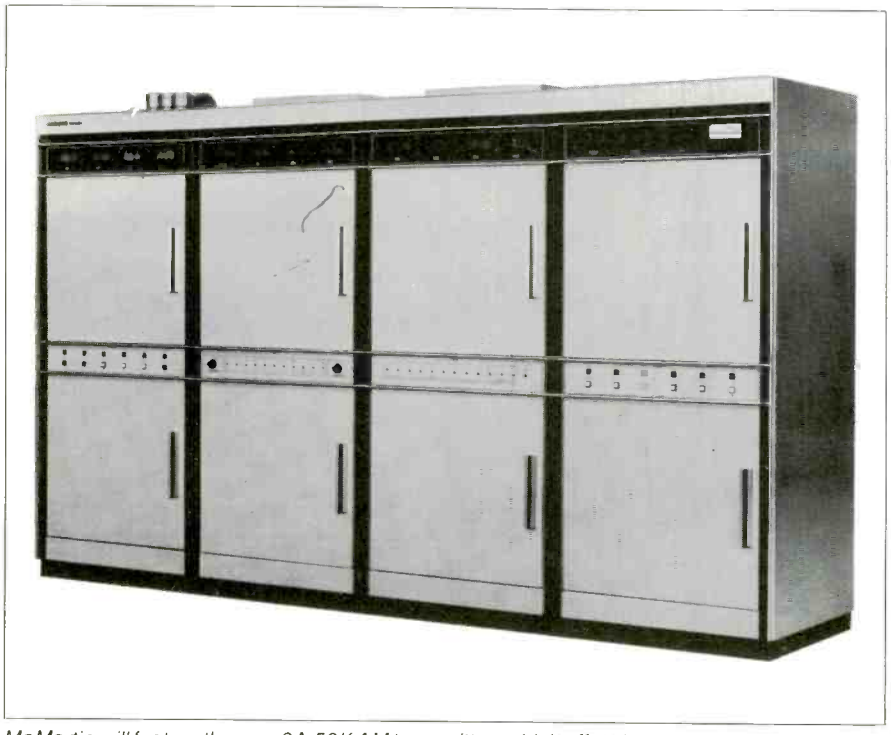
and equipment; the Roll-Up **Carrier** for equipment transport; and the Space Clamp **mounting device.** The range of Omni-light and D light focusing spotlights, Tota-light floods, Softlight 1500 portable softlight, Lightflector and Variflector II sun or artificial light reflectors, and the complete system of portable support, rigging, and lighting control equipment will be displayed.

Exhibit hours: Sunday, Monday, Wednesday, 9 a.m.–5 p.m.; Tuesday, 9 a.m.–8 p.m.



MCI, Inc. will introduce the JH-636 mobile recording console

Newscan from McInnis-Skinner now offers a high-resolution computerized graphics package for weather and other visual presentations



McMartin will feature the new 8A-50K AM transmitter, which offers increased signal efficiency

Lyon Lamb Video Animation System (439S)

Will introduce a new **animation system,** the VAS 1V, a microprocessor-based controller that drives an Ampex VPR-2B one-inch recorder. System offers sync to 24 or 34 frames per second. Will also show the prototype of a new **animation stand** offering rotation in any direction and calibrated to one-hundredth of an inch.

M

McCurdy Radio, Inc. (308, 113)

Will bring a new series of economical radio **on-air and production consoles,** the 9800 Series, with new refinements. Will also introduce a line of **studio cabinetry,** with desks, turntable mounts, console mounts, etc., the 8900 Series of **audio consoles** for television production. Also bringing a new class of product, an **"announce turret,"** with inputs and controls for microphones for connection to on-air and production consoles.

MCI, Inc. (133)

Are introducing the JH-636 **mobile recording console** with 36 inputs and 24 outputs, aimed specifically at mobile recording vehicles, with three-band EQ, HP and LP filters, six effects sends, VCA fader grouping. Also showing the lines of recorders and consoles: the JH110B and 110BX tape recorders, mono to eight-track; JH-24 recorders, 16 and 24 tracks; JH-600 remix consoles with up to 52 inputs; JH-45 Autolock synchronizing system.

McMartin Industries, Inc. (300)

Will show for the first time the BA-50K, a new 50 kW **AM transmitter.** Also showing the product line of AM

NEC DME® System features:

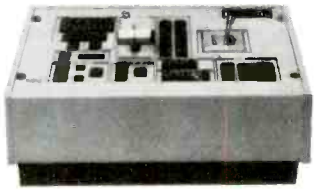
- Single or dual channel operation with DME dual system for simultaneous single-studio multi-channel or two-studio single channel use.
- Complete frame synchronization on all inputs including TBC, freeze and Velcomp capabilities.
- Intelligent digital control system with 18 complete memory locations of start and finish position/size and special effects.
- Automatic pan and tilt control with limit for not going out of frame.
- New vertical and horizontal inversion effects including "tumble" using new digital control.
- New "mosaic" effect with adjustable tile size for dramatic visualization of show openings and closings.
- TTL pulse circuitry for sequential and external triggering to permit extensive interface with editors and other creative controllers.

NEC DME Control features:

- Operation with DME or existing DVE® Digital Video Effects System for full digital control of all system functions.
- Memory capacity for 18 complete pattern manipulations including start position and size, finish position and size, posterization and solarization effects, freeze frame or freeze field and real time frame entry of effect duration . . . all effects instantly and exactly repeatable.
- Automatic pan and tilt functions with selectable limit to prevent pattern transition beyond blanking.
- Memory reveal function to permit image-track effects by revealing the entire memory and removing normal mask.
- Bridging of all memories to permit multiple effect sequences up to 999 frames each for a total capacity of 17,982 frames of pre-programmed effects.
- Auto-freeze for pre-timed incremental freezing.
- All digital construction including digital shaft encoder instead of conventional faders.

NEC

NEC America, Inc.
Broadcast Equipment Division
130 Martin Lane
Elk Grove Village, IL 60007



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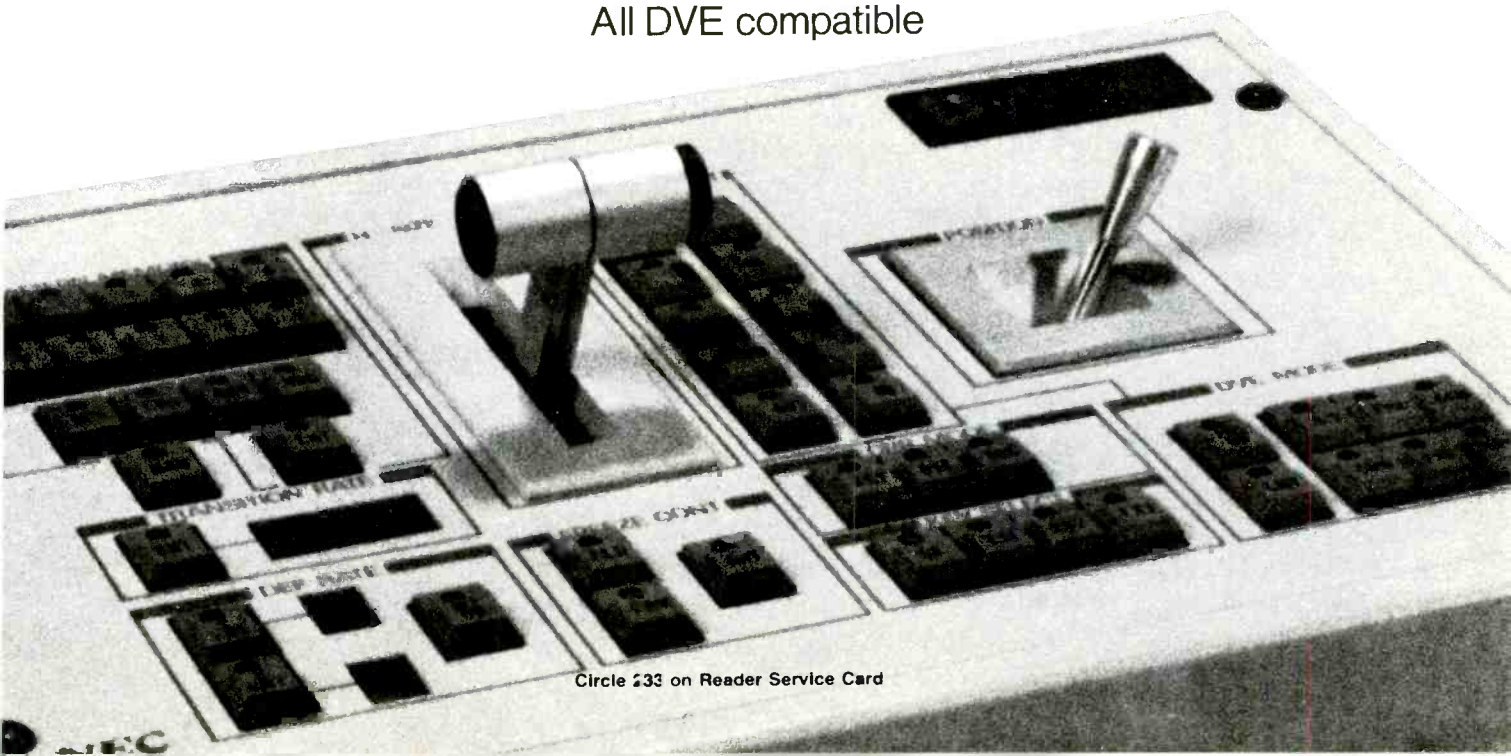
NEC INTRODUCES THE MOST FLEXIBLE DIGITAL EFFECTS SYSTEM AVAILABLE!

All digital control
All function memories
All DVE compatible



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and FM transmitters, audio consoles, RPU equipment, stereo and SCA generators, mono and stereo audio processors, FM modulation monitors, FM exciters, SCA receivers, satellite/microwave products.

3M Magnetic Audio/Video Products Div. (815)

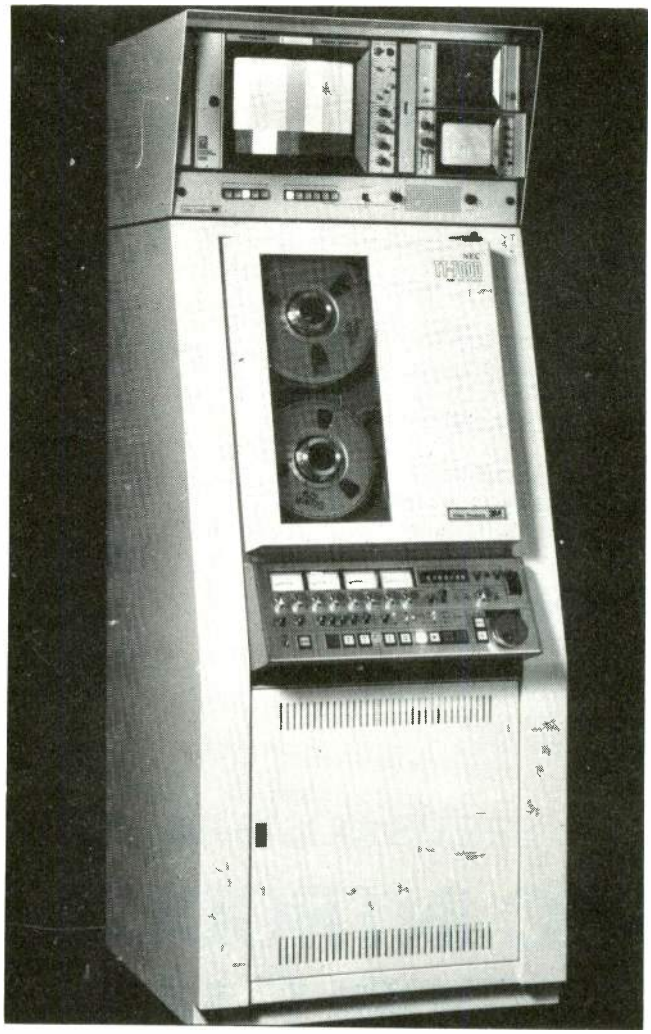
Will celebrate the twenty-fifth anniversary of videotape by introducing the Scotch® MBU-18S mini Color Plus **videocassette** and the MBU-45 Color Plus **videocassette.** Will also feature its entire line of video and audio tapes and cassettes, audio and video accessories, and hanger system under the Scotch brand.

3M Video Products (815)

Will display its character generators, routing switchers, one-inch C format VTR, and digital audio recording system.

Magnasync/Moviola Corp. (1825)

Will introduce the Videola V-2000 Deluxe **film-to-tape transfer system,** similar to the V-1000 shown in prototype last year but housed in an upright cabinet with built-in picture and waveform monitors. Production model of the V-1000 will also be shown. Video output is said to be of broadcast quality, without flicker or jitter. A 24-facet hollow-prism optical system makes Videola completely independent of TV synchronization constraints. A standard camera in NTSC, PAL, or SECAM format produces video limited only by the resolution of the camera itself. Videola handles 16 mm or 35 mm picture and sound (composite, optical or magnetic, separate magnetic) through the use of interchangeable transport modules.



Studio console and monitor bridge are options available with 3M's TT-7000 recorder

Magnavox (104)

Will demonstrate the latest refinements in AM stereo receivers.

Magnum Towers (324)

Will display its line of guy towers and radio and television support towers.

Marconi Electronics, Inc. (927)

Will feature the MARK IX hand-held EFP color television camera, the MARK IX television camera for studio/field use, the MR-2 Type C format one-inch helical tape machines, and the Marconi line of transmitter equipment.

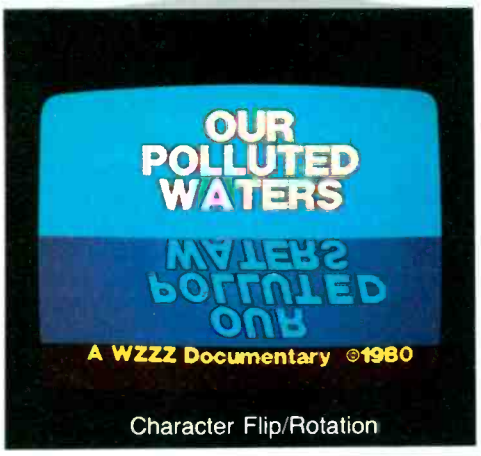
Marti Electronics, Inc. (307)

Emphasizing the RMC-30 30-channel all-digital remote control system. Will introduce two new STLs, Models TSL-2/450 and TSL-15/450, and a new

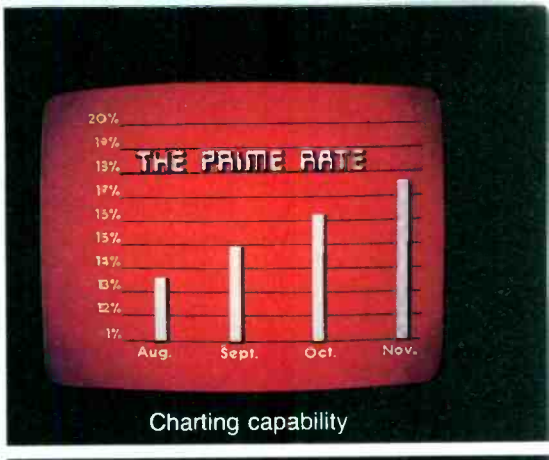
3M will offer a new four-channel digital audio recorder

3M will feature the latest advancements in its D-8800 character generator

Dual channel mix



Character Flip/Rotation

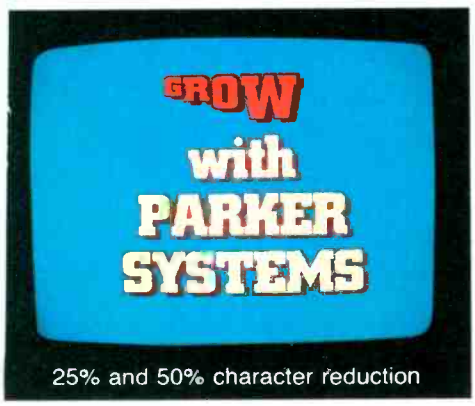


Charting capability

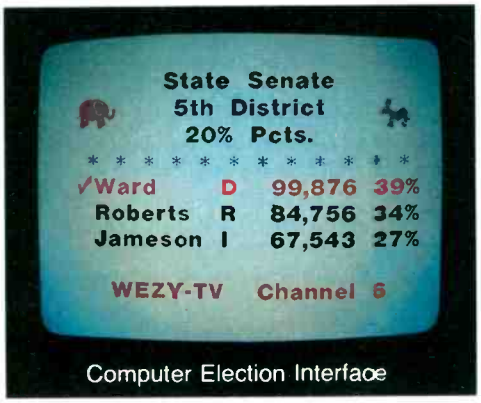
Static headline, changing copy

Keyboard logo compose

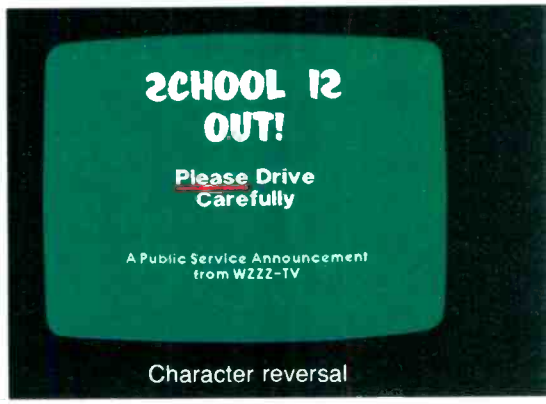
Left and right italics



25% and 50% character reduction



Computer Election Interface



Character reversal

Many of our capabilities aren't even options on other graphic generators.

Which is the do-all, top-of-the-line graphics generator?

It may not be the one you think it is. Unless you specify the D-8800 Graphics Generator System from 3M.

It's the graphics system that gives you almost every creative capability you could want.

Such as the features you see above, photographed from a monitor using graphics generated from the D-8800 keyboard with no external hardware. And dual channel mix. Ten roll and crawl speeds. Eight mask positions. Both horizontal and vertical autocentering. Character reduction and italics

that give you hundreds of fonts to create and store.

And much more.

Plus the D-8800 talks to you in plain English, at the keyboard. Not in codes that so often take weeks, even months to learn to decipher.

Call 3M today at 612-733-8132 and ask for a demonstration. You'll quickly discover the D-8800 is your only real option. Or write on your letterhead to: Video Products/3M, Bldg. 223-5E/3M Center, St. Paul, MN 55144. In Canada contact 3M Canada, Inc., P.O. Box 5757, London, Ontario, N6A-4T1.

3M Hears You...

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3M

generation of compact, highly portable **remote pickup equipment.** Will show other units from line of STLs for AM and FM, and ENG communications systems, including mobile repeaters, automatic repeater stations, hand-held transmitters.

NAB program schedule on page 147

Matrix Systems (152)

Will feature new Data General installed traffic/billing/accounting **computer systems;** self-installed traffic/billing **software** for most CP/M microcomputers; **music rotation software and systems,** and call-out **music research software** and systems. Also on view will be the Matrix System 3 installed traffic/billing/accounting computer system.

Matthews Studio Equipment, Inc. (1806)

New products will include the Video Mini-Jib counterbalanced **camera support arm,** the Mini-Vator **cranking light stand,** and the Tulip **crane,** which reaches 20 feet in height and carries both the camera operator and assistant. Will also show the line of location and stage equipment for lighting and camera control, including overhead light diffusion sets, flags and scrims, stands, dollies, dolly tracks, mounting equipment, and accessories.

Maxell Corp. of America (1831)

Will show the line of video and audio recording tape. Will unveil some **new products** at the show.

Merlin Engineering Works (1128)

New this year are **one-inch VTR conversion kits** to extend the playing time of Sony and Ampex machines to 2½ hours. Also displayed will be custom-built refurbished quad VTRs and accessories.

Media Service Concepts, Inc. (227S)

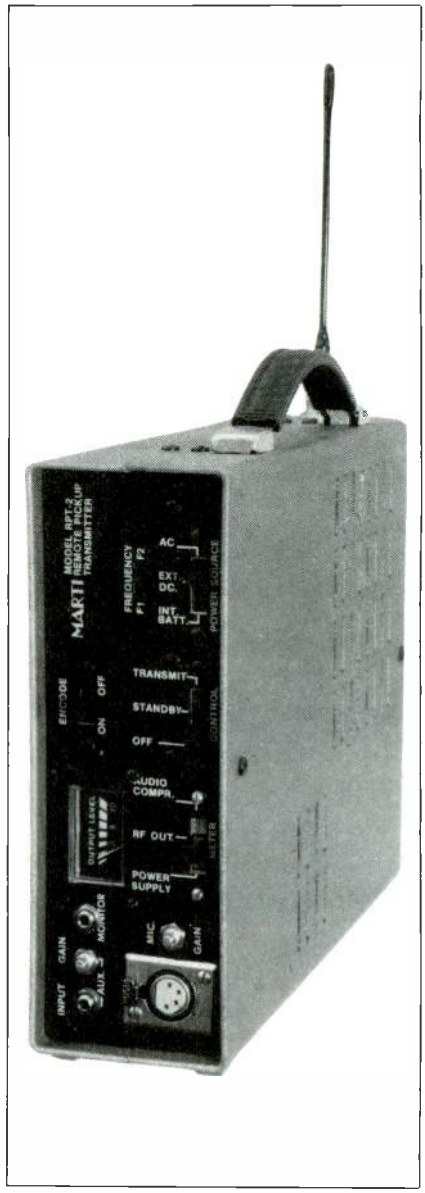
New this year is the Recall microcomputer **ratings analysis program.** Focus-Phone, a qualitative telephone focus and group research service for radio and television stations, will be shown, as will custom weather reports for broadcast stations.

MicMix Audio Products (406)

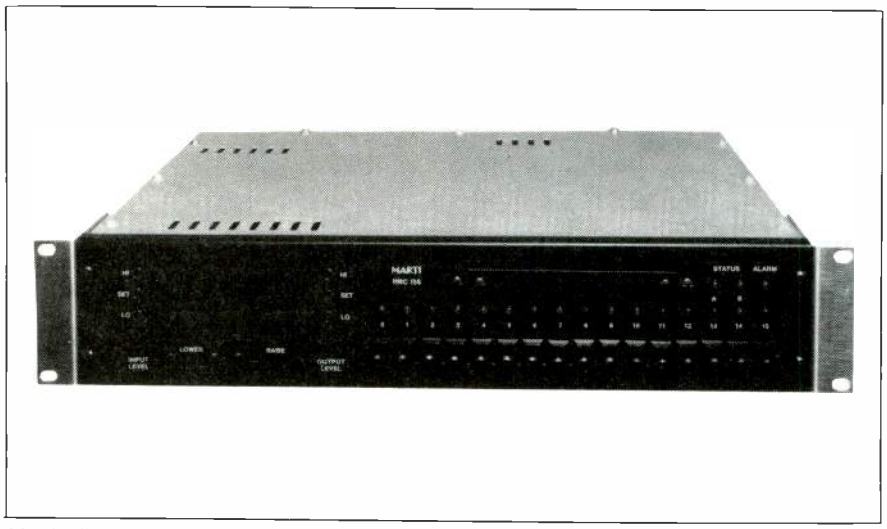
Will show the line of reverb units, including the XL305 and the XL260. Also showing the line of audio processors.

Micro Communications, Inc. (1108)

New products will include **low-power diplexers and combiners** for VHF, UHF, and MDS power levels 10 W, 100 W, and 1 kW; **low-power antenna** for VHF TV; and **high-power UHF waveguide switches** in three, four, and five-port versions. Also featured will be coaxial transfer switch, switching combiner systems, absorption filters, super high-power TV diplexer, low-power dual-cavity TV diplexer, TV channel combiner, integrated switching combiner, FM diplexer combiners, high-power FM multiplexer, high-power waveguide filterplexers and diplexers, high-power combiners, waveguide switch, water load, power combiners, harmonic filters, loop couplers, dual FM antenna, dual transmitter phase detector/compensator, circularly polarized FM and VHF TV antennas, and TV or FM antenna.



One of the new products being introduced by Marti is the RPT-2 remote pickup transmitter



Marti will also be showing the RNC15/30 digital remote control

Micro Consultants, Inc. (1207)

Information not available at press time. Line includes the Quantel DPE 5000 Plus multiple-input digital production effects system and DLS 6000 digital library system, both premiered last year, plus digital synchronizers, TBCs, effects systems, and digital standards converters.

Micro Control Associates, Inc. (310)

Will introduce an updated version of the **remote control system** and a new **heterodyne aural STL.**

Microdyne Corp. (1317)

Will show its line of satellite terminal equipment, including the five-meter antenna, five-meter transportable antenna, seven-meter antenna, and 1100-TVR (X24) B receiver.

CONRAC

INNER VIEW:
A closer look at Conrac Monitors

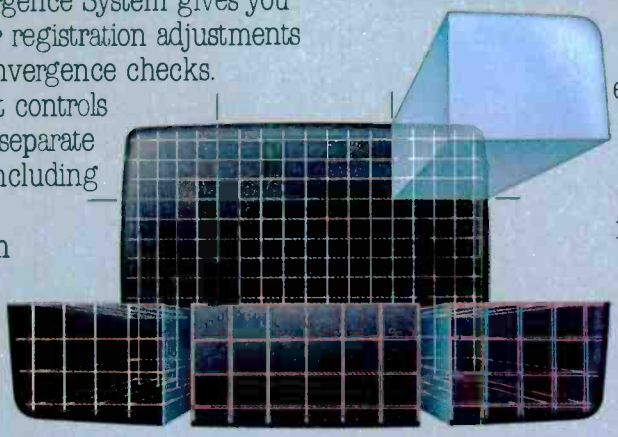
Active Convergence: Registration made simple.

Conrac's Active Convergence System gives you complete control over color registration adjustments and greatly streamlines convergence checks.

It uses 36 independent controls to individually adjust nine separate areas on the CRT screen – including corners!

You spend less time on convergence checks — and the adjustments you make will be much more accurate.

Conrac's system uses 24 operational amplifiers to independently control red, green, and blue in each screen area. Vertical and horizontal waveforms are referenced for shaping the signals that excite the convergence yoke assembly. Dynamic blue lateral convergence is achieved with operational amplifiers.



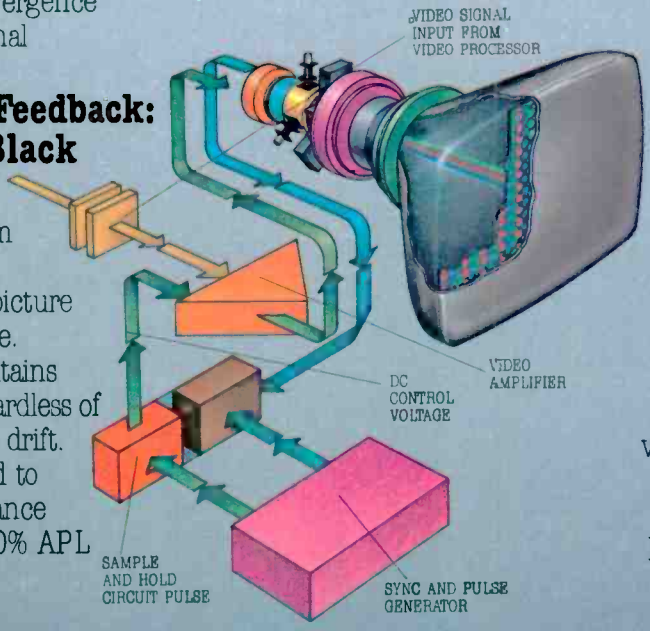
Conrac's Active Convergence system lets you adjust color registration on nine separate areas of the CRT.

Beam Current Feedback: The Ultimate in Black Level Stability.

Conrac's unique Beam Current Feedback system maintains a more stable picture for a longer period of time.

It automatically maintains black level stability — regardless of CRT aging or component drift. In fact, black level is held to within 1% of peak luminance level between 10% and 90% APL (Average Picture Level).

Conrac's exclusive Beam Current Feedback system automatically maintains black level stability.



Conrac's unique system uses a keyed back porch video amplifier and beam current sensing that occurs during the vertical interval. The video signal is ac coupled to the video amplifier, thus eliminating the dc component and retaining the level between black and white. It is then amplified and applied to G1 of the CRT. The feedback loop is completed when a sample cathode current (gated by the brightness pulse) is applied to a sample and hold circuit. If the cathode current changes for any reason, the video amplifier's dc level is automatically adjusted. Result: reference black level will remain constant.

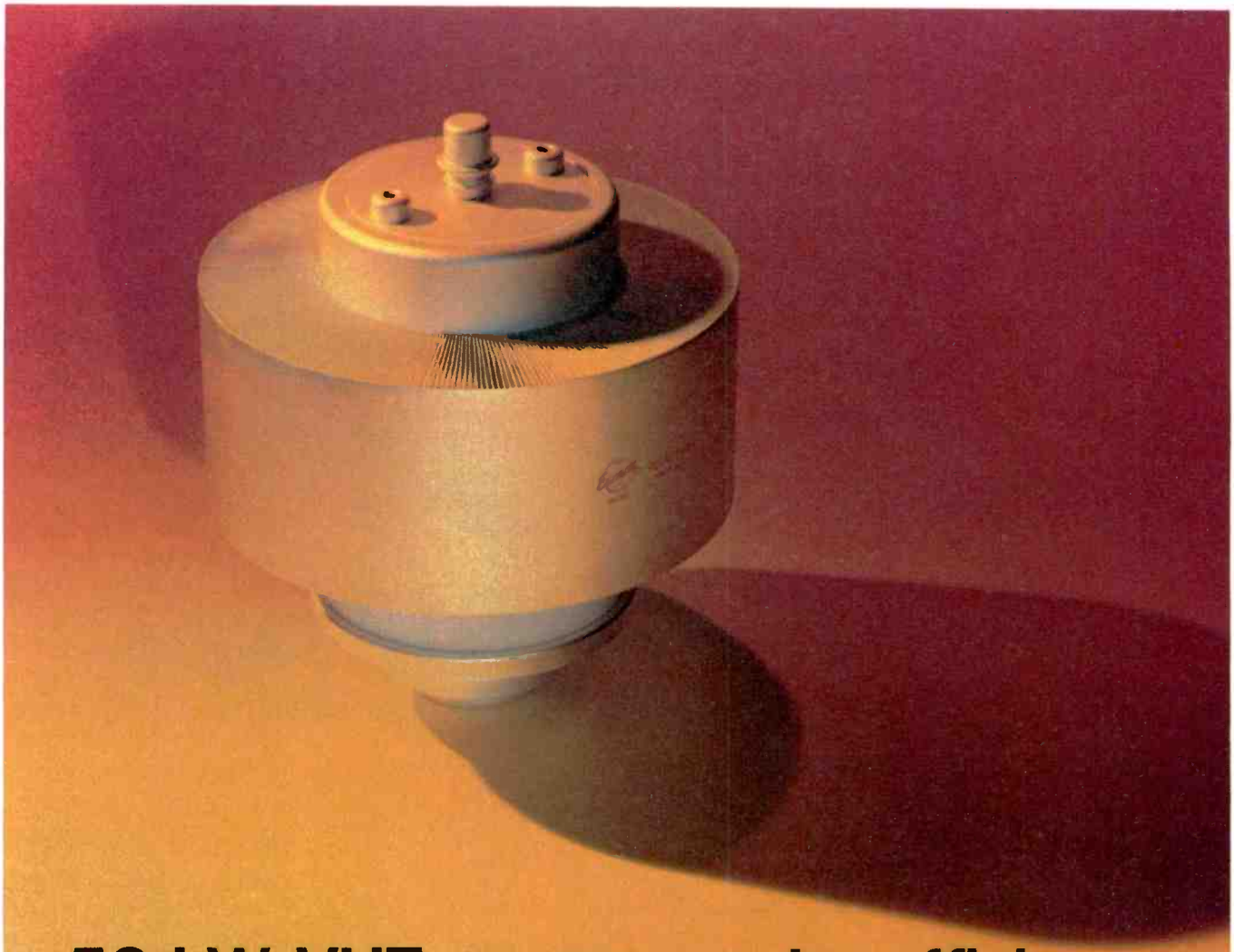
Conrac Technology: 30 years of leadership.

Conrac's track record of technical innovation stretches back nearly three decades. And what we've learned since then goes into every monitor we make today. That's important to you. Because the more technology we pack into each monitor, the more performance you'll receive from it. Active Convergence and Beam Current Feedback are just two ways Conrac technology can save you time and money. For the complete inner view of Conrac technology, call or write us today: Conrac Division, Conrac Corporation, 600 North Rimsdale Ave., Covina, CA 91722, Telephone: (213) 966-3511, Telex: 67-0437

Quality you can take for granted.

Circle 235 on Reader Service Card

See us at Booth No. 809 at NAB '81



50 kW VHF power, greater efficiency. 4CX40,000G tetrode and cavities from Eimac.

Eimac's new CV-2200 series of practical, low-cost cavities are available now. Combined with Eimac's 4CX40,000G VHF tetrode, this efficient, compact package is recommended for FM broadcast service, VHF-television, particle acceleration and VHF radar.

Generating a measured power output of 60 kW, the 4CX40,000G tetrode offers power gains of 20 dB up to 218 MHz. High stability is achieved with the pyrolytic graphite grid structure. And a highly efficient, economical and quiet anode cooling system is inherent in its design.

Eimac supplies cavity and tube to match your requirements. We back it up with know-how and application engineering information.

50 kW FM broadcast cavity CV-2200 with 4CX40,000G tetrode.

More information is available from Varian Eimac Division. Or the nearest Varian Electron Device Group sales office. Call or write today.

Electron Device Group
Eimac Division
301 Industrial Way
San Carlos, California 94070
415•592-1221,
ext. 218

varian

Circle 236 on Reader Service Card

Microprobe Electronics, Inc. (408)

Will show a new Model 100MP **programmer** with microprocessor control, available for 24 or 48 events. Also showing a new "Contract 3" **random select controller** for Carousels, Go-Carts, or Instacarts that can control three machines at one time.

Microtime, Inc. (1409)

Information on **new products** was not available at press time. The line of digital video and video processing equipment, including video synchronizers, digital TBCs, signal processors, image enhancers, and an automatic video programming system, will be at the show.

Micro-Trak Corp. (508)

Will introduce the M Series of **studio furniture units** and the 6411 stereo **phono preamplifier.** Also showing the complete studio furniture line, audio consoles, preamplifiers, audio distribution amplifiers, Ditty Desk, tape cartridge storage racks.

Microwave Associates Communications (1401)

Will introduce several new products in its ENG and satellite systems for broadcasters. A new generation of **helicopter ENG systems** will be on view, including mini-microwave transmitters, retractable mounts for helicopters, and advanced optical systems. New **portable and mini-portables** for the 2, 2.5, 7, 13, and 15 GHz bands will be at the show, as will new **satellite systems,** including HPA, uplink exciter, earth station antennas, and frequency-agile and single-frequency **receivers.** Also new will be computerized **monitoring and remote control systems** for ENG, satellite, and broadcast facilities, and new operator-controlled and automatic tracking **ENG antenna systems.**

Midwest Corp./Mobile Unit Group (1829)

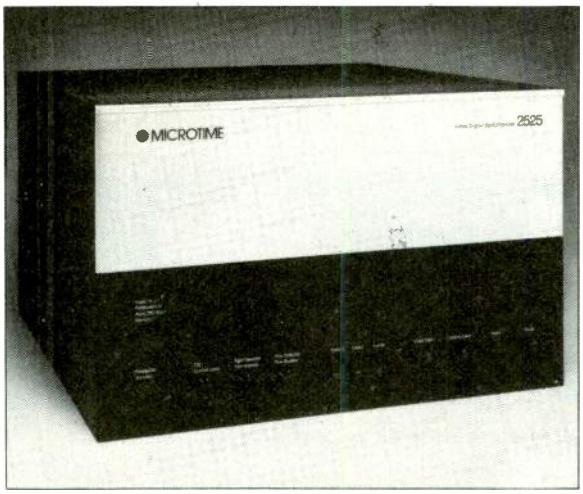
New units in the line of **mobile units** for television will include an ENG van and an EFP van.

Mole-Richardson Co. (1008)

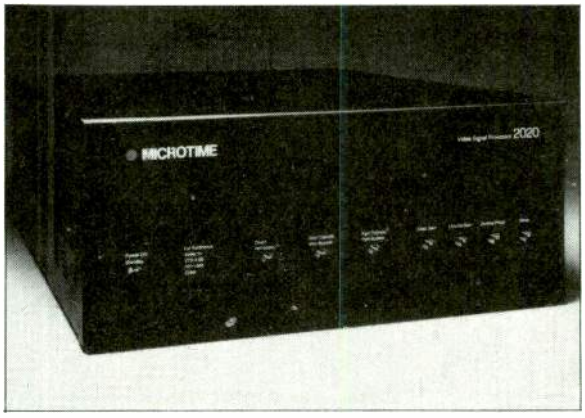
Will introduce a new 600 W Mole-Quartz Teenie Mole solar spot **fresnel** unit and The Mole Quartz Super **cyclight.** Will show a sampling of the regular line of lights, stands, and fixtures.

Keith Monks Audio USA (509S)

Showing for the first time at NAB a **record cleaning machine,** the line of **microphone stands,** the LS-18 powered **monitor loudspeaker,** a **producer's listening unit, turntable** with preamps.



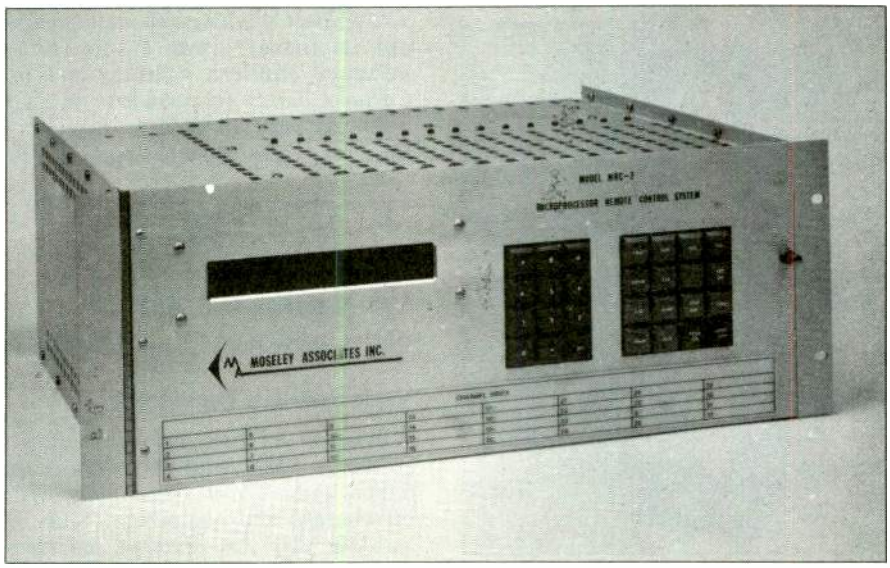
Along with new products, Microtime will show its 2525 synchronizer



Microtime also will be featuring the 2020 video signal processor

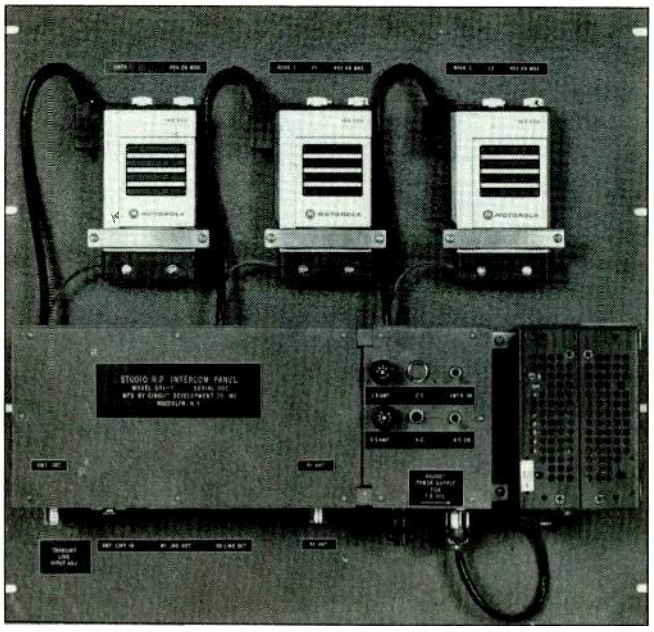
Moseley Associates, Inc. (505)

Will show the newest product in line, MRC-2 **microprocessor remote control system,** with fully automated supervisory control of remote transmitters and earth satellite stations, "smart" terminals at all sites, digital operation, up to 99 remote sites. Also showing other remote control and STL systems from complete line: MRC-1 microprocessor or remote control; TCS-2A microprocessor control; aural STLs; RPL-3 and RPL-4 outside broadcast links; telemetry return links; audio limiters and gain control systems; stereo and SCA generators and demodulators.



A new remote control system for earth station receivers will be featured by Moseley Associates

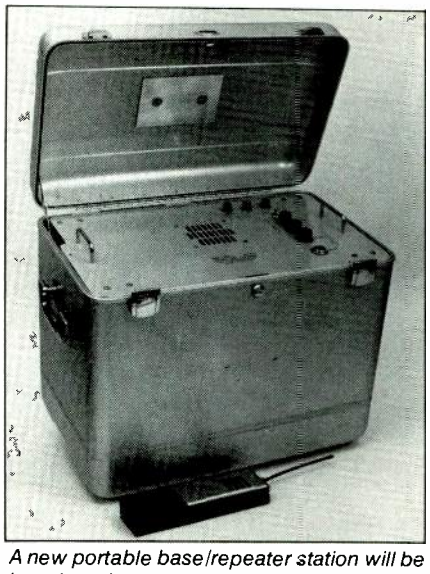
Motorola will introduce a number of accessories for its communications systems



A new panel for the MX series studio intercom system will be shown by Motorola

Motorola Communications and Electronics, Inc. (318)

Will show AM stereo equipment (unless FCC chooses a different system before show). Also showing portable and mobile communications systems, base stations for mobile systems.



A new portable base/repeater station will be introduced by Motorola

The Musicworks, Inc. (323)

Will show full information on syndicated radio programs for 24-hour service: *Alive Country* (with major-market personalities); *Country 80* (unannounced modern country music); *Casual Country* (announced and unannounced easy listening); *Pop Adult Lifestyle* (mass appeal, target 25–49).

N

NTI America, Inc. (600S)

Will show the line of signal generators.

Nady Systems, Inc. (1839)

Will show for first time the new 610 Series of **VHF mini-receivers,** compatible with all VHF transmitters in line of wireless mic equipment. Showing also the VHF 700 diversity receivers, the VHF 600 receivers, the VHF 800, 900 and hand-held mic transmitters, the Nady FM tunable line, the Pro 400 and 500 receivers.

Nagra Magnetic Recorders (510)

Will show its line of portable tape recorders, including the Model E, designed for radio remotes. Other Nagra products include hand-held mixers, lavaliere mics, and tape timers.

NAB program schedule on page 147

NEAL Ferrograph USA, Inc. (504S)

Will show its quarter-inch tape machines, SP-74R logging system, two-, three-, and four-channel cassette machines, and test equipment, including recorder test set.

NEAS (220S)

Will show its automation systems for traffic, sales, master control, and business (accounting and invoicing).

NEC America, Inc., Broadcast Equipment Div. (1301)

New products will be announced in Las Vegas. Other products to be shown will include the DME digital mix effects system, TT-7000 Type C VTR, FS-16 frame synchronizer, FM transmitters, TAKS-1000 production switcher, TKA-105 routing switcher, digital strobe action "Actiontrak," stereo television exciter, AVDL, TAP-170 proc amp and other terminal equipment, and a CCD camera.

S. David Ness Studios (1471)

No information available at press time.

Network (1615)

Will describe its music library program formats with new monthly releases.

Rupert Neve, Inc. (1203)

Will exhibit for the first time at the NAB the Necam II **automation system** for use with 5000 series of audio consoles. Will also have the 542 series of portable and transportable console units; the 5316 eight-bus stereo TV production console complete with Necam II automation; the 5315 four-bus stereo TV production console.

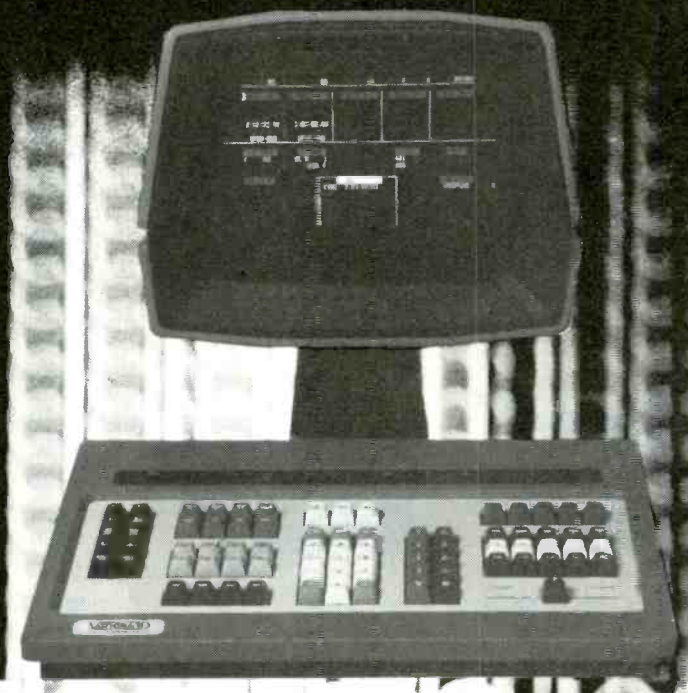
Newscan/McInnis-Skinner & Assoc. (720)

New to the line of broadcast news automation systems will be the **Weathergraphics**™ system for broadcast television, featuring high-resolution display, large color selec-

The Trend Setter

When It Comes To Professional Editing, VANGUARD Creatively Does It All

- Controls 5 VTRs plus switcher and DVE
- Performs A/B rolls and A/B/C/D sync'd rolls
- NTSC/PAL/SMPT/EBU code or control track operation, insert or assembly
- Interfaces for over 40 types of tape decks and film chains
- Dual VaraScan ™ variable speed tape search controls
- 999 event edit list memory
- Uncomplicated, powerful edit list management
- Auto-assembly from up to 4 sources



- Paper tape or floppy disk edit list I/O in industry-standard formats
- Five-tier time code scratch-pad memory
- Built-in scratchpad time code calculator performs mixed drop/non-drop frame addition and subtraction
- Edit and split times can be marked on-the-fly or key-board-entered
- Auto-tag, with override
- Well organized editing status display on eye-soothing green CRT screen; dedi-cated function, color-coded keyboard
- Selectable preroll, postroll and reaction time

datatron, inc.

Vanguard leads the way in giving creative editing pro-fessionals innovative new editing system features that add new dimensions to the editing craft. Latest in a long list of Datatron firsts is SmartScan ™ learn mode variable motion editing. This feature opens the door to a dazzling array of slow-mo, high-speed and freeze-frame edit effects. SmartScan lets you speed the action up, slow it down, freeze it or change directions, all with a single slide con-trol; every move you make is memorized by the Vanguard system, faithfully repeated in your next edit, and reflected in the edit decision list. Pe-form freeze-frame edits automatically, with or without subsequent learned motion; compress or expand edit segments to fill time slots — automatically; select exact, cal brated play speeds for your VTRs over their ful speed range. All this and more can be accomplished quickly and easily with Vanguard's SmartScar feature. There simply isn't another editing system you can buy that comes close to Vanguard's capabilities. BE A TREND SETTER; GET A VANGUARD

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datatron, inc.

MAKING CREATIVE EDITING AFFORDABLE

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tion, automatic display of NWS/FAA weather data, operator input via keyboard and graphic tablet, and telephone access to Weatherscan International data base. Also on view will be the Newscan™ family of newsroom computer systems.

Nortronics/Recorder Care Div. (401)

Will introduce a new "Proformer" Series of professional **tape recorder maintenance products,** for broadcasters, recording studios, etc. Showing the established line of maintenance equipment and accessories. Full information on magnetic head replacements for all machines.

The Nady 610 series of mini-VHF receivers will be premiered at NAB along with the other NADY audio products

Fred A. Nudd Corp. (178S)

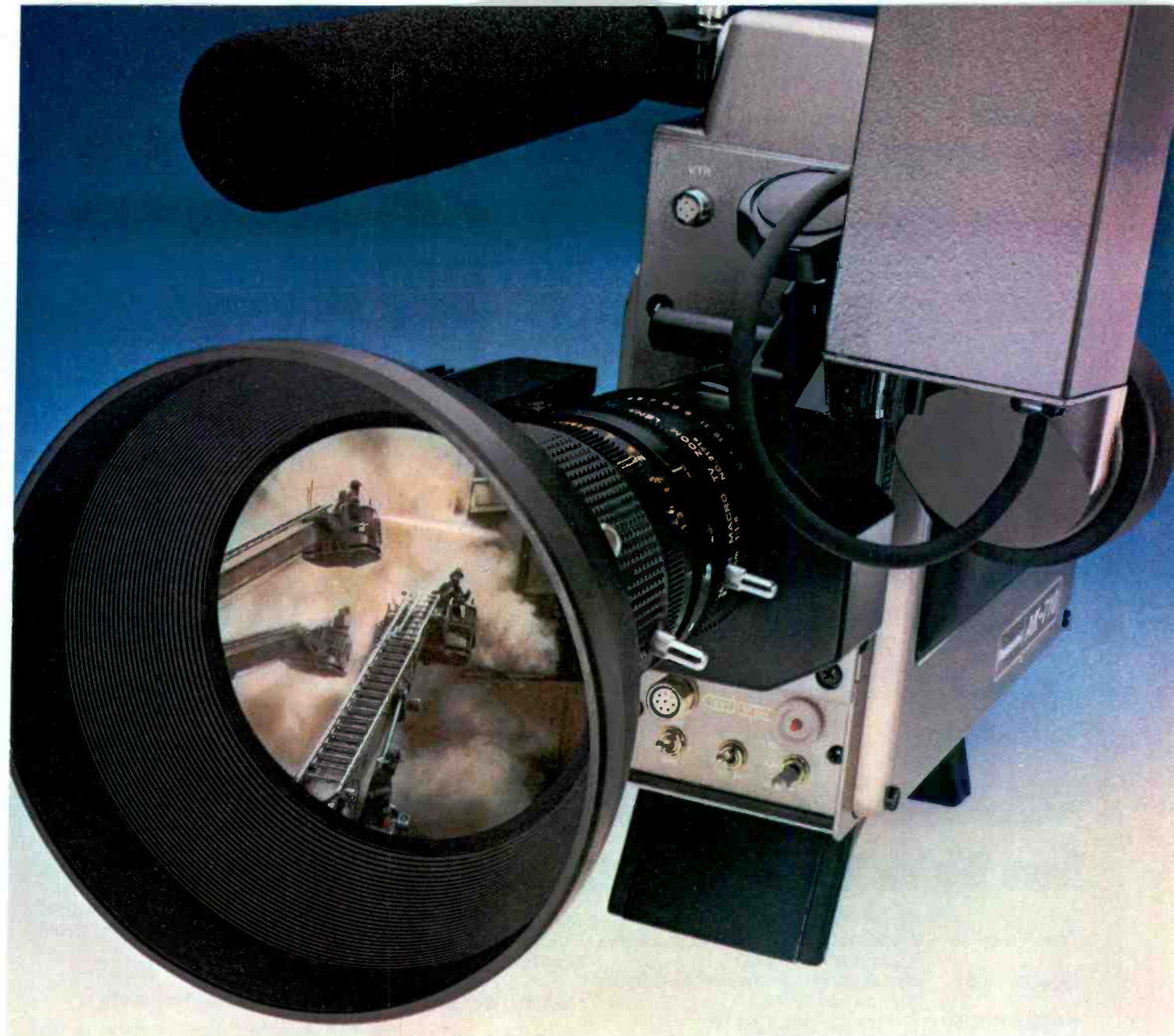
Will show the line of self-supporting towers, including models of monopoles with actual miniature antennas on top. Will have information and pictures of many completed tower projects to show diversity.

Nurad, Inc. (198, 199)

New products this year will include the **Mini Pod™, Auto Transmit™, Goldenrod™** D-Series, and the 20PA15 **power amplifier** for ENG/EJ operations. Other products on display will include the dual-band Superquad™ II receive antenna system, a single-band Superquad II with radome, the Supertrack™ receive antenna systems for airborne ENG/EJ operations, MC3 digital remote control systems, the 70 OR1 Mini-SQ™ with 70 PA5 power amp for 7 GHz operations, the original Goldenrod™ series of transmit antennas, Quad receive antenna systems, and associated ENG/EJ system components.

Nytone Electronics Corp. (1702)

Will display its flying spot scanner systems with broadcast-quality color slide reproduction, 80-slide capacity, self-contained, standalone operation, and random access capability.



The big news is performance. The good news is price.

Once again Panasonic makes headlines with our newest ENG camera, the AK-710. And the reasons are simple: High performance Saticon® tubes plus prism optics—all for a newsworthy price of $10,950*

The AK-710's compact size, light weight and durable die-cast chassis make it a natural for electronic newsgathering. While the performance of a high-index optical system with built-in bias light and three Saticon tubes makes it a natural for news broadcasting: Performance like horizontal resolution of 500 lines center, a S/N ratio of 52 dB and standard illumination of 200 footcandles at f/3.5. And for even more light-gathering capabilities, there's a 2-position high-gain switch.

You'll also get colors as intense as the action, thanks to the AK-710's automatic white balance circuit and built-in color temperature conversion filter wheel. And for minimal comet tailing, the AK-710's feedback beam control stabilizes highlights that exceed normal white levels without reducing dynamic range or resolution.

Equally newsworthy is the AK-710's built-in genlock and adjustable horizontal and vertical blanking intervals. With them the AK-710 can double as a system camera. There's also an optional remote control unit, as well as a 5" CRT viewfinder for studio use.

So if news is what you're after, go after it with the AK-710. A newsmaking camera from Panasonic.

For more information about the line of Panasonic broadcast equipment, call your nearest Panasonic office.

Northeast —(201)348-7620
Southeast —(404)923-9700
Midwest —(312)364-7936
Southwest —(214)258-6400
West Coast—(213)655-1111

*Manufacturer's sugg. price. (Lens not included.)
Saticon is a registered trademark of NHK (Japan Broadcasting Corp.)

Panasonic
VIDEO SYSTEMS DIVISION

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O

Oak Communications, Inc. (1517)

Will show for first time the "Sigma" addressable **encode-decode system** for subscription television, for scrambling video and audio signals, and the "Orion" system for similar encryption of satellite signals, with addressable decode units.

O'Connor Creative Services (115)

Will show the extensive line of short-time radio syndication programs covering a wide range of information and entertainment subjects.

O'Connor Engineering Labs (1122)

Information not available at press time. Line includes high-quality wood tripods, introduced last year, plus a full range of fluid heads and camera supports for all sizes and weights of cameras and the Hydro-ped hydraulic pedestal.

Oki Electric Overseas Corp. (1801)

Will feature its LT 1200 TV standards converter and 12 GHz receiver-only satellite earth terminal.

Oktel Corp. (1715)

Will feature the BDR 400, BDR 300, and DM 3000 series videodisc recorders.

NAB program schedule on page 147

Olesen (1411)

Will bring its line of television lighting equipment, TV studio layouts, dimming and distribution equipment, track rigging for cycloramas and cyc screens, studio fabrics and lighting grids, and studio flooring.

Optek (1725)

Will introduce a small **speaker box** with built-in amp; high-power **rack-mount amps** in 25 W and 50 W versions; a **cueing system for remote ENG** that tunes in the aural channel and separates subcarrier; and a **subcarrier paging radio** for remote ENG viewing. The Model 8000 automatic **bulk tape degausser,** seen in prototype last year, will be on view in a production model with several changes.

Orban Associates, Inc. (411)

Will have live demonstrations of the Optimod AM, Optimod FM, equalizers (graphic and parametric), de-essers, stereo synthesizers, compressor/limiters, spring reverbs.

Exhibit hours: Sunday, Monday, Wednesday, 9 a.m.–5 p.m.; Tuesday, 9 a.m.–8 p.m.

Allen Osborne Associates (206S)

New to NAB will be the NX series of **pneumatic telescopic masts** from Hilomast Ltd. of England. Also on view will be the line of pneumatic antenna masts designed especially for mobile vehicles.

Osram Sales Corp. (301S)

Will display its line of HMI lamps, including HMI xenon lamps, tungsten-halogen lamps, and a special incandescent model.

Beyond ENG

Born into ENG, the HL-79A adapts beautifully to EFP. The accepted leader in ENG, the HL-79A, reinforced its position as the preeminent portable camera at the 1980 Winter Olympics. Scores of HL-79A's covered the ski slopes, the bobsled and luge runs and the skating rinks for the ABC Network. Their performance brilliantly etched into the world's visual memory, is history. But the industry already knows about the HL-79A's capability.

Today, more and more broadcasters are learning that the HL-79A is a superior EFP color camera. Options such as 4½-inch electronic viewfinder with return video, program and intercom audio plus genlock — among other features — transform it into the ideal camera for sports and special events, commercials and high quality production. Triax equipped, it ranges nearly a mile from its base station. Near-darkness is its frequent habitat; but it has knee control for brilliantly lit scenes too.

Of course, you may need some of its ENG flexibility for EFP too —like its shoulder action shape, 11.2 pound weight, 6-hour clip-on battery.

The specs and automatic features of the HL-79A are equally outstanding. They're yours, along with an eye-opening demonstration, at your Ikegami distributor. Or contact Ikegami Electronics (USA) Inc., 37 Brook Avenue, Maywood, N.J. 07607, (201) 368-9171. West Coast: 19164 Van Ness Ave., Torrance, CA 90501 (213) 328-2814; Southwest: 330 North Belt East, Suite 228, Houston, TX 77060 (713) 445-0100; Southeast: 552 So. Lee St., Americus, GA 31709 (912) 924-0061.

Ikegami HL-79A

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Visit us at Booth #817 at NAB

Scotch® is a registered trademark of 3M

For the second year in a row, Scotch® 479 won the award for the best picture of the year in a test of one-inch video tapes.

We scored well in all of the twelve categories tested, but especially well in the categories that commonly represent picture quality: color dropouts, high frequency dropouts, chroma noise, signal-to-noise ratio and stop motion.

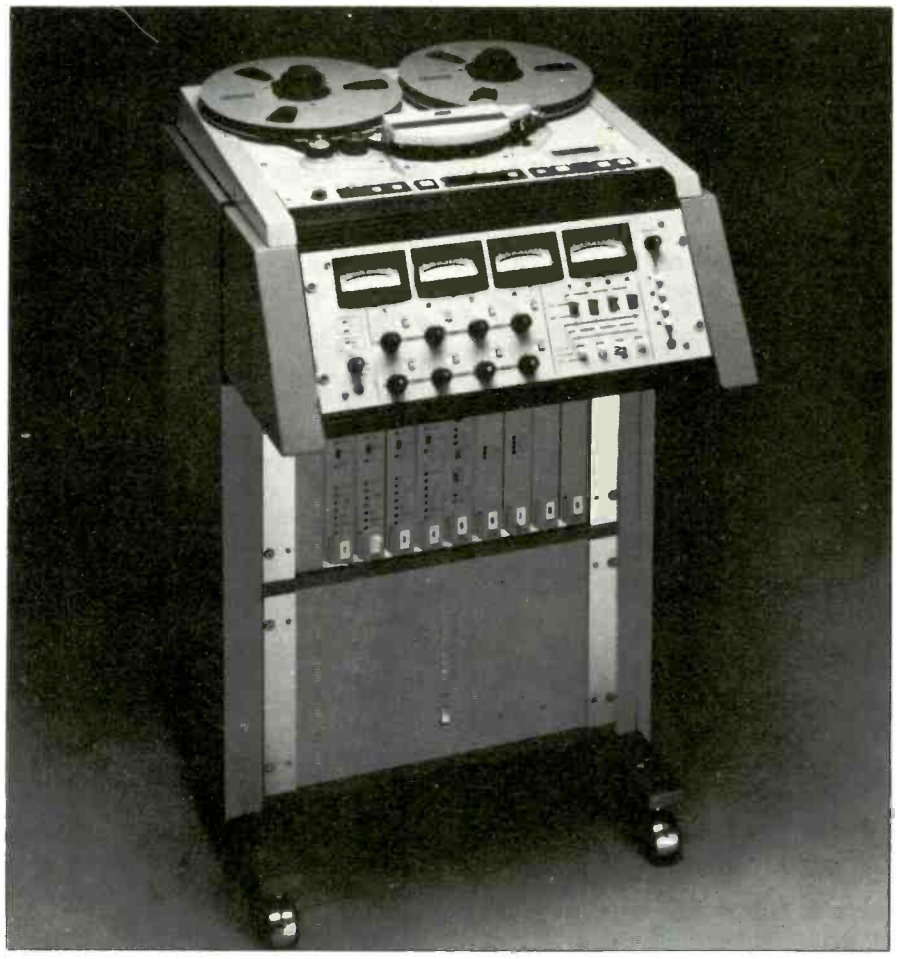
These were scientific, quantitative tests, conducted as you would conduct them yourself, with no room for brand bias. The meters didn't play favorites. The standards were the same for every brand tested. And we tested every brand.

These kinds of test results don't surprise us. We pioneered the invention of video tape. And we've been setting the standard for quality ever since.

Our quality has always been consistent from the first replay to the last. In fact, our sophisticated binder and oxide coating are more advanced than the binders and oxides on some quad tapes. They had to be advanced to meet the special durability demands of one-inch video production.

So choose Scotch 479 for your one-inch video production. You'll find it looks good from repeated mastering all the way through post production. And we've seen the test results to prove it.

3M



Otari will introduce a new four-channel half-inch mastering recorder, the MTR-10-4

Otari will also introduce a new quarter-inch four-channel recorder, the Model 5050BQ Series II

Otari Corp. (503)

Will have for the first time at the NAB the MTR-10-2 two-channel, and MTR-10-4 four-channel **production/mastering tape recorders** using quarter-inch tape, with the MTR-10-4 convertible to half-inch tape. Both have dc PLL servo tape transports governed by microprocessor control systems. Will also show the line of other tape machines, including the 5050 MkII series, MTR-90 multitrack, ARS-1000 automation playback, and others.

Otis Conner Productions, Inc. (182)

Will introduce new radio **ID/promo packages,** including *Certified Country, Come Home To XXXX, Close To You, We Play Your Song, Let's Make Music Together*, and others. Will also bring new TV **promo packages,** including *Just Look At Us*. Will also have the line of format syndications.

P

Pace Inc. (1028)

Will introduce the Micro, a new field-portable **circuit board repair system** for removing and replacing circuit board components. Other circuit board repair equipment will be displayed.

Pacific Recorders and Engineering, Inc. (511)

Will display Tomcat cart recorder/players; BMX audio consoles; audio distribution amplifiers, routing switchers and systems; control room and studio cabinetry.

Panasonic Co. Video Div. (1521)

Will announce **new products** at the convention; details were not avilable at press time. Panasonic's regular line of ENG cameras, ¾-inch SMPTE and programmable editors, VCRs, and monitors will also be on display.

Panasonic Professional Audio Div. (600)

Will bring the new Technics R&B RS-10A02 **tape recorder,** the Technics R&B SV-P100 **digital tape recorder,** the Ramsa WR8210 10 by 4 **recording mixer,** and the Ramsa WM8100 push-pull back **electret microphone.** Also showing the line of Technics turntables, speakers, Ramsa mics, mixers, amplifiers.

Parsons Mfg. Corp. (406S)

Will show its line of wheeled cases for shipping and carrying portable production equipment.

Patrick Computer Systems (171)

Will introduce the IC 686 **computer** that incorporates business, word processing, traffic, and billing functions. Also on view will be the IC 486 model computer. Both will be demonstrated with software written especially for the broadcast industry.

PEP, Inc. (1006)

Will display its lighting equipment and fixtures. No further information available at press time.

Perrot Engineering Labs, Inc. (1023)

On display from the line of battery packs and chargers will be silver-zinc, Ni-cad, and lead acid battery packs for cameras, VTRs, portable lighting, video analyzers, video monitors, and microwave equipment. Also on hand will be batteries for portable communications equipment, the Minicharger series for battery packs, and the Equalizer, Nicadomatic Analyzer, and Microprocessor Evaluator specialized test equipment.

Peters Productions, Inc. (305S)

Will demonstrate both in booth and in hospitality suite a new Country **adult contemporary format,** *All Star Country,* designed for the 18 to 40 demographic. Also demonstrating several other full-format syndications and the "Total Image concept" promotion and sales campaigns for radio and TV stations.

NAB program schedule on page 147

Phelps Dodge Communications Co. (112)

Showing the line of FM antennas, coaxial transmission line and components, harmonic filters, directional couplers.

Philips Broadcast Equipment Corp. (807)

Will unveil the LDK-14S **camera** (latest version of the LDK-14) for EFP, studio, and ENG. Also new will be a 20-foot **mobile van** "production studio on wheels" with complete three-camera production system. Other products will include the LDK-25B multiconductor studio/field camera, the LDK-5B triax studio/field camera, the LDK-65 film camera chain, the PVR-2 one-inch console VTR and PRV-20 one-inch portable VTR, UHF/VHF broadcast transmitters, LDM-3001 digital noise reducer, plus test and measuring equipment, sync and pattern generators, VITS analyzer and generator, modulators, demodulators, and oscilloscopes.

The Phoebus Corp. (521S)

Will introduce a new follow spot **arc lamp** called the Ultra-Arc.

Porta-Pattern, Telecommunications Industries Ltd. (1325)

Will introduce a full-field **color bar chart,** application-matched subjective **color reference system,** and a **multiple chart storage case.** Also on hand will be the range of test charts, chart systems, slides, films, transparencies, transparency illuminators, high-resolution optical test media, and ENG/EFP illumination accessories.

Potomac Instruments, Inc. (109)

Will have for first time at NAB a low-distortion, frequency-synthesized **AM monitor receiver** and a directional antenna parameter **processor and logger.** Also showing the line of antenna monitors, audio test equipment, wow and flutter meter, field strength meters, ATS, and others.

Power-Optics, Inc. (1017A)

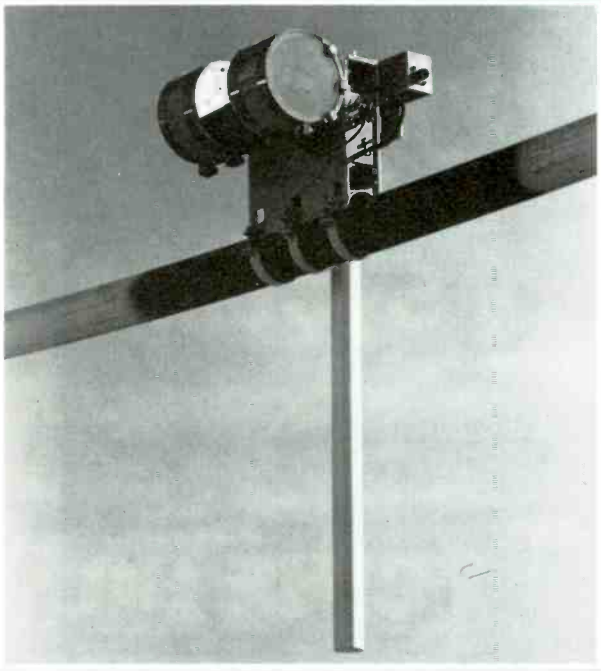
Highlighting its theme of "new concepts in remote control systems for studios and legislative use," will feature its remote camera systems and Grafikon monitor calibration equipment.

TAYBURN DOES IT AGAIN!

SEE OUR NEW "FREQUENCY AGILE" TRANSMITTERS AND RECEIVERS AT NAB BOOTH #1708

Introducing the TBT-50 miniature, portable, 7 GHz electronic News Gathering Microwave Transmitter— camera mounted, tripod mounted, helicopter mounted, or hand held teammate to our popular 2 GHz model.

Tayburn was first in bringing space age technology to the broadcast industry with an automatic tracking antenna system for helicopter ENG.



Helicopter Antenna Systems 2 GHz, 7 GHz Availability Retractable Omni, Switchable Horns

Tayburn was first to introduce a 26 db gain steerable antenna system remotely controlled by digital modems.

TBA-600A Autotracker 2 GHz, 7 GHz Availability Continuous Rotation Low Wind Load, 100 lbs.

Now . . . the smallest, lightest most versatile portable transmitters and receivers available, brought to you by the leader in state of the art ENG microwave.

Tayburn Electronics

6106 Ave. Encinas Carlsbad, CA 92008

(714) 438-5444 TWX 910 322 1986

Circle 244 on Reader Service Card

Procart (315)

Will show the new Procart **broadcast carts** for AM/FM and FM stereo, with new XT Polymec plastic case.

Protech Audio Corp. (123)

Introducing a new Model 725/ATS **tone sensor** for automation systems and an improved Integra Three line of **PC mic, booster and line amplifiers;** also introducing the PL-AMP **intercom,** single and dual-channel. Showing major items from the line of audio amplifying and processing equipment.

Exhibit hours: Sunday, Monday, Wednesday, 9 a.m.–5 p.m.; Tuesday, 9 a.m.–8 p.m.

Q

QEI Corp. (417)

Will show the Model 691 combined FM monitor and spectrum analyzer; the line of low-power FM transmitters at 150, 300, and 500 W output, all solid state; the FM exciter; SCA generator; and the complete ATS.

QSI Systems, Inc. (1603)

Will make several product introductions, including the CB7000 series of **color bar generators** with video source identification; the CB9300-9400 series of **color bar generators** with video source identification and single-line vertical interval piggyback source identification; a six by one utility **video distribution amplifier** with front-panel control for gain and equalization; VSID-81, new **video source identification boards;** VT-10 10-second seven-segment **countdown timer;** NVS numerical **video slate; master clock systems** with synchronous video; **multiple displays;** and **time and temperature video display** over radar. Will also bring its line of single-line vertical interval source identification encoders and decoders, time date generators, off-air 24-hour audio/video loggers, count-up timers, frame/field counters, and video source identification with audio follow-through.

Q-TV (907)

Will unveil the **Mini Q-Prompter** for on-location use — lightweight, portable, and compact. Will also display the line of VideoPrompTer cueing equipment.

NAB program schedule on page 147

Quad Eight Electronics (300S)

Will introduce a new modular **broadcast console** with expandable frame using "bucket" units that bolt together, each bucket holding four modules. Available from eight-in two-out to 24-in four-out. Also showing the firm's new System 5 **digital audio processor and reverb unit** with high-speed processing, 103 dB dynamic range, and about 96,000 different settings. It has provision for remote operation and can be set over normal trunk from any room in studio. Will also introduce the Model 24 **automated console,** 32 mixing channels, with floppy disc editing unit, mini edit panel with CRT readout, and SMPTE interface to videotape recorders; it will be demonstrated in a video "sweetening session" in the booth.

Quick-Set (1012)

Will feature its complete line of tripods, dollies, heads, and other support

Profit from the big picture... affordable, airborne ENG

The Hughes Helicopters 300C makes airborne Electronic Newsgathering affordable for most stations and marketplaces. The newest addition to the ENG field combines the Ahead of TIME technology of the Hughes 300C and microelectronics to produce the most economical airborne ENG system available.

The 300C's lightweight, durable design has proven its reliability in the toughest applications. All components are engineered for minimum maintenance and low operating costs. With a low initial investment the 300C provides stations with outstanding ENG capabilities. It provides a low vibration platform for better pictures. Its small size, maneuverability and wrap around cockpit design allows you to follow all the action.

When equipped, with an I.M. Systems installed, GHZ-12 watt miniature portable transmitter, the 300C is the most cost effective newsgathering helicopter ever developed with the capability for live or tape delay coverage and ground-air-ground relay.

To obtain the complete picture on the Hughes 300C-ENG and a free demonstration, contact: North American Sales, Centinela & Teale Streets, Culver City, California 90230, USA, or call (213) 305-3054.

Hughes Helicopters
Ahead of TIME Technology

Circle 246 on Reader Service Card

You wanted precision video level control of multiple, random sources! Now you've got it! The Microtime 2525 SP system.

Only the Microtime 2525 SP insures precision alignment and solid stability of all proc amp controls for up to eight nonsynchronous video sources. When used in conjunction with the popular Microtime 2525 Video Signal Synchronizer, the programmable SP system can guarantee virtually perfect alignment of hue, set up, video and chroma gain for any video source. These sources are fed directly through the Microtime 2525 where they are time based corrected and synchronized.

Programmable features include:

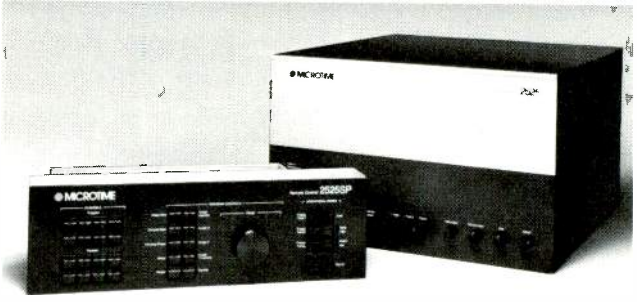
- Complete processing amplifier for 8 independent video signals
- Time base correction or synchronization of any one of 8 signals with automatic optional mode selection
- Full control of image enhancement and noise reduction with the 2121 SP Video Image Processor option.

The 2525 SP also includes operator cues such as video confidence indicators human engineered to minimize inadvertent switching to idle channels. A digital control port is provided to interface the system with existing broadcast computers for station automation application. In addition the light weight Engineering and Director's Control Panels may be located up to 1000 feet from the equipment area to permit installation in major broadcast system complexes.

The Microtime 2525 SP System and the companion 2121 SP provide significant cost savings over conventional processing equipment and conserve valuable rack space in tight operating conditions.

The 2525 SP—another intelligent application of framestore technology—from Microtime, a world leader in video processing technology.

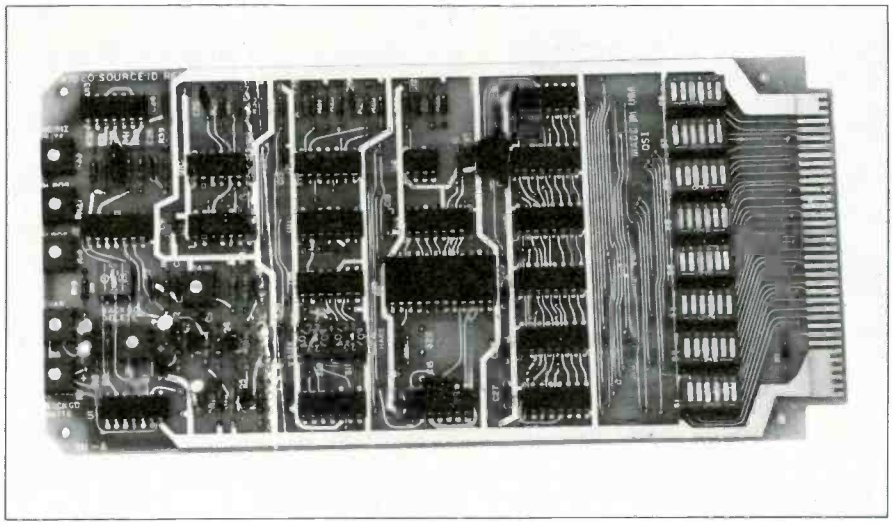
For more information about the 2525 SP System or Microtime's wide range of broadcast products, contact your Microtime distributor or get in touch with us directly.



MICROTIME

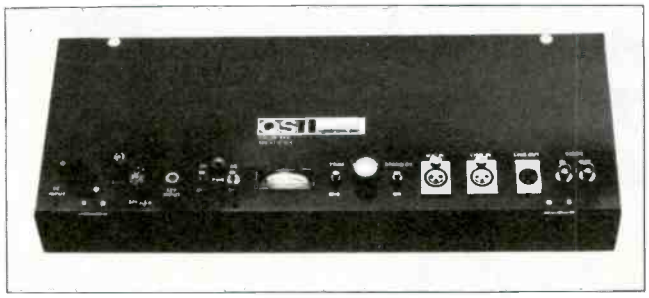
MICROTIME, INC., 1280 Blue Hills Avenue, Bloomfield, CT 06002 • (203) 242-4242 • TWX 710-425-1165
MICROTIME INTERNATIONAL, INC., Rokin 9-15, Amsterdam, Netherlands 1012 KK • 020-23.07.34 • Telex 16354 MI NL

See us at the NAB, Booth 1409 Circle 247 on Reader Service Card



Solid state circuit boards are one of the keys to the flexibility of QSI products

The CB7200 color bar generator is another QSI product being introduced



QSI Systems' color bar identifier is one of the new products being introduced at this year's show

equipment for both studio and ENG/EFP application.

Quintek, Inc. (1959)

Will introduce the Audio Kinetics Q-Lock 310 **synchronizer** for controlling up to three video/audio tape transports, with full auto locate and multi-standard SMPTE built in; the Advanced Music Systems **digital reverb unit** with memory for nine preset reverb programs; and the Advanced Music disc mastering **digital preview delay** with 16-bit linear encoding and 96 dB dynamic range. Also will show other Audio Kinetics and Advanced Music synchronizing and audio processing systems and Court Acoustics equalizers.

Quintek will introduce the Audio Kinetics Q-Lock 310 synchronizer, which will control three audio/visual tape transports

R

RCA American Communications (700)

Will describe its satellite distribution services for television broadcasters.

RCA Broadcast Systems (700)

Will introduce the new high-power model of the TT-6 Series **VHF transmitters;** other **new products** will be shown in the booth. From the line, will show TR-800 one-inch VTRs, TH-200A recorder, TH-50 portable recorder, TCR-100 video cart machine, RTA-5SS all solid state 5 kW AM transmitter, TK-29C telecine, TK-47 automatic camera, TK-86 portable camera, TK-780 studio/field triax production camera, and a circularly polarized antenna.

NAB program schedule on page 147

RCA Solid State (700)

Will have new Saticon tubes with improved photo conductors aimed at handling specular highlights well. From the line, will show FM and AM power

VICTOR DUNCAN VIDEO

check and double check

For more than 20 years, the Victor Duncan 'check and double check' symbol has assured producers that the equipment they needed was as clean and mechanically perfect as skilled technicians could make it. Every camera package, each light, even the smallest piece of production gear has been carefully *checked*, not once — but twice; before it ever leaves our office.

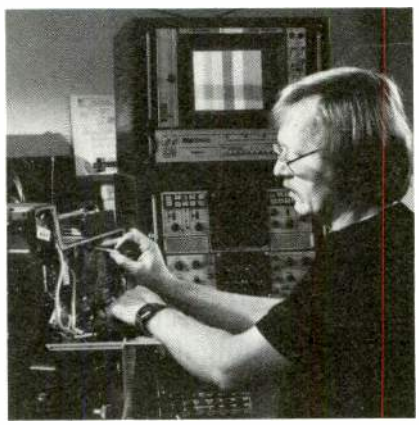
The Standard for Electronic Production Equipment

This attention to detail begins with a comprehensive physical inspection. Each mechanical function of our video cameras is carefully checked. Housing screws are tightened, lens functions are verified. The camera is mechanically and electrically registered. The white and black balance is adjusted. Colorimetry is *double checked*. The signal to noise level is carefully monitored.

Each Video recorder is also subjected to the same physical inspections, including the signal to noise levels. The interchange of tapes from deck to deck is carefully checked.

And then a second *check* is made of the complete system as a unit; camera, recorder, switchers and accessories. These same careful steps are used on each piece of equipment ordered. Switchers, monitors, CCU's, all are put through the same detailed electronic tests before they ever leave our department.

These *double check* procedures insure flawless performance in the field, and guard against costly production tie-ups. "Check and double check" at Victor Duncan Video.



Rentals, Sales & Service

VICTOR DUNCAN, INC.

Film & Video Production Equipment

CHICAGO
661 N. LaSalle, Chicago, IL 60610 (312) 943-7300
DALLAS
2659 Fondren, Dallas, TX 75206 (214) 369-1165
DETROIT
32380 Howard, Madison Hgts., MI 48071 (313) 589-1900

Circle 250 on Reader Service Card

tubes up to 55 kW, TV power tubes, and camera tubes.

R.F. Technology, Inc. (1624)

Introducing a new **microwave transmitter,** 12 W at 2 GHz, using 12, 28 V dc or 120/240 ac, frequency-agile, dual audio subcarriers, local or remote control. Also introducing new 7 GHz and 13 GHz **fixed microwave systems;** a new hand-held **wireless microphone system** in the 950 MHz band; and the QA-6 steerable on-camera **automatic ENG antenna.** Showing other microwave systems for ENG and intercity service.

Research Technology will show its CineScan™ high-speed film preview with Quik Trac speech processor

R-Columbia Products Co., Inc. (1703)

Will bring new **wireless intercom headphones,** with base stations that allow interface with existing hard-wired systems: model TR-50 headphone; model T-5012B base station; model R-50/2B base station. Also will show other units in line of intercom headphones and microphones.

Radio Computing Services (184S)

Will introduce the new "Selector," a **computerized system for choosing music titles** compatible with chosen policies and guides. Will also introduce the "Sampler," a **music title survey system; traffic and accounting systems;** and the "News Machine," offering **computer storage of news items** from many sources for instant recall and editing.

Radio Programming/Management (RPM) (333)

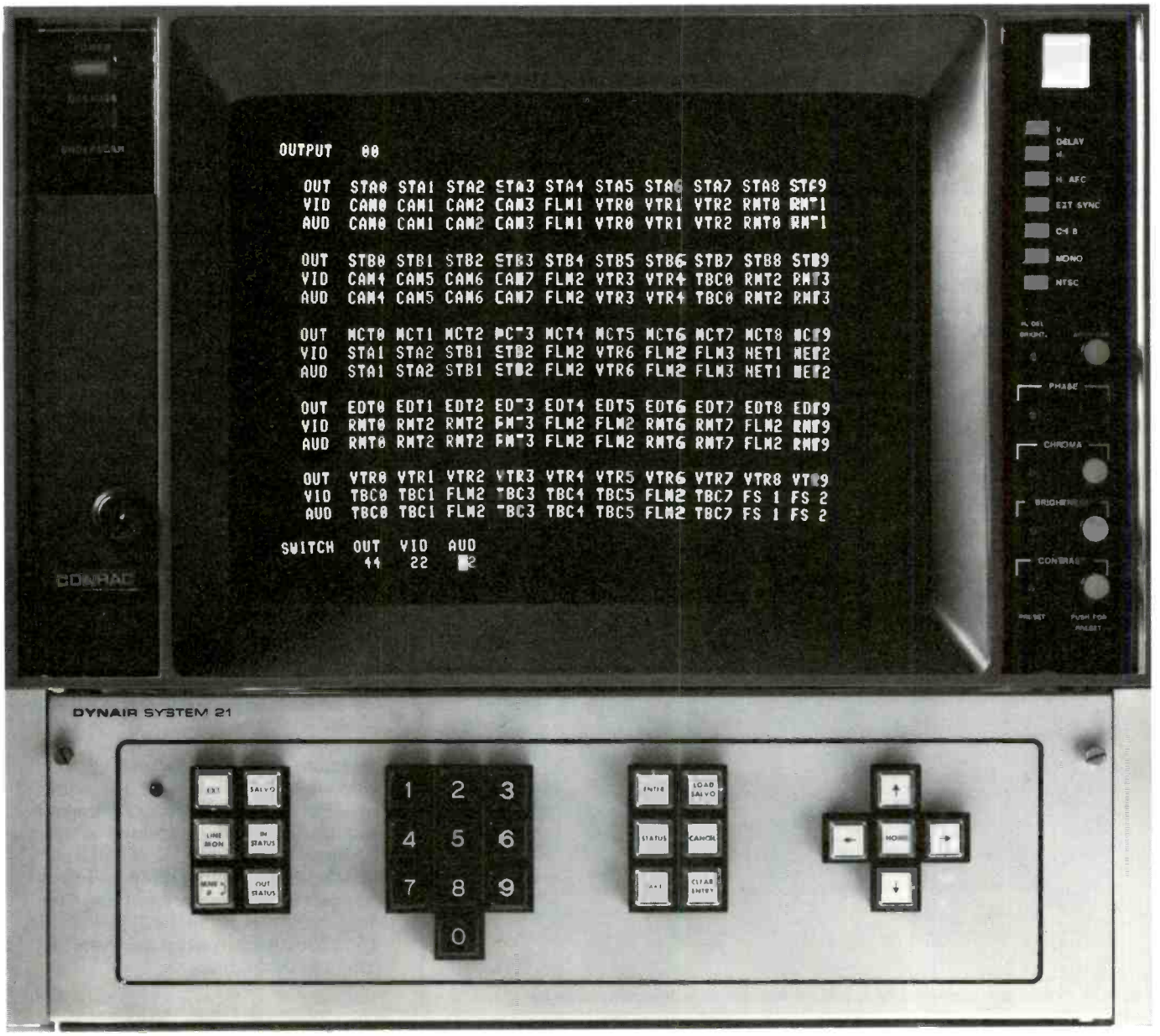
Will introduce a new **syndicated format,** *Country One,* assembled by Dan Dixon of station WCXI, Detroit. Also showing the line of formats, including Classical Beautiful Music, Contemporary Beautiful Music, and Progressive MOR. Formats will be demonstrated in the booth and in a hospitality suite.

Radio-Television News Directors Association (150)

Will highlight group's ongoing fight to protect freedom of information in the broadcast industry.

Ramko Research, Inc. (146)

Showing the Phase Master cart system; the line of audio consoles; the audio router; audio distribution amplifiers; turntable preamps; mic, line, and monitor amps; Technics turntables and reel-to-reel tape decks.



What's up?

Plenty! CRT distribution switcher status monitors are not new, but DYNAIR's SCA-250B is in a class by itself. It makes the System 21 tell all.

It's a master control . . . using easy to understand keys, call for any one of the System 21's 1000 outputs. Connect it to any of the 1000 inputs, different video and audio if desired.

Not enough? Load 80 preset selections. Edit at will and then make all switches on the *same vertical interval.*

Status by the output? Pick a number and you'll see that output plus the next 49. Choose numerics or mnemonics. Roll through outputs 50 at a time.

Status by the input? Key in a source and the display lists all outputs on line . . . *right now* . . . in numerics or mnemonics.

There's more! So ask about System 21's capabilities. The SCA-250B is only a 5¼" example.

SYSTEM 21

DYNAIR 5275 Market Street, San Diego, California U.S.A. 92114; Phone: (714) 263-7711; TWX: (910) 335-2040

Circle 252 on Reader Service Card

Ramtek Corp. (434S)

Will introduce a new **encoder** which will convert color computer graphics to NTSC for broadcast video standards. Will also show the 6214 color graphics computer.

Exhibit hours: Sunday, Monday, Wednesday, 9 a.m.–5 p.m.; Tuesday, 9 a.m.–8 p.m.

Rangertone (506S)

Will feature a line of 16 and 35 mm telecine film chain projectors and film sound recorders with digital interlock.

Recortec, Inc. (1200)

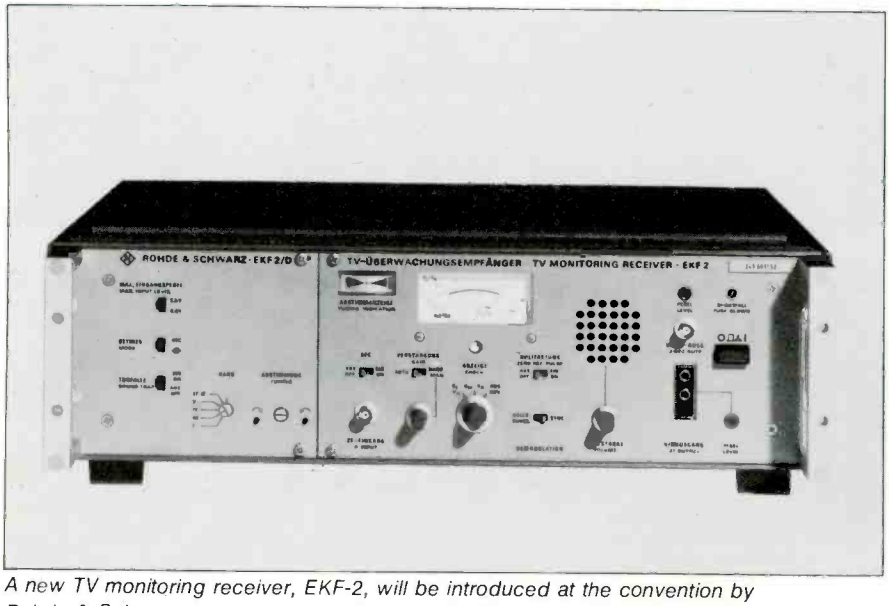
Will show for the first time the LPA **long play attachment** for nine-hour play/record time on standard ¾-inch VTRs and three-hour record time on Recortec HBU-2860 recorder. Also showing from the line the HBU-2860 high band U-format recorder, HBU-4400 portable U-format recorder, videotape cleaners and evaluators, and videotape timer for quad machines.

Rees Associates, Inc. (623S)

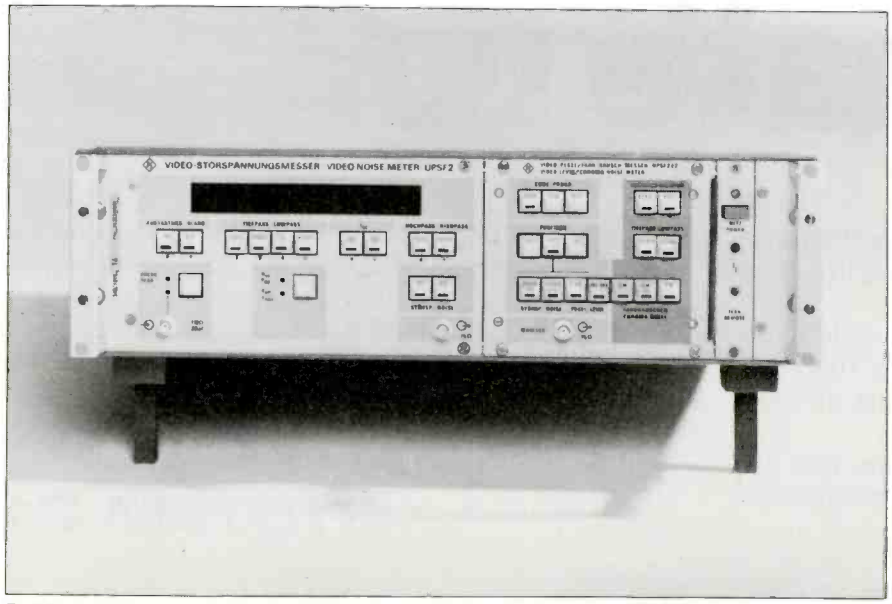
Provides architectural and engineering planning for the construction of broadcast facilities. Specializes in planning for anticipated growth.

Research Technology International (1112)

Stressing its theme of "film editing of the future," will introduce a high-speed **videotape cleaner/eraser** for ¾-inch cassettes that features reduced dropouts and head clogging; it operates at up to 30 times play speed. Also new is the CineScan 16 mm **film previewer,** compact and low in price. Items from the general product line will include the TV-120 editing system and Data-Film computerized editing.



A new TV monitoring receiver, EKF-2, will be introduced at the convention by Rohde & Schwarz



Rohde & Schwarz will introduce a new video noise level meter, UPSF2

R-Columbia will introduce a wireless headphone to go along with its new wireless system

Rohde & Schwarz Sales Co. (1110)

New this year are the UPSF2 **video noise meter,** the SPF2 **test signal generator,** and the EKF2D **demodulator,** plus a Barco **complex comb filter** (two lines). Also on view will be the Barco lines of CTVM color monitors, demodulators, and modulators.

ROH Corp. (107S)

Will show the line of intercom systems.

Rosco Labs (1039)

Will show its line of color correction filters, lighting gels, and other light control materials.

Ross Video (1812)

No information at press time on new products but will show from its regular line the RVS-514 four-bus production switcher and the 500 series of switchers.

The end of the endless loop.

Eumig's new FL-1000 makes cassettes the broadcast medium.

The Eumig FL-1000, an extraordinary new cassette tape deck, has started a revolution in the world of broadcasting. We believe—and radio engineers agree—that it will soon make the cassette the standard tape format in the broadcast industry.

The FL-1000 is the world's first computer-interfaceable cassette recorder. Up to sixteen FL-1000 decks can be controlled by any 8-bit computer. Some of the decks can be used for commercials; others for news and weather; still others for music and station ID's. And the location of *every* item on *every* cassette can be stored at the beginning of each tape and then in the computer, so *any* sequence can then be played back—automatically, with no human intervention, all day and all night long.

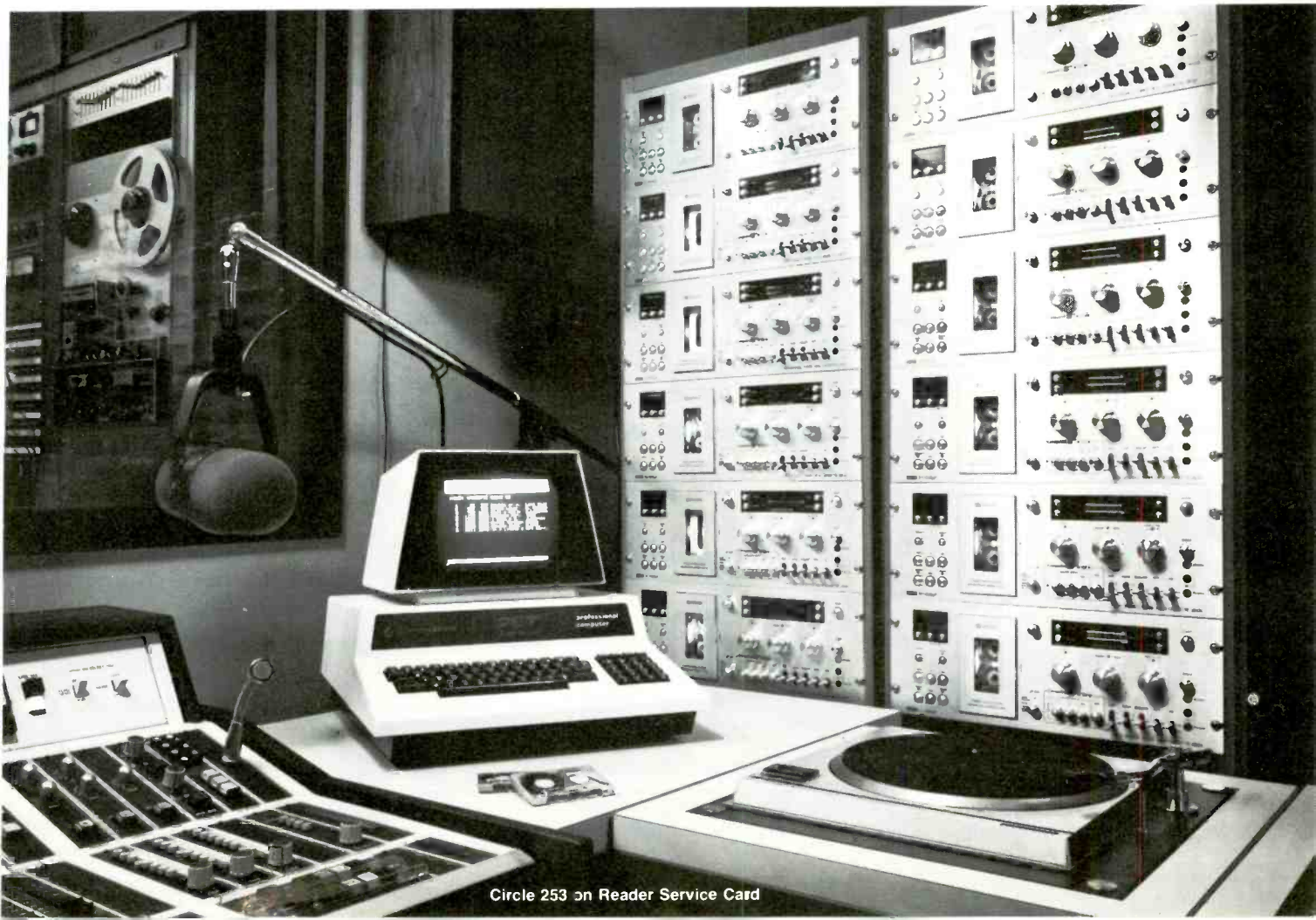
Watching a bank of FL-1000's working together is an awesome experience. One deck is rewinding while another is playing, and still another is moving in fast-forward to locate the next selection. Meanwhile, other decks are copying from a network feed and recording an air check.

The technology of the FL-1000 is so advanced that half a dozen units can do the work of more than 100 individual cartridge players—plus several reel-to-reel recorders. And they do it better, at far less cost, with sound quality comparable to that of the finest open-reel equipment. And the Eumig FL-1000's have none of the mechanical problems that plague endless-loop broadcast cartridges.

To see the end of the endless loop, call Eumig about the new FL-1000. Once you see and hear this amazing new recorder in action you'll agree that this is the long-awaited deck that will make cassettes the standard medium in the broadcast industry.

eumig®

Eumig (USA) Inc., Lake Success Business Park, 225 Community Drive, Great Neck, New York 11020, (516) 466-6533



Circle 253 on Reader Service Card

NAB'81

RTS Systems, Inc. (1525)

Will introduce a **microprocessor-assisted communications system;** a self-contained **squawk system**; a dedicated line **master station switchboard**; a new **TW intercom power supply**; a 24-channel **dryline intercom system**; a 26-output **source assignment panel**; and three new **connector distribution panels.** Will also show the line of TW intercoms, mixers, mic and phono preamplifiers, distribution and monitor amplifiers.

Exhibit hours: Sunday, Monday, Wednesday, 9 a.m.–5 p.m.; Tuesday, 9 a.m.–8 p.m.

Russco Electronics Mfg., Inc. (207)

Bringing new dial-up **remote equipment** for radio sportscasts, and **telephone line equalization** and **interface audio** equipment for studio use. Also showing the line of studio units, including turntables, phono preamps, mixers, audio power amplifiers, distribution amplifiers, and others.

Studer Revox will feature the PR99 professional audio tape deck (above)

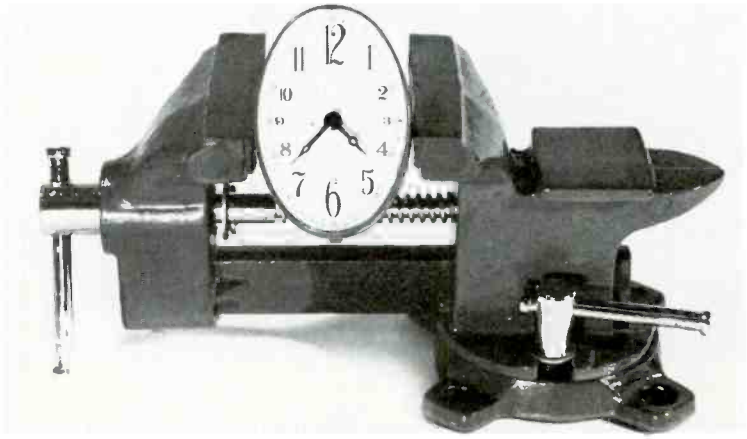
The PR99 (below) has balanced input and output with editing features such as retractable headshield and tape dump switch

S

S.W.R. (1626A)

Will bring the complete high-power coax line, with thermocouple connector

Eventide Clockworks ends the tyranny of the clock.

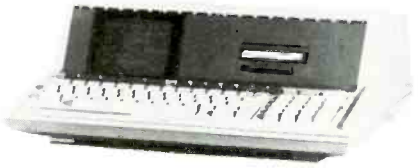


Introducing the Eventide Timesqueeze system.

It lets you control time. Specifically, the running time of videotape and audiotape playbacks. With no editing, no "Donald Duck" audio effects and no material eliminated. In fact the process is virtually undetectable in use.

Think what this can mean! Did a local commercial come in at 32½ seconds? With the Eventide Timesqueeze system, that spot will fit in a 30 second slot. A 100 second news spot can fit a 90 second news slot. You can even program a 95 minute movie package in a 90 minute slot. And the system works the other way too. It can stretch time. For example, a 36 second musical background can be stretched to cover a 40 second scene.

For television use, the Eventide Timesqueeze system controls your one-inch variable-speed-capable VTR. Radio stations can use the system to control most any pro-audio recorder. And Eventide delivers full 15KHz audio response.



How much does it cost to control time? Amazingly, as little as $3500 for the most basic system. The fully computerized system is only $8500. So not only can you control time, you can control costs.

The Eventide Timesqueeze system. It gives you freedom of time.

See us at N.A.B. booth 177—S

Eventide
the next step

Eventide Clockworks Inc.
265 West 54th Street
New York, N.Y. 10019
(212) 581-9290

Circle 255 on Reader Service Card

Ask Eventide:

Q. How does the Eventide Timesqueeze system work?

A. In order to change the timing of an audio or video recording, first the tape playback speed must be varied so that the original play time is changed by the amount desired. Second, the detrimental effects of the speed change must be negated or corrected. In audio this means restoring the pitch so that the announcer doesn't sound drunk (on slowed tapes) or like Donald Duck (on sped-up tapes, of course.) In video it requires signal manipulation so that sync is not lost as the VTR speed changes. Compatible one-inch VTR's, equipped with their companion TBC's can provide stable pictures at slow and fast speeds.

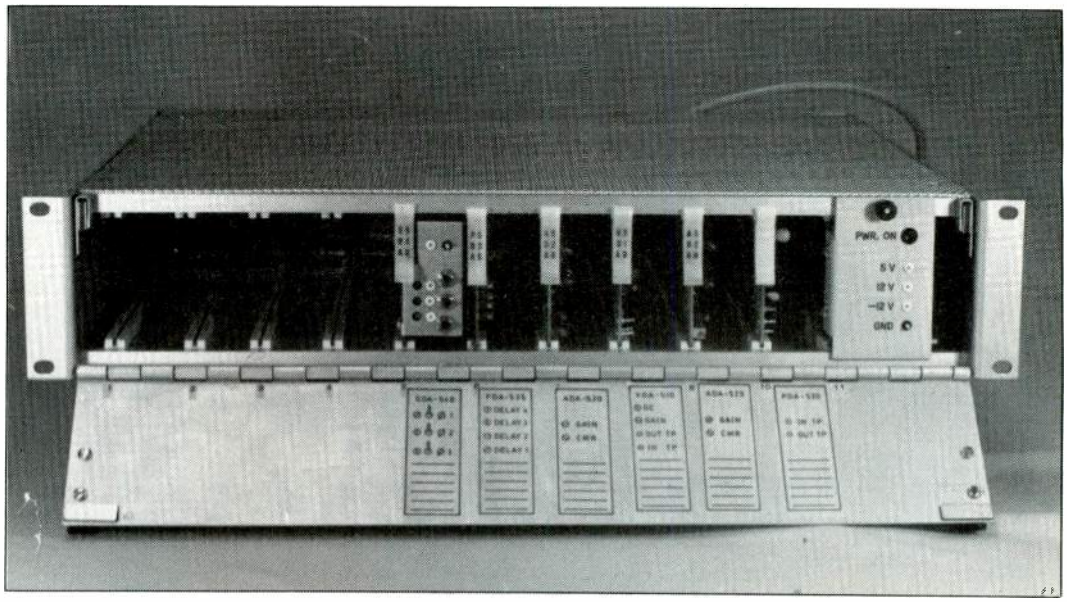
The Eventide Timesqueeze system accomplishes time compression and expansion by first computing and generating tape machine control signals to vary tape speed by the proper amount, and then by correcting the audio pitch, using the H949 Harmonizer.® The system can be configured in several ways. To control an audio recorder, often the H949 Harmonizer alone can be used. In other cases, such as when very precise final timing is required, the crystal-controlled PTC945 Precision Tape Controller should be added, to generate both the control signals for the tape machines and to control the pitch ratio of the Harmonizer. If the PTC945 is used, the final component of the system becomes a computer. We recommend the Hewlett-Packard HP-85 for its overall quality and reliability, but any small computer with an IEEE-488 interface, including the inexpensive Commodore PET can be used. The computer takes overall control of the system, by sending messages to the PTC945 and thence to the H949. All functions, including tape timing can be controlled by the computer. The computer-controlled Eventide system is unrivalled in operating simplicity. Just answer the questions the computer asks on its CRT readout:

COMPUTER: HOW LONG IS YOUR TAPE?
OPERATOR: 67 SECONDS.
COMPUTER: HOW LONG DO YOU WANT IT TO BE?
OPERATOR: 59.5 SECONDS.

What could be simpler? In fact you don't even have to answer the first question. Just cue up the tape and the computer will time it for you and then automatically set the correct pitch and timing.

A few words about the heart of the Eventide Timesqueeze system, the H949 Harmonizer. This unit performs the most difficult part of the task, pitch change. Pitch changing requires digitally sampling audio at a high speed and then "reading out" that data at a variable rate. The varying input vs. output rate makes it necessary to "splice in" or delete small segments of signal. To prevent "glitches" caused by this process Eventide uses a proprietary splicing algorithm which permits broadcast quality to be maintained. Broadcasters and producers will find many other uses for the H949 Harmonizer, when it is not in time compression/expansion and pitch change use. For example, the H949 can perform flanging, time reversal, digital repeat and many other audio "special effects." TV and radio program and commercial producers will find these additional uses invaluable.

Got a question about time compression or digital audio effects? Send it to "Ask Eventide" 265 West 54th Street New York, N.Y. 10019. If we use your question in print we'll send you an Eventide T-shirt, so include your size.



The Sigma 500 series modular rack holds up to 10 plug-in modules and a power supply

and manual coax switch.

Sacred Sounds (624S)

Will have information on items in line of syndicated religious music, with a number of items on demo in booth.

Saki Magnetics, Inc. (331)

Will introduce new **heads** for RCA and Ampex recorders with stainless steel wear bar center piece and Sakalogy long life cores. Also showing the full line of ferrite heads for most studio and high-speed duplication equipment; some have new single-crystal TDK ferrite with high resistance to abrasion.

Scientific-Atlanta, Inc. (1119)

New to the line of broadcast earth stations will be a **low-cost broadcast receiver.** Also on exhibit will be a complete seven-meter earth station with high-speed drive and earth station controller and a low noise amplifier earth station.

NAB program schedule on page 147

Sennheiser Electronics, Inc. (508S)

Are showing for the first time the new HD-222 **seal-cushion headphones** for broadcasting and consumer use. Also introducing new narrow-band, 10 mW **wireless microphone systems,** Models Sk-1010-6 and FM-1-10-7. Will also show the line of microphones and headphones for broadcasting and recording.

Sescom, Inc. (905)

Showing the line of audio interfacing units, including ENG mixers, multiboxes, and audio transformers.

Sharp Electronics (1121)

Will introduce a **parts kit** for the XC-700 ENG/EFP camera. The kit, which will cost under $2000, will contain extra circuit boards and other components for field repair. Will also show Saticon and Vidicon cameras, monitors, special effects generators, color bar generators, and other products for broadcast production.

Shintron Co., Inc. (1107)

Will unveil the model 374 Super 80 **switcher,** model 909 **color monitor,** model 392 **switcher,** model 645 **portable time code reader,** and model 326 **stereo DA.** Also on view will be the general product line, including the 375 Super Switcher, 373 and 370 III switchers, 505 character generator, 640 and 641 portable time code generators, 644 time code reader, 316 audio DA, 336 video DA, 338 pulse DA, 339 subcarrier DA, 350 encoded chroma keyer, 317 sync generator, and 318 genlock sync generator.

Shively Labs (128A)

Showing the line of circularly polarized FM antennas, transmission lines, pressurizing equipment, and FM panel antennas.

Shure Brothers, Inc. (107)

Exhibiting the line of microphones and audio mixers, emphasizing the SM81 mic and the SC39 series of phono pickup cartridges.

Sigma Electronics, Inc. (1602)

Will introduce the System 500 video and audio **distribution amplifiers.** The System 500 frame holds up to 10 plug-in modules plus plug-in power supply, or 11 plug-in modules with external power supply. The Sigma Interface Adapter allows the mixing of audio, video, pulse, and subcarrier distribution amplifiers in the same frame. Will also feature the CSG-365 sync generator, the CSG-160 sync generator, the ADA-210 audio distribution amplifier, and the VPA-100 video processing amplifier.

Simmons Market Research (201S)

Will show examples of use of Simmons market and audience data by radio, cable, and television managements.

Singer Broadcast Products, Inc.

See CCA Broadcast Transmitters

Sintronic Corp. (126)

Will bring a new 1200-watt **AM transmitter** with solid-state low-level stages and RF amplifier with tube type 4-500A. Also showing 3.5 kW FM, 5/10 kW AM, and 27.5 kW FM transmitters.

Skirpan Lighting Systems (1525)

New this year are Autocue/80, a visible **memory lighting control system** utilizing a unique combination of computer and video technologies to store, display, control, and recall lighting cues; Cuelog, an economical **computerized memory lighting control**

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system; and MCP **modular control panels,** designed for manual control of solid state dimming systems. Astral Dimmers and K Dimmers in 2 kW, 3 kW, 6 kW, and 12 kW versions will also be shown.

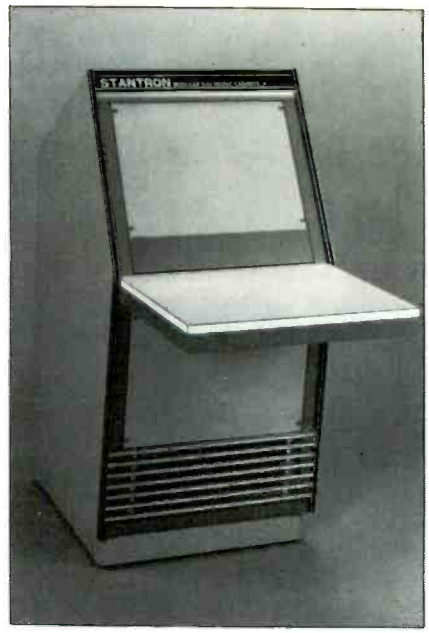
Skotel (1720)

The line of TCR and TCG time code reader/generators, PTC 100 portable time code reader/generator, and digital metronome will be on view. **New products** may be announced at the show.

Sono-Mag Corp. (309)

Will introduce the Mini Pro, a **live-assist programmer and mini-automation programmer** combined. Will show the ESP-1 carousel system.

NAB program schedule on page 147



Stanton will feature its line of modular cabinets for use with various video equipment

Sony (1211)

Will show its full line of portable and studio cameras, one- and ¾-inch tape machines, and slow mo controllers. Also Sony's full range of audio products including recorders, microphones and other broadcast services. While no information is available at this time, there are indications that the company will have something new in editing.

Sound Genesis (330)

Will show Otari tape machines, Auditronics Series 200 on-air audio consoles, Aphex compressor/expander and equalizer modules, Aphex grouper router, Sound Workshop consoles, BTX sync systems, Aphex aural exciter, Orban and UREI units.

Exhibit hours: Sunday, Monday, Wednesday, 9 a.m.–5 p.m.; Tuesday, 9 a.m.–8 p.m.

Sound Technology (1132)

Will introduce new optional accessory for Model 1500A tape recorder test system: a 1/3-octave **spectrum analyzer** that allows identification of noise components, 20 Hz to 20 kHz, and wow and flutter components, 0.2 Hz to 200 Hz. Also new will be a Sound Technology **test record** for checking phono cartridge performance with the 1500A test set. Will exhibit in addition the FM alignment generator, signal conditioner, stereo test panel, and Model 1710A distortion measurement system

"WE DON'T SEE A $27,000 DIFFERENCE BETWEEN SHARP'S XC-700 AND A $44,000 CAMERA."

LARRY HATTEBERG, CHIEF PHOTOGRAPHER,
KAKE-TV (ABC's WICHITA AFFILIATE).

"My cameramen were pretty skeptical when Sharp® introduced the XC-700 last year.

Like a lot of pros, they just didn't believe that a $12,000* camera could be any good. But we were looking for an economical way to go from film to tape, so we decided to give Sharp a shot.

We started using the XC-700 at the Democratic Convention last summer. And by the time we were covering the World Series, we were believers.

In fact, we've got seven XC-700's in our news department right now, and we're just one camera away from being an all Sharp operation.

So we've made the transition to tape long before I ever thought we could. And we've done it with a minimum of compromise.

Of course, there will always be differences between an XC-700 and a $44,000 camera. But reliability isn't one of them.

For day-in, day-out reporting, the XC-700 has held up as well as any camera we've ever used, even the most expensive ones.

It's also easy to handle. With the controls up front where a cameraman would expect to find them. And more features pound for pound than all the cameras I've seen in its class.

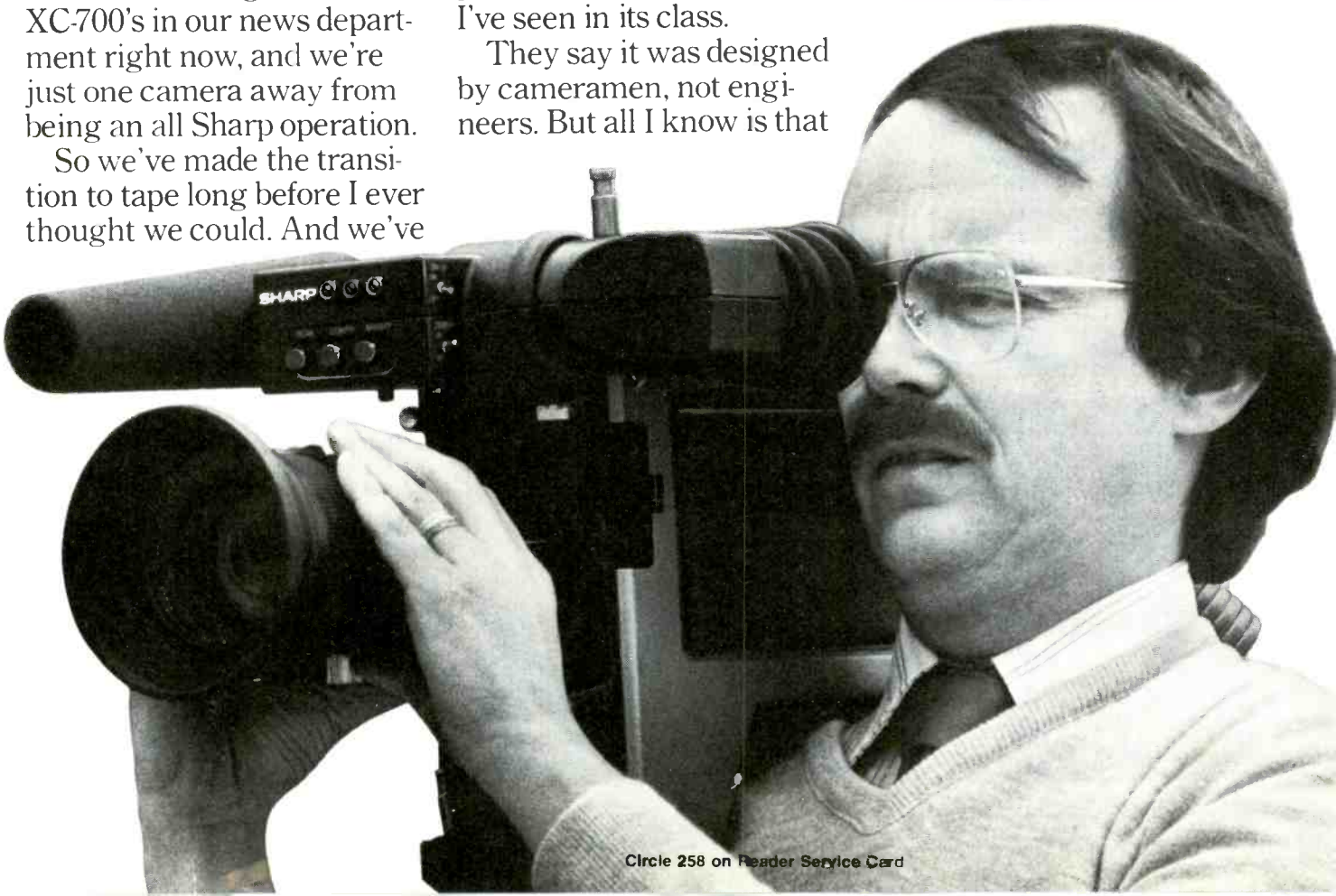
They say it was designed by cameramen, not engineers. But all I know is that the XC-700 has given our station a lot more for its money.

For $44,000, we didn't just get a lot of camera. We got a lot of cameras."

For more information, contact your local dealer, or write Sharp Electronics Corp. Professional Products Dept. BME-3 10 Keystone Place Paramus, New Jersey 07652

*Manufacturer's suggested retail price less lens.

SHARP



Circle 258 on Reader Service Card

in a version specifically for broadcasters.

Sphere Electronics (609S)

Will have a new Eclipse C TV production **audio console**; also the Satellite 1604 mixer, a 16-in/four-out rackmount model. Will have units in audio truck in Best Audio booth (across the aisle). Also showing equalizers for rack or console mounting.

Spin Physics, Div. Eastman Kodak (1118)

Will describe its quad video head refurbishing service, using a long-life ferrite head.

NAB program schedule on page 147

Stainless, Inc. (1009)

Will have photos and technical information on tower designs and installations.

Stanton Magnetics, Inc. (118A)

Will show for the first time the new BA-26 **pre-preamplifier,** battery powered, for use with the 980LZS low impedance phono cartridge. Also showing the line of phono cartridges and headphones. Introducing a new series of RC4 **record cleaning products.**

Stanton will introduce its new 980LZS phonograph pickup

Stanton will also feature a line of cleaners for styli and records

Stantron Div. of Wyco Metal Products (1828)

Will introduce the new Stantron Cooling Base which attaches to the bottom of the company's cabinet to provide **air cooling** without using available rack space. Will also introduce the model 1800 **slope cabinet** for housing monitor and other equipment.

Station Business Systems (Div. Control Data Corp.) (509)

Introducing the new MPI **music playlist and inventory system** for radio, with full format and demographic controls built in, for high-speed music selection and playlist printing for radio. Also introducing the new PPI **program package inventory system** for financial tracking and program planning for TV/film/tape packages. Will display the BAT 1700, BAT 1500, NEWS-

Beyer. We make the best broadcast mics, too.

In recording studios, concert halls and theatres worldwide, Beyer is the premier name in microphones. Loved by performers and respected by engineers.

Now that same Beyer quality is available in a full line of innovative broadcast microphones, to meet every need and solve every problem.

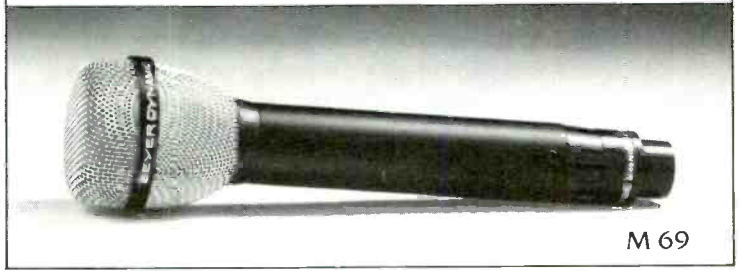
The Beyer MCE 5 is the world's smallest electret condenser and provides true broadcast-quality audio from a 7 x 23 mm. cylinder weighing just 6.5 grams. It has wide frequency response, but is immune to most body noises. And you can hide it almost anywhere and connect it to a cable or a wireless transmitter.

If you can't get the mic near the sound source, try our Beyer MC 717 shotgun. It has a directional gain of at least 20 dB and a 40-20K frequency response.

The MC 717 is part of a modular condenser mic system consisting of six different transducer capsules plus amplifiers and phantom power supplies that can be perfectly tailored for a wide range of broadcast situations. They're all ruggedly built to handle ENG as well as studio work and can accept temperatures up to 160° and 99% humidity.

Other mics include: the M 55 – an omni-directional dynamic mic that is especially suited for reporters and field interviews; the M 69 – a uni-directional hypercardioid dynamic mic that is perfect for announcers on TV and a studio mic in radio stations; the M 88 – a uni-directional cardioid dynamic mic with warm and full bass response that is ideal for booth or radio announce. This is easily one of the best mics in the business – with a special suspension that eliminates transmitted noise if hand held. Our M 201 is another microphone with excellent vocal characteristics that is favored by singers and reporters alike.

There are many more mics in the Beyer line, plus stands, booms, headsets and accessories. Visit your local Beyer distributor for more information and specs.



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In Canada, H. Roy Gray, Ltd.

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COM, and other business computer systems.

Storeel Corp. (911)

Will highlight space-saving storage systems for the television and radio industries, including a new **double-entry setup truck** to be introduced at NAB. Also on exhibit will be high-density storage systems for TCR-100 RCA carts and ACR25 Ampex cassettes and multiple-purpose mobile storage systems with horizontal or vertical bases.

Strand Century, Inc. (1204)

Will bring its new MiniPallette compact **memory lighting control console,** new **portable dimmers and control console,** Polaris Bambino 1 kW five-inch **fresnel,** Mizar three-inch 500 W **fresnel,** Pulsar fiberglass 120 V and 30 V small **floods,** Kahoutec 5 kW **combination fresnel and softlight,** motorized **remote control fresnels,** and **pole-operated lights** controlled from the floor with pan, tilt, focus, and switching functions. Will also show the complete Strand Century/Ianiro product line of fresnels, HMI units, softlights, cyc lights, and portable lighting kits, plus the Lekolite family of units from 4½ to 10-inch lens (1 kW) and light lifts, dimmers, stands, and lighting accessories.

Reduction in size but not power is the theme of Strand Century's line of lights

Strand Century will have a complete line of Ianiro HMI Fresnelites

Strand Century's new Ianiro Bambino 2K studio light is smaller and lighter but with the same power

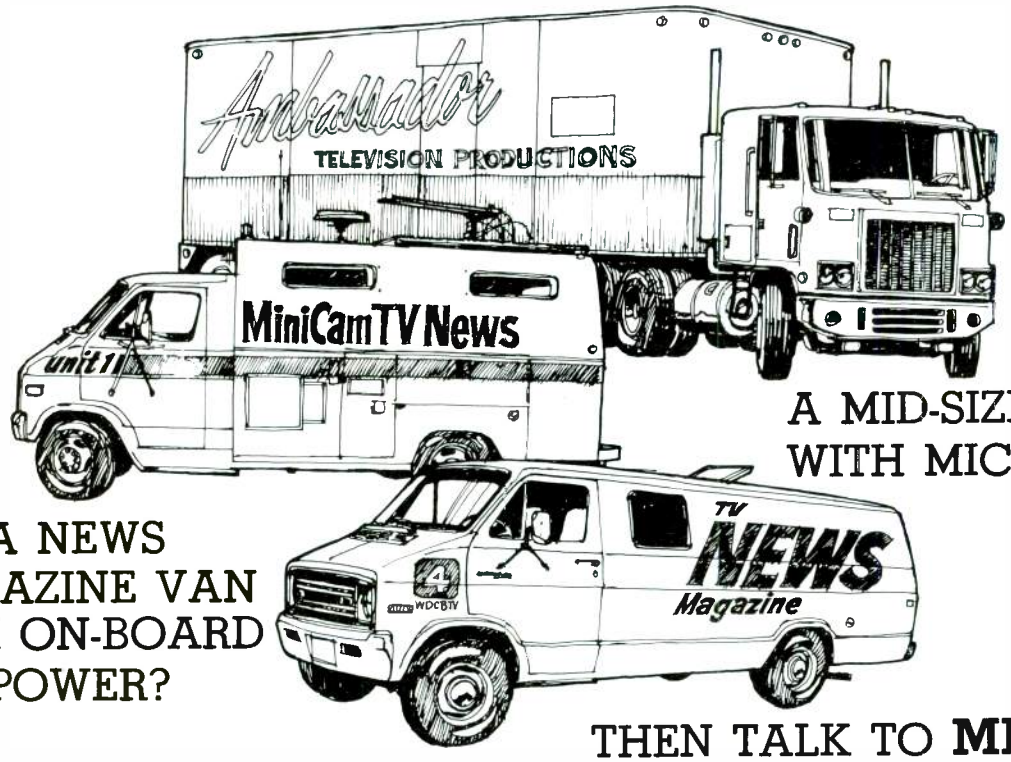
Strike Systems, Inc. (in Hughes Helicopter booth)

Will show new **airborne ENG system** for the Hughes 300C helicopter and the new Strike Eagle **ENG system** for ground coverage, both offering a systems approach to hard news coverage.

Studer Revox America, Inc. (602)

Showing for first time at NAB the new Revox PR-99 **recorder** for broadcasters; the Revox PR-100 for automation systems; the Studer B67 Mk II **re-**

NEED A FULLY EQUIPPED 40-FOOT PRODUCTION UNIT?



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A NEWS MAGAZINE VAN WITH ON-BOARD POWER?

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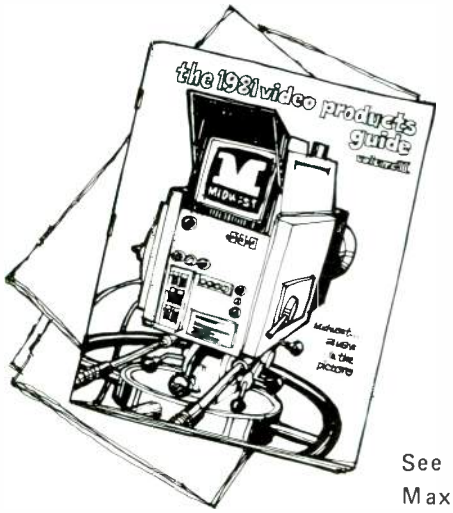

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Request a copy
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- 1981 Video Products Guide
- 1981 CATV Products Guide
- Midwest Capabilities Brochure

See us at NAB in Booth 1829 or at our Maxim Hotel Hospitality Suite.

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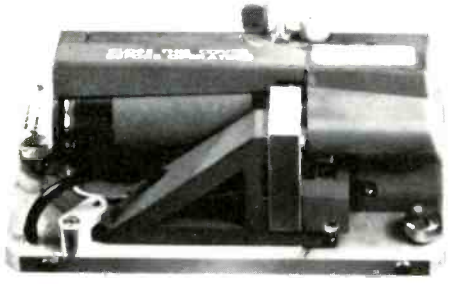
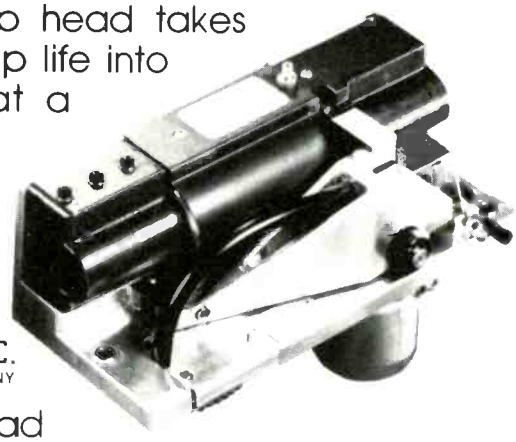
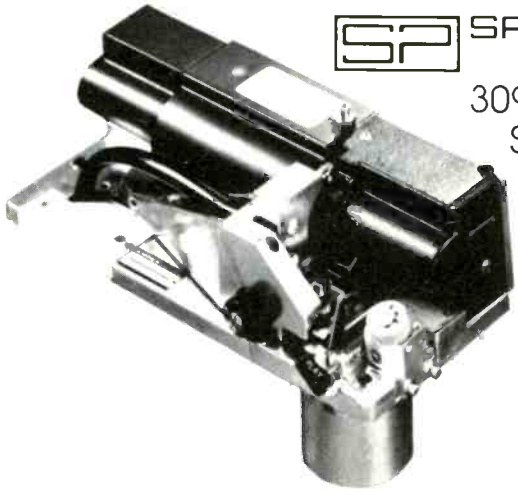
FOR $2.25/HR. YOU CAN GET A HEAD OF THE EIGHTIES.



Now you can cut quad recorder head costs and improve your image at the same time. This latest Spin Physics ferrite-tip head takes picture quality and tip life into the next decade at a price that would have been right in 1976. Today's $2.25 an hour maximum cost for a 1,000-hour prorated warrantied head is an incredible bargain. It's well worth spending a few minutes in our Booth 1118 at the N.A.B.





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corder, an improved version of the older B67; the Studer 369 **audio mixing console** for complex production work in small space, with up to 32 inputs, eight groups, and eight submasters, well suited to van installations; the Studer 900 series of **broadcast consoles;** the Revox B710 **cassette recorder** with microprocessor control, four direct-drive dc motors, tape tension control in all modes, and new head mounting for azimuth stability. Will also show from its line the A800 tape recorder, TLS 2000 synchronizing and editing system, the A80 tape recorder series, the electronic telephone hybrid, and other Studer and Revox products.

Swintek Enterprises, Inc. (1800)

Introducing the MK-200 Series of **full duplex communicators** for remote stations (wireless RF intercom) with multiples of receive stations; also the MK-200/CPS for TV camera mounting. Also showing wireless microphones and intercom systems.

Sylvania Lighting/GTE (909)

Will feature its line of tungsten, halogen, and arc discharge lamps for television, theater, and stage lighting.

Strand Century's miniPalette is a microprocessor-based lighting controller with remote focus

System Associates (1422)

Booth will highlight the company's used broadcast television equipment service, which includes a free listing of equipment the customer wants to buy or sell, retained as long as necessary in a flyer sent to TV professionals throughout the country. Also featured will be the Nova Corp. universal tape cleaner.

System Concepts, Inc. (1305)

Will feature the Quantafont "Q" series graphic titlers, the QST Automatic Sub-

titling System with SMPTE/EBU time code interface, and the QuantaNews computerized television newsroom system.

T

T.A. Associates (224S)

Will describe its financing services for broadcasters.

Taber Mfg. and Engineering Co. (502)

Will show its line of bulk tape erasers and replacement audio heads for Ampex and RCA quad videotape machines. Also showing the Taberamp replacement electronics for reel-to-reel tape machines and describing its reconditioning service for audio heads.

William B. Tanner Co. (117)

Will demonstrate jingle/ID packages both in the booth and in the hospitality suite. Also demonstrating syndicated formats in all styles of popular music. Will have an important give-away in the booth.

Tayburn Electronics (1708)

New to the line are the QBT-50A series frequency-agile **mini microwave transmitters and receivers;** TBT/50A **small auto tracker;** TBT/10/K series microprocessor-based **microwave system;** and new **helicopter antennas.** The general product line, including live auto tracker, will be displayed.

Teac Corp. Of America (702S)

Will introduce the new Model 22-2 **half-track mastering tape machine,** 15 ips; and the new Model 22-4 **four-track mastering tape recorder,** 15 ips. Also showing the line of tape machines, four-track to 16-track, using quarter-inch tape for four-track, half-inch for eight-track, one-inch for 16-track. Also showing a new **mixer,** six-in/four-out up to 24-in/12-out, including equalizers and pan pot. Teac Video will introduce a new **U-format VTR** made to military specifications.

NAB program schedule on page 147

Teatronics Sales (1505)

No information available at press time for this division of Ultra Audio Pixtec.

Technicolor Audio Visual Corp. (1126)

Will introduce a new **¼-inch video recorder** and battery which weighs seven pounds. Will feature its complete line of video accessories.

Tech Theatre (1709)

New this year is a **location makeup kit.** The general line of makeup and special effects products will be at the show.

Tektronix (1111)

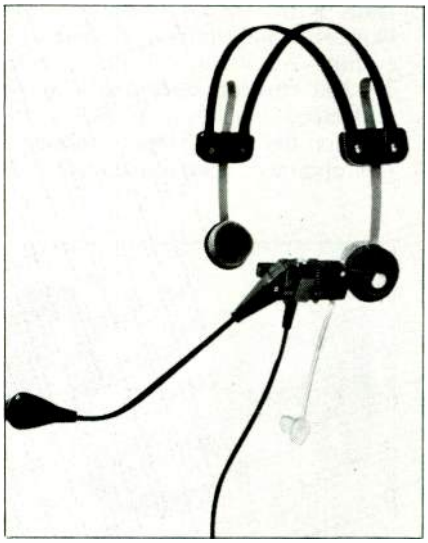
Will introduce the 7L14 digital storage plug-in **spectrum analyzer,** the 523A **waveform monitor,** the TSG7 **SMPTE color bar generator,** the 690 DT delta-gun shadow mask **color monitor,** and the 1450-2 system B/G **demodulator** with tunable down converters. Also showing the AA 501 audio distortion analyzer, 492P spectrum analyzer, 468 digital storage oscilloscope, 308 data analyzer, 465B44 oscilloscope, 1900 digital test signal generator, 1980 ANSWER system, and assorted PAL and SECAM broadcast equipment.

Tele-Cine, Inc. (1114)

Will show several new **lenses** from Schneider, including a new lens for the RCA TK-47 studio camera and additions to the company's long lens adaptations for hand-held ENG cameras.

Telemet, Div. Geotel, Inc. (1010)

Emphasizing its theme of "transmitter performance," will feature its precision demodulators, fiber optic systems with and without sound, routing



Telex will feature its intercom systems with lightweight headsets

The Telex wireless microphone system can be operated as either a dual or single-antenna configuration

Telex's 3000 Series tape recorder/reproducer with RP85 preamplifier handles reels up to 10½ inches.

switchers, isolation amplifiers, thermal equalizers, sideband analyzers, spectrum/sideband analyzers, test signal generators, modulators, chroma keyers, chroma keyer decoders, group delay measuring systems, RF test equipment, video and pulse DAs, video DAs with clamp and equalization, and pulse DAs with variable delay.

Telescript, Inc. (1025)

Will introduce the new MPS-DP **monitor prompting system** at the show. Will also bring its line of lightweight monitor prompting systems, including the 900 line monitor/prompters and precision crafted transports, the Telecue and Telescriptor. Other items will include 2-1 600-line vidicon cameras; 12.5 fl. 8-1-inch format lens; beamsplitters with second surface low reflectance coating; telepods for roll-around lens viewing; and a contrast enhancer/DA for greater script clarity.

NAB program schedule on page 147

Telesource Communication Services, Inc. (1810)

Will feature a new **sports and weather information package** for interface with station character generator system, in addition to its election program already in use at numerous stations. Also manufactures a universal computer/character generator interface.

Television Engineering Corp. (1201)

Will introduce a new 23-foot **television remote unit.** Will feature its regular line of peripheral equipment.

Television Equipment Associates (1019)

Introducing improved **video filters,** the Elcon **evaluator** for ¾-inch cassettes, BCA/Drake **intercom system,** Avitel **video distribution equipment,** and Drake **audio distribution equipment.** Also on view will be Matthey video and pulse delays and video filters, Elcon tape evaluators for one- and two-inch tape, Racal intercom and sportscaster headsets, and BCA interphone system.

Television Products Co. (409S)

Will exhibit its line of camera pedestals and introduce the model P-80, a full-size state of the art **pneumatic camera pedestal.**

Television Technology Corp. (1623)

Will introduce a 10 W **VHF transmitter** for low-power TV and solid state 20 W **UHF television translators** and **low-power TV transmitters.** On view from the general line will be the UST-106 100 W UHF TV translator, the TVB 1 W VHF translator, the TVF-10 VHF amplifier, the XL10FM 10 W FM translator, and the T-99 1 W solar-powered translator.

Telex Communications, Inc. (311)

Will introduce the new 3000 Series of 10½-inch **reel-to-reel tape machines** for mastering, production, and automation. Will also have a new VHF high-band **wireless microphone system** with internal compression/expansion and simplex or diversity operation. Also new will be the Model TS-200 **camera operator's headset** with electret microphone. Will show in addition the line of other headsets and microphones, intercoms, reel-to-reel

Tiffen's new collapsible rubber lens shade fits most ENG/EFP cameras

NEW. VIDEO EDITING LIST MANAGEMENT WITHIN YOUR REACH.

Now videotape editing list management is within your reach! Convergence Corporation's easy-to-operate, multi source ECS-104 List Management Editing System offers full auto assembly list management capability at a very affordable price.

Unique Standard features include:

JoyScrol™ Joystick scroll
TimeSearch™ Source & Record VTR time search
"**409**" EMMY-winning "409" program
CleanIt™ Unique auto-clean
SyncTag™ Special sync roll tag
CheckIt™ Automatic self diagnostics
TenCom™ Command generator*

The ECS-104 has all of the standard EMMY-winning ECS-100 Series features, and more...

- Auto assembly with audio select.
- Full sync roll with listing.
- 600 edit lines internal storage.
- Add, replace, delete and block moves.
- "Exchange" - Alternate edit register.
- Preview BVB/VBV/In/Out/In-Out/Open
- Comment entry and storage.*
- Dedicated reel number and edit number keys.
- Battery back-up.*
- Utilizes user bits in time code.
- Most popular 1 inch, 3/4 inch, and 1/2 inch interfaces.

OPTIONAL ACCESSORIES AVAILABLE

Floppy Disc System, Printer, Command Generator Unit, Comment Keyboard, Special Effects Switcher with optional control panel, Battery backup system, Cutlap and Liplock®

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For information Circle 317 on Reader Service Card For demonstration Circle 316 on Reader Service Card

machines, and cart machines.

Tennaplex (343)

Will feature its line of broadband UHF log periodic antennas, completely waterproof and suitable for STL links, plus its broadband VHF and UHF transmitting dipole panels.

Tentel (1005)

Will show for first time its **run-time meter,** which measures head/run time on U-Matic VTRs by plugging line cord into timer box. Also showing line of tape tension gauges for video and audio recorders and the spindle height gauge to prevent tape damage and other problems on U-Matic VTRs.

Terracom — Loral Corp. (1043)

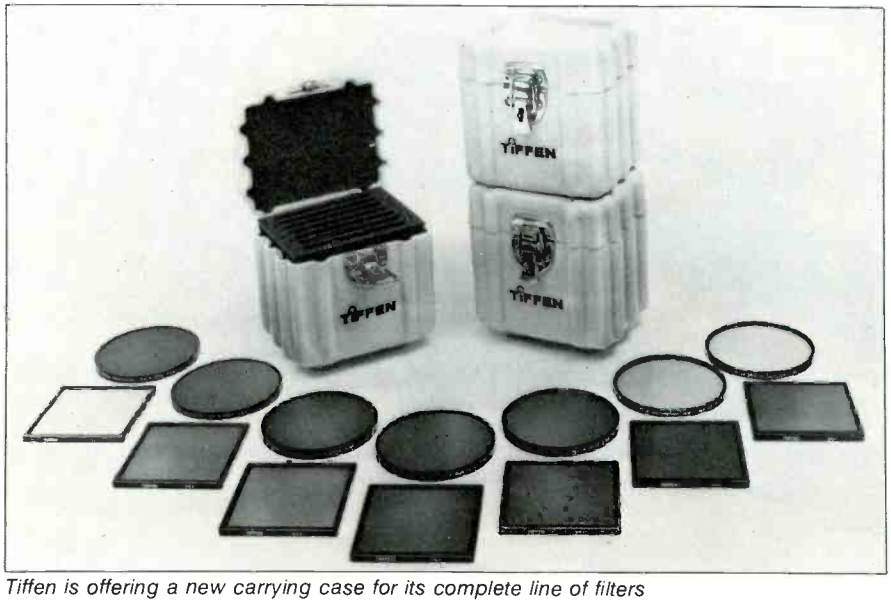
Will show the line of STL equipment, including the TCM-6 series of microwave transmitters and receivers, switching equipment, program channel multiplexers, and the TCM-7 ENG microwave transceiver.

Thermodyne International Ltd. (1627)

Will feature its complete line of shipping and operating cases for all types of production equipment, with 80 standard, off-the-shelf models.

Thomas-CSF Broadcast (919)

Will introduce its new Vidifont Graphics V **character generator** and display its complete line of audio and video products. The audio side will include the AM and FM Volumax automatic peak controller, dual channel auto distribution amplifier, Audimax automatic level controller, and the dynamic presence equalizer. On the video side will be the Microcam cameras, the TTV 1525 and 1650 color cameras, the TTV 2705 slide scanner, the Digital Video Processor and the Vidiplex/Strap system for simultaneous transmission and reception of alternating pictures.



Tiffen is offering a new carrying case for its complete line of filters

Thomson-CSF Electron Tube Div. (128)

Will show for the first time a series of **power tetrodes** for broadcasting satellites, 1 kW to 10 kW; also new **travelling wave tubes** for KU and C bands and a 3 kW C band **klystron.** Also new will be the THX-1130 **CCD** for miniature TV cameras. Showing the line of other power tetrodes for UHF and VHF, 100 W to 5 kW.

Tiffen Manufacturing (1606)

Will reveal a number of new products, including the "Hi-Impact" **filter case,** the Series 9 universal **rubber lens shade,** a 4½ "mini" **collapsible lens shade,** new **fractional filters,** black net and white net **soft diffusion filters,** and a **sepia filter.** The line of special effect and standard color filters and accessories for TV cameras and lenses will be on hand.

Time and Frequency Technology, Inc. (124)

Will introduce an **intelligent computer terminal** for remote control operations and the E-Alert **receiver** for the EBS broadcasts and warnings. Will show the line of TV, AM, and FM frequency and modulation monitors, STL equipment, and remote control equipment.

The Toshiba PK-60, to be shown for the first time at NAB, is one of the lightest ENG/EFP cameras on the market

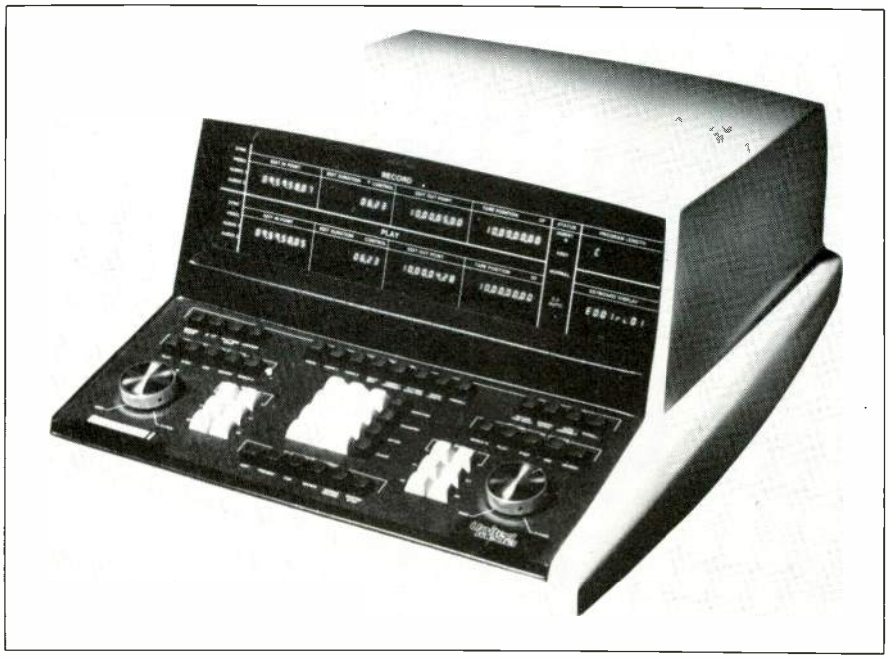
Toshiba America, Inc., Broadcast Electronic Systems Div. (1214)

Will feature its new ultra-light compact, self-contained PK-60 **ENG/EFP color camera** with Digital Data Lock, a plug-in digital memory adapter designed to work with the Auto Setup unit. Power requirements have been reduced to 20.6 W and S/N has been increased to over −54 dB. Also on view will be the PK-39 portable color

ENG/EFP broadcast camera and the PK-40A microprocessor-controlled automatic color studio camera.

Townsend Associates, Inc. (1007)

Will bring a new **klystron pulser,** all solid state; a new line of low-power **VHF and UHF transmitters;** and a new line of low-power and high-power **UHF antennas.** Also on exhibit will be low-power amplifiers.



The Commander I, United Media's basic edit controller, features LED display and variable speed control

Exhibit hours: Sunday, Monday, Wednesday, 9 a.m.–5 p.m.; Tuesday, 9 a.m.–8 p.m.

Trompeter Electronics, Inc. (1124)

Will unveil new armored **RF cable assemblies,** armored **camera cable assemblies,** and fire retardant **coax cable.** The general line of RF connectors, patching panels, and cable will also be on view.

Tweed Audio (219)

Will show the line of broadcast audio consoles.

U

UMC Electronics (108)

Will introduce the Beaucart III multi-deck record/playback tape machine and the Beaucart System 8 for automatic recording of air-ready cartridges from network transmission. The microprocessor-based system features preselection of cuts and is based on the Beaucart 100 playback/record cart machine, also on view. Will also display the Beaucart 200 playback/record cart machines, the Beaucart 2 line of play-

back, record/playback, and Monitor 2 machines, a Beaumaster stereo console with dual redundant power supply, and the Type 20 recorder/reproducer.

Ultra Audio Pixtec (1819)

Will have the new VA Series of **audio follow video switchers,** with talley and time code switching and stereo audio. Also showing the line of waveform monitors, vectorscopes, audio distribution and power amplifiers, battery-powered and studio audio mixers.

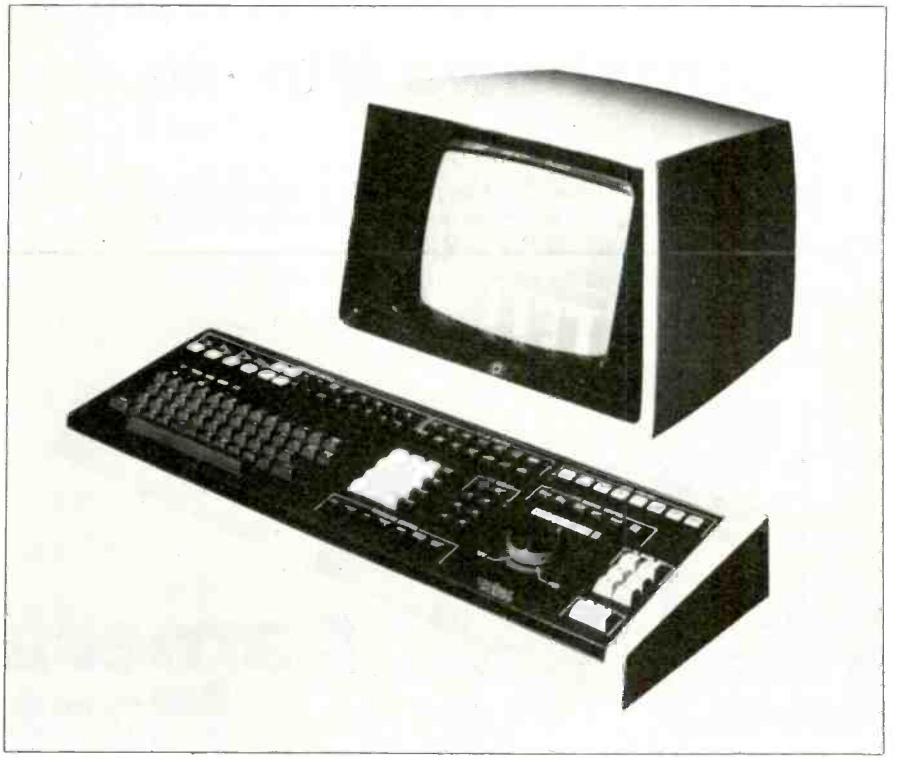
Exhibit hours: Sunday, Monday, Wednesday, 9 a.m.–5 p.m.; Tuesday, 9 a.m.–8 p.m.

Unarco-Rohn (1021)

Will feature field towers for a variety of broadcast needs.

Uni-Set Corp. (1106)

Will feature its modular studio staging system and graphic design cart, plus a new **rear screen/chromakey module.**



United Media's Commander II is a microprocessor-based edit controller that controls up to eight VTRs

United Media, Inc. (1711)

The new Commander II computer-based **electronic video editor** provides control of up to eight VTRs and automatic switcher control of up to 999 frames. Features include list management, control of punched paper tape, punched paper reader, high-speed printer, dual disc, or TTY; sync step; cut/list; auto/sync for built-in TBC; selectable control track, and others.

NAB'81

United Press International (903)

Will have all the services delivered to NAB via satellite. Will feature all the services of UPI, high-speed wires, UPI Audio, Unifax Unislides, and Geosfax.

United Recording Electrical Industries (UREI) (607S)

Will have the line of power amplifiers, limiter/compressors, equalizers, filters, broadcast consoles, and the Time Align monitor speakers.

United Research Lab Corp. (414)

Will introduce an auto-sense **electronic motion sensing system** for tape recorders. Also showing the line of Auto-Tec tape recorders, replacement parts of Ampex and Scully machines, Auto-Tec record/reproduce electronics, alignment tapes, motors of all types, other accessories.

Ursa Major, Inc. (414A)

Are showing for the first time the new eight-by-32 **digital reverberation system**. Also showing the Space Station special effects system.

U.S. JVC Corp. (159)

Will display its ¾-inch videocassette recorders, players, and editors, along with edit control systems, VHS recorder/players, color cameras, color monitor/receivers, and a color magnetic disc recorder.

U. S. Instrument Rentals (105S)

Will show Microwave Associates portable ENG equipment as exclusive distributor. Also will have information on rental of instruments of all important manufacturers.

U.S. Tape and Label Corp. (407)

Showing the line of promotional bumper strips and inside window labels for broadcasters.

Utah Scientific, Inc. (1629)

Will introduce a **metallic contact switching matrix** and a **hard-copy printout device** that records all switching events while flagging discrepancies and operator errors. Will feature the AVS-1 series of audio and video routing switchers and control panels.

Utility Tower Co. (500)

Will have actual tower sections on display and will show lighting equipment, galvanized hardware.

V

V&B Tower Construction Co., Inc. (320)

Will emphasize its theme of tower design, maintenance, erection, and fabrication by introducing new **tower lighting material.** Will also display its line of towers and tower lighting equipment.

Exhibit hours: Sunday, Monday, Wednesday, 9 a.m.–5 p.m.; Tuesday, 9 a.m.–8 p.m.

Thomas J. Valentino, Inc. (412)

Will introduce a new service, **video stock shots** (many kinds of visual background material) available for TV broadcasters on U-Matic cassettes. Also showing the extensive line of special effects sound recordings and background music for radio broadcasters.

Valtec Communications Fiberoptics (1811)

Will demonstrate the Valtec VS-100 fiberoptic baseband video system, said to reproduce studio-quality video over distances of up to three km. Because of the inherently noise-free transmission by fiber optics, Valtec says there is no need for expensive FM modulation/demodulation equipment.

Varian Associates (306)

Will show the line of high power tubes and klystrons for radio and television broadcasting visual couplers, FM broadcasting cavity amplifiers, exciters for FM, UHF cavity amplifiers, AM/FM/TV transmitters.

Versa-Count (516)

Under the theme of "new standards of performance in FM radio exciters and measuring equipment," will introduce the EX-80 **FM exciter,** with 0.008 percent harmonic distortion and better than 80 dB S/N for both AM and FM noise. The MM-80 **modulation monitor,** capable of measuring the performance of the EX-80, will be reintroduced. Will also show the line of FM modulation monitors, FM translators, TV translators, audio DAs, low-cost FM exciters, STLs, FM transmitters up to 250 W, and automatic video processor.

Video Associates Labs (1716)

Will introduce a **keyer** which will interface with the Apple 2 and key over any NTSC video source with broadcast quality.

Video Data Systems (1523)

Will introduce the new TPT-2500 **television production titler.** The basic system utilizes a 16 by 20 character matrix, with graphic symbols, 32 pages internal memory, and an optional digital cassette memory. The MCG-2599 message character generator is intended as a standalone system with internal sync and color background. VITL — Vertical Interval Transmission Link — is a new simplex transparent **communications system** utilizing standard television signal and the vertical interval for data transmission.

Videomagnetics (1808)

Will show new **ferrite heads** for Ampex and RCA quad recorders.

Videomedia (1403)

Will introduce the new Z6000 multisource **editing system.** Other editing systems on display will include the Mini Z, Z6-B, Z6-D, Z6-C, and Z6-E.

Videotek, Inc. (1611)

Will show a new **waveform monitor** for video signals, the TSM-5, with five-inch CRT; a new **vectorscope;** and a new **audio program monitor,** APM-2R, dual-channel with built-in speakers and VU meter. Also showing the line of color monitors and demodulators.

Vidicraft Inc. (180S)

Will introduce a new **test signal generator.** Will feature the Detailer II image enhancer and the Video Fader.

Viscount Industries Ltd. (1802)

Will bring its line of small portable production switchers, including models 1107, 1127, and 1150B.

Vital Industries, Inc. (921)

Will introduce the Saturn series of **microprocessor control switchers** and a new **CRT terminal** control unit for the SqueeZoom video manipulation unit. SqueeZoom will be on view, as will the 114 production switcher, the 115 master control switcher, and the 250 P/N switcher.

W

Ward-Beck Systems, Ltd. (1216)

Display will have three sections: first, units from the line of consoles; second,

a complete operational radio studio with all equipment mounted in finished cabinetry, with consoles, turntables, tape machines, etc. Third section will be a demonstration of communications systems in pleasant operating surroundings, showing a new line of microprocessor-controlled **intercoms.** The intercom will be linked to a number of other booths on the floor to show quality of operation.

Exhibit hours: Sunday, Monday, Wednesday, 9 a.m.–5 p.m.; Tuesday, 9 a.m.–8 p.m.

Weathercaster, Inc. (525)

Will introduce two **weather forecasting computer systems** for broadcasting: the CT-1000 colorgraphic weather forecasting computer for television, with animated weather presentations, and the R-300 for radio with LED display or optional voice synthesizer.

Weathermation (1625)

Will introduce a fully digital system for receiving satellite weather information with user-selectable background colors and maps. Will introduce **new features** for color remote radar system: pan and zoom, two-color underlays, pseudosweep, and eight-frame storage capacity.

Weather Services International/ AutEx Systems (Suite in The Dunes)

Will introduce its real-time on-air **computerized color graphics system,** which accesses WSI's comprehensive data base of weather, sports, and business information and interfaces directly into the station video chain to produce up-to-the-second information graphics ready for broadcast.

Western Union Telegraph Co. (1401A)

Will show the satellite distribution system for radio and television broadcasting and cable television, with the three operating Westar satellites.

Wilkinson Electronics, Inc. (302)

Showing the line of AM and FM transmitters, plus dummy loads and associated RF equipment.

Winsted Corp. (823)

Will feature new concepts and the latest in video furniture with a complete range of editing and VTR consoles, equipment racks, and space-saving tape storage systems. New this year is a **one-inch VTR console** with full overhead

The Vinten 702 pedestal offers a flexible base for all types of studio cameras

bridge that accommodates a 12-inch color monitor, audio, waveform monitor, and vectorscope; also new "Super-Pak" **tape storage system** for ¾-inch videocassettes, designer-type, low-profile **editing/production console,** and **vertical equipment racks.** Items from the general product line will include editing consoles for ¾-inch and one-inch tape formats, videotape and film storage systems, videotape and film trucks, equipment racks, dubbing racks, and post-production consoles.

Robert Wold Co., Inc. (1221)

Will introduce a new **satellite distribution service** called Satellite Express. Service is in conjunction with AP and will offer rapid distribution of programming for radio and TV stations. Will also show regular line of satellite services, including portable earth stations.

Wolf Coach, Inc. (1225)

Will display a 26-foot straight frame, three-camera production truck built for WPSX-TV at Penn State.

Frank Woolley & Co. (507S)

Will introduce the Motion Master **video animation system** that prepares camera-ready art in the user's own studio. The non-computerized system can be used by any graphic artist, the company states.

World Tower Co., Inc. (420)

Will show the line of antenna towers.

X

Xedit Corp. (223)

Will introduce a new **sound pulse generator** for synchronizing film strip production. Also showing the line of tape splicing blocks and tabs for all widths of tape, including those acquired from Editall Corp. Will show in addition a drift and flutter test instrument.

Z

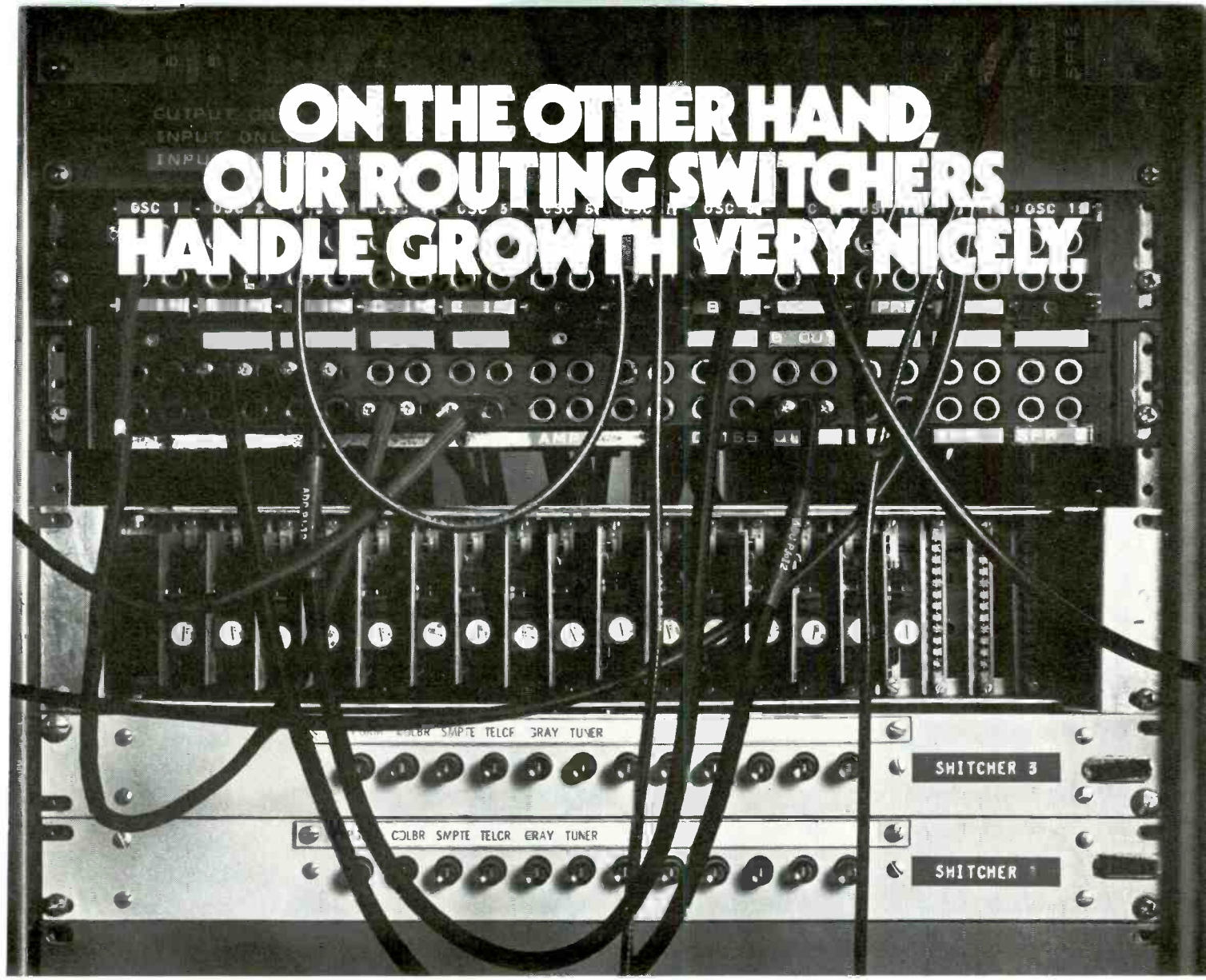
Zei-Mark Corp. (1643)

Will display its line of optical multiplexers.

Zenith Radio Corp. (505S)

Will show for the first time the SSAV-1 **subscription TV decoder** in an all-channel version, displayed jointly with American Television and Communications Corporation.

ON THE OTHER HAND, OUR ROUTING SWITCHERS HANDLE GROWTH VERY NICELY.

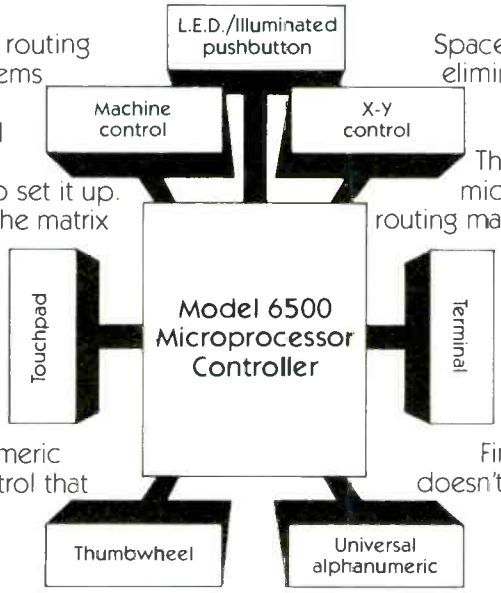


With a microprocessor-based 3M routing switcher, you can eliminate the problems of hard wiring once and for all. And specify just about any type of control you want.

It all depends on how you'd like to set it up. Our design engineers can then tailor the matrix for you. From your smallest requirement on up to any desired size. And they'll help you select the control that's best suited to your needs, too.

The choice is yours. Touchpad, thumbwheel, illuminated or L.E.D. pushbutton, machine, X-Y, or alphanumeric universal control. Even a terminal control that allows you "supervisory" control throughout the system, or computer control through our RS-232 port.

What's more, 3M routing switchers are easily expandable. Start with a matrix that matches your present requirements. Then as your studio grows, your routing switcher does, too. With the simple addition of extra frames and switch cards.



Space-guzzling, multi-conductor cables are eliminated. And so are unnecessary output panels. Because with our system, outputs can be reallocated as required.

The heart of the system, the Model 6500 microprocessor, as well as controlling the routing matrix, can be integrated with a machine control system to offer absolute production control of film chains, VTR's and other production machines.

Or it can be used as a stand-alone machine control system which offers the same coaxial wiring and expandability of the routing switcher panel.

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M203 photo taken at KBHK, San Francisco, California

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One writer states, "—on-air discrepancies have almost been totally eliminated". Echoes another, our station's M203 system "—virtually eliminated operator switching errors".

The bottom line? One engineering manager informed GVG their M205 system "—makes us look like our best operator is switching 24 hours a day, every day!" "We look much cleaner on the air—" reports a 1600-4S enthusiast, and an M203 user stated, "—the on-air look became smoother and more professional".

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BM/E NEWS FEATURE

INTV Convention Reflects Growing Strength Of Independent Operations

THE OVERALL ATMOSPHERE of the eighth annual convention of the Association of Independent Television stations (INTV) was one of rising optimism for the indies, particularly in the areas of programming and competitive equality with affiliated competitors in their markets.

The major news to come out of the convention was the unveiling of an eight-month study conducted by Burke Marketing Research for INTV. The Burke study, which set the INTV back some $340,000, revealed that, in essence, there was no difference in viewers' reaction to commercial messages — in believability, commercial recall, persuasiveness, attitude towards sales/copy messages, or perception — when the same commercials were tested on both independent and affiliated TV stations.

The report was hailed as a "breakthrough" by Herman Land, president of INTV, who labeled the Burke study "the top INTV priority for implementation in 1981." Land's comments were backed by Sherman Cooper, chairman of INTV and president of WGN-TV, Chicago, who noted that the study "should go a long way to lay to rest any doubts about the competitive equality of affiliates and independents."

Other issues that were discussed by the delegates to the convention were the increasingly high cost of programming, the growing fractionalization of home audiences, and the importance of more local production by the independent stations. The opportunities for additional news service for independents were outlined by both ITNA, the Independent TV News Association, and INN, the Independent News Network. Leavitt Pope, president of WPIX-TV, New York, which originates the INN service, said that plans were underway by INN for a mid-day newscast to be sent via satellite for 11:30 a.m. airing. Pope also noted that INN currently is on 46 stations and is in nine of the country's top 10 markets.

The potential for additional satellite-transmitted programming, for ad hoc networks as well as news, was outlined by Harry Pappas, a member of the board and president of Pappas Telecasting of Fresno, Calif. Pappas noted that 46 of the 56 member stations of INTV were equipped with earth stations, providing a solid nucleus of audience and markets for ad hoc networks

The INTV board gets together for a group shot at the convention. President Herman Land is second from left in front row; Elmer C. Snow, back row, far left, was just elected treasurer

and other forms of programming possibilities.

Perhaps the most provocative session at the convention was the sports discussion moderated by Bob Wormington, president of KBMA-TV, Kansas City. With James Fitzgerald of the NBA's Milwaukee Bucks, William Y. Giles of the Philadelphia Phillies, and Wiles Hallock of the NCAA fielding a veritable barrage of questions on sports programming, the session provided a great deal of heat but not much light. From the standpoint of getting specific answers to sports questions, one of the most important programming areas for many independent stations, there was little of a concrete nature. The broad generalizations drawn by the panelists, despite some extremely sharp prodding from moderator Bob Wormington and WPIX-TV prexy Leavitt Pope, gave the general feeling that the major sports groups are playing it close to the chest until they see which way the cable ball bounces.

Overall, however, the record turnout (527 registered participants) mingled and mixed in an atmosphere of restrained optimism. President Herman Land put this feeling into words when he projected a 40 percent increase in INTV's membership for 1981: "The future is largely with us." **BM/E**

Reagan Transition Team Addresses INTV Via Satellite

INTV delegates get "big picture" of Reagan transition team

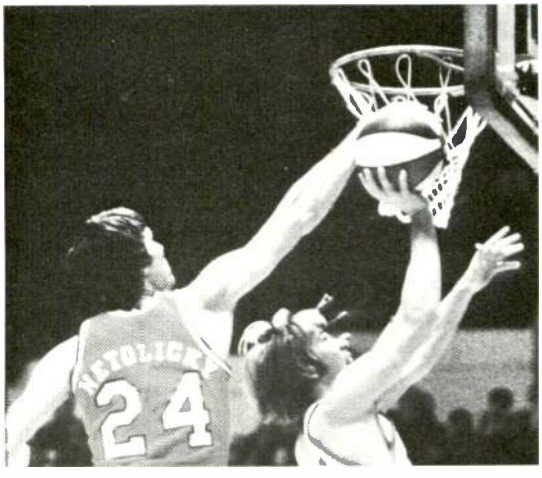
Highlighting the INTV convention was a two-way satellite-transmitted report on the FCC by the Reagan transition team. The production for the two-way audio, live transmission event, presented before an SRO luncheon gathering on Monday, January 19, was arranged by the Robert Wold Co. Beamed on a large screen at one end of the huge dining room, the unique broadcast was transmitted from the news studios of WTTG, Washington, where the panel was assembled.

Former FCC chairmen Dean Burch and Richard Wiley, former FCC commissioner Margarita White, and transition team chairman Michael R. Gardner made up the panel. They predicted that President Reagan would appoint at least four new members to the FCC within the next six months, including a new chairman to replace Charles Ferris. They also projected that the low-power VHF proposal might find tough sledding with a newly formed FCC and that license renewal legislation would be high on the agenda for the new Commission.

Transition team members were less optimistic, however, about the chances for a review of the recent FCC CATV deregulation.

Wiley opined that the new FCC would take a long look at the Fairness Doctrine and that Congress would take some definite steps on First Amendment issues. Panelists agreed unanimously that Congress should attack the problem of copyright legislation immediately because of the palpable unfairness of the current structuring.

White brought cheers from some delegates when she spoke out in favor of maximum broadcast deregulation. "Broadcasters," she said, "should not have to compete with one hand tied behind their backs."



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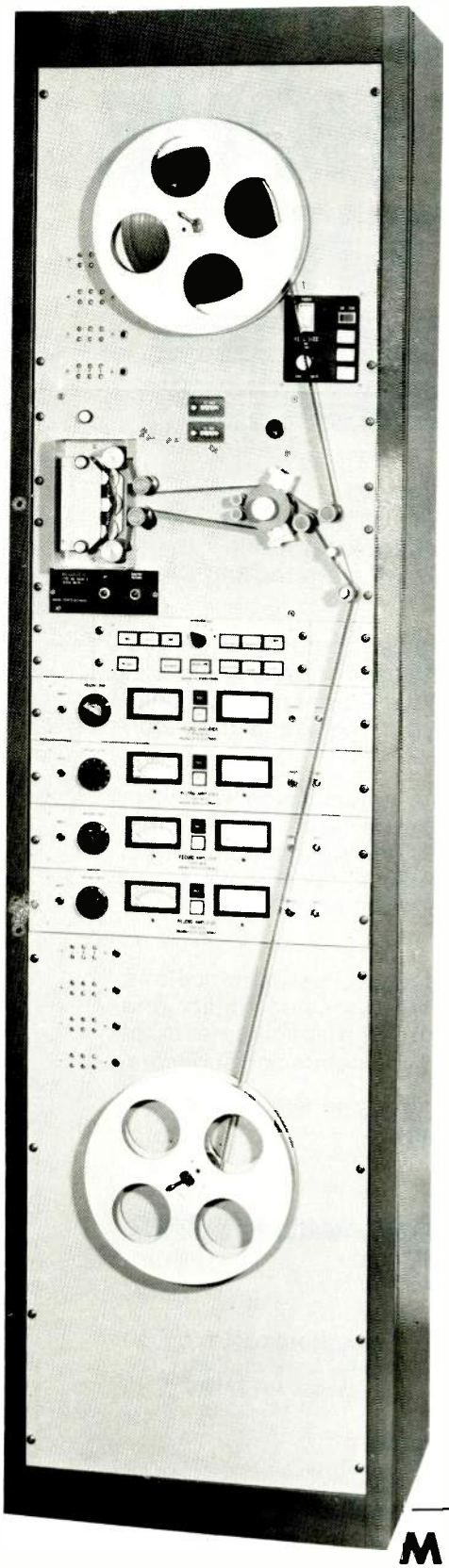

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INTERPRETING THE FCC RULES & REGULATIONS

FCC Adopts Deregulation Proposal

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

IN WHAT IS LIKELY the final major policy action by the Federal Communications Commission under chairman Charles D. Ferris, the Commission has handed a major victory to the advocates of radio deregulation. In a six to one vote on January 14, 1981, the FCC voted to adopt virtually all of the proposed changes set forth in the 1979 *Notice of Proposed Rule Making*.[1] According to chairman Ferris, "The rhetoric of 'deregulation' is now translated into reality."

Specifically, the four regulation changes include:

- The elimination of community ascertainment procedures;
- The end of limitations on hourly commercial time;
- The removal of rules requiring maintenance of comprehensive program logs; and
- The modification of nonentertainment obligations.

At press time, the text of the *Report and Order* of this major decision had not yet been published. However, the Commission expects the text to be ready by the middle of February. In addition, opponents of the decision have already appealed. So, the final outcome of radio deregulation will likely be determined by the courts.

In the meantime, the message of the Commission is clear: leave radio "regulation" to the marketplace and minimize federal involvement. We expect that the new Commission, which will be soon dominated by appointees of President Reagan, will probably support this view.

This article will outline these policy changes, as well as briefly review the evolution of radio regulation.

History of FCC radio regulation

The Radio Act of 1912 was the first attempt by the U.S. government to control radio broadcasting. This act gave the Secretary of Commerce and Labor the authority to license radio stations and operators. The lack of authority to authorize particular frequencies resulted in chaos on the airwaves. This fact, together with the apparently developing monopoly of the industry by major communication companies, led to the Radio Act of 1927, the foundation of present-day regulations.

The Act of 1927 not only regulated technical aspects of the industry, such as allocation of frequency bands, assignment of specific frequencies, and control of station power, but also mandated that radio stations were to be licensed and operated "in the public interest." This public interest standard resulted in the Communications Act of 1934, the FCC Report on *Public Service Responsibility of Broadcast Licensers* ("Blue Book"), the Fairness Doctrine, the development of ascertainment standards, and the *Primer on Ascertainment of Community Problems*. Now it has been invoked as the rationale for deregulation.

New "structural" focus of regulation

The Commission evaluated its deregulation proposal in light of the present-day composition of the industry and prevailing attitudes toward regulation. The goal of FCC regulation is to insure that through its rules, policies, and decisions, the radio frequency spectrum is used most effectively *for the benefit of the public*.[2] In this decision, the FCC has determined that the best way to serve the public interest is through easing some regulations and eliminating others altogether.

In the past, FCC regulation has focused on "content-related" policies. The Commission has imposed programming standards, time limitations, and other content-related regulation to insure program diversity. Lately, the Commission has attempted to reach this goal through other means — structural regulation. Equal employment opportunity (EEO) rules, the minority ownership policy, more effective use of the broadcast spectrum, and expansion of the AM band exemplify this new regulatory thrust. The Commission envisions that structural regulation will have the same result as the stringent content direction. According to the Commission: "The course that appears to be in the public interest, with respect to commercial AM and FM broadcasting, is the one that permits the market to dictate the programming decisions while the Commission regulates the *structural aspects* of that medium."[3]

Community ascertainment procedures

In 1927 there were only 681 radio broadcast stations in the entire United States. Today there are nearly 9000 commercial and noncommercial stations. This tremendous increase in the number of radio stations has resulted in heightened competition between stations for the largest percentage of listeners. In order to attract these listeners, the stations must structure their programming to meet the varied needs of the community. The Commission stated that this natural market process, instead of the detailed ascertainment procedures used until now, will be more effective in determining the needs and problems of a licensee's community.

[1] Docket No. 79-219, 73 FCC 2d 457, 46 RR 2d 237 (1979).
[2] See *Id.*, 46 RR 2d at 246.
[3] *Id.*, 46 RR 2d at 247.

The proliferation of stations addressing the interests of all manner of minority programming preferences, tastes, and interests in recent years indicates an awareness of the importance of those groups in the community. Already 416 radio stations in 239 markets provide regularly scheduled Black-oriented programming. In addition, 270 stations in 1973 markets provide regularly scheduled Spanish-language programming; 44 stations in all provide full-time Spanish-language programming. Overall, programming exists in 63 foreign languages or dialects.[4]

The Commission noted that another added benefit of abolishing the existing ascertainment procedure is the elimination of much unnecessary paperwork. Under the new decision, the only required paperwork related to programming will consist of the programming schedule from either a new, assignment, or transfer applicant, or a similar proposal whenever a present licensee wishes to expand its coverage area.

Even though addressing the community needs is still a paramount consideration for new or renewal license applicants, the ascertainment process itself will not be an issue in either comparative or renewal proceedings. Community ascertainment issues have already been designated by the Commission in many pending applications. At this time, it is still unclear how these cases will be affected by the decision. However, it appears that these issues will probably be dismissed.

Commercial guidelines

A study conducted for the FCC, which was included in the notice, showed that consumers would not listen to over-commercialized radio stations. The study cited the popularity of commercial-free hours, among other things, as examples of this contention. The Commission also pointed out that most licensees not only meet the present guidelines for maximum commercial time (18 to 20 minutes per hour, plus additional time during political campaigns), but also usually program commercials far below the maximum. Furthermore, if the individual radio stations take advantage of the "no guideline" policy, the Commission reasoned that any tendency towards excessive commercialization would be contained by pressure from the market.[5] If licensees were not to curb such practices, they would go out of business because they would get no support from consumers, advertisers, or other individual radio station owners.

Modification of nonentertainment guidelines

Today, because of the large number of radio stations and the individualistic attitudes of Americans, most radio stations specialize in one area of programming or target one segment of the community. In this light, the Commission felt that specific time requirements for nonentertainment programming are now unnecessary. The modification of the nonentertainment guideline would allow each station to serve its own audience. The FCC believes that more community issues will be addressed through this policy, given the large number of stations.

The Commission provided statistics to support its position that the public demands news and public affairs programming. This has been evidenced by the success of all-news formats in major cities. An Associated Press study cited by the Commission found that more than 86 percent of those surveyed considered news either "very important" or "important" and that the respondents paid attention to content.[6] Various studies based upon data from license renewal applications have shown that broadcasters generally have responded to demand for news and public affairs with nonentertainment programming in amounts significantly over the minimum. So, modification of the guidelines will likely not result in any real decline of nonentertainment programming.

Program logs

The FCC states that the elimination of program logs is a logical consequence of the other deregulation changes. Since the greater portion of the program logs were concerned with nonentertainment programming and commercial time allocations, the Commission decided to eliminate the requirements for detailed logs. The Commission reasoned that the station's public files will contain sufficient information for routine station monitoring by the public and the Commission itself.

Change, not revolution

The Commission cautioned that the changes in regulation policy do not mean that all control will be lifted from the radio industry. Federal law requires that the FCC be concerned about guarding "the public interest" in radio broadcasting. It should be noted that the FCC has not eliminated the guidelines for ascertainment, commercial time, and nonentertainment programming. The Commission has merely shifted the responsibility to the individual stations to monitor community needs and provide appropriate programming for these needs. Through this shift of control, the FCC hopes to maintain a high standard in broadcasting — the most benefits with the lowest cost.

As noted above, there will still be certain structural regulations such as EEO, minority ownership, and technical requirements and specifications. The standards outlined in the Fairness Doctrine will also be maintained.

Even though the Commission will still entertain petitions to deny, consumer complaints, and other submissions to guard against possible market failure, there are rule modifications for renewal challenges. Now, petitioners must show that a licensee is doing little or no programming to meet community needs. The quantity of local nonentertainment programming or advertising will no longer be the sole basis for petitions to deny. Under the new deregulation policy, a licensee can respond to these allocations by pointing to its own programming that dealt with local issues or cite the programming schedules of other radio programmers in the community.

However, as noted above, the thrust of the deregulation proposal is clear: the marketplace and consumer tastes and needs will be the primary factors in the operation of radio stations. Failure to address the needs of the market will result in failure of the business.

This decision is a major event in the history of the radio industry. All licensees are encouraged to read the decision in its entirety when it becomes available. Station staff should also be fully briefed on the contents of the decision. **BM/E**

[4] *Id.*, Appendix, Tables 4,5,6,7,8, 46 RR 2d at 279–285.

[5] "Freedom and Responsibility — Law: Code or Czars," speech delivered by chairman Frederick W. Ford, April 5, 1960, reprinted in Congressional Record April 11, 1960, Vol. 106 p. 3186.

[6] AP Research, "Radio News Listening," cited in *Id.*, Table 9, 46 RR 2d at 286.

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SPEAK OUT

"A Standard Interface For TV Sets Can Keep Pace With Changing Technology," Says Gene Leonard

IT APPEARS that we are approaching the adoption of a new standard in the video industry — that of teletext. Only slight hesitation should arise from the consideration that there remains some disagreement as to whether it should be teletext, Telidon, or Antiope. A somewhat longer hesitation may be suggested by the idea that, if adopted, there may be a whole new subclass of TV receivers embodying new hardware adding $50 ($100? $200??) to the cost of a set. An even longer pause may arise when we consider that the inertia generated by the placement of additional transmitter gear, production and graphic facilities, by the marketplace promotion and cost of production tooling may convert that standard into stasis.

Perhaps more information is generally required before those of us not on the EIA Teletext Committee can make reasonable judgments. Based, however, on the technical data available (see, for example, the March 1980 issue of IEEE's *Spectrum*) and demonstrations during the last year or so, one wonders how many TV production people and graphic designers have critiqued the available displays or inquired as to the improvements possible with near-term technology. Are we failing to remember the experience in the character generator field? The acceptance of that equipment was negligible until high starting-point resolution, multi-font, proportionally spaced, camera-equal, typographical capabilities were introduced.

The quality shown to date by teletext has not been highly regarded by those graphics designers whose comments I have heard. The 80 by 72 element graphic grid (teletext) or 240 by 240 grid (Philips) or the 240 by 320 grid (Telidon) are a far cry from the 30–40 nanosecond starting-point resolution of broadcast-quality character generators with their grids of 1250 to 1600 horizontal points by 480 vertical points. The public expects, and the artistic folk require, the display flexibility and quality which with two-level video can be achieved only by providing high starting-point resolution.

It may be argued, and it may be true, that the immediacy and the pseudo-interactivity of teletext (or Antiope or Telidon) more than offset primitive graphics. By the time that has been truly demonstrated in the marketplace, however, both the primitive graphic and pseudo-interactivity constraint may well be bypassed by other than teletext technology.

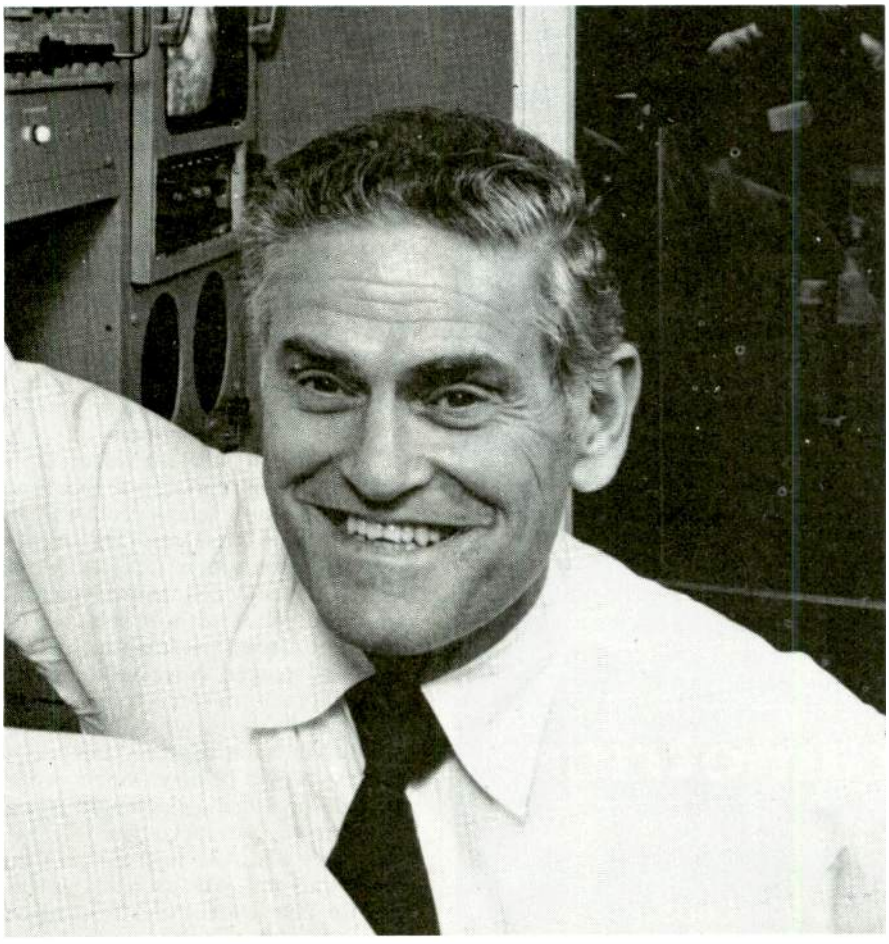
The "parade" type of selection used by teletext and its comrades with "page-turning" times of up to 20-odd seconds represents a poor compromise between access time (page-turning rate) and system capacity in hundreds of pages. (Thousands of pages are simply out of the question in a parade.) A truly interactive system wherein the head-end response to the individual subscriber's demand (a la the return-flow-via-telephone of Viewdata/Prestel) allows an enormous increase in one of the basic figures of merit (viability) of the system, namely:

$$\frac{\text{Capacity in Pages}}{\text{Peak Access Time Per Page}}$$

If one restricts the application to over-the-air transmission, it would be foolish to overlook the telephone as a method for return data flow.

If one considers the implication of multiple-channel (30? 50? 125??) cable, the viability of the limited solution to visual interactivity in the home offered by teletext suffers even further. Certainly in such a cable environment, high-quality, individualized, interactive video will appear shortly, if indeed it has not already done so by the time this column is published.

One suggested use for part of the



Gene Leonard is president of Da Vinci Systems Group, Inc., of Port Washington, N.Y.

Speak Out

teletext technology is captioning for the deaf. Here the requirements are totally different. There is no interactivity requirement. There is no loss of graphic quality on the screen. The inability of a particular section of the viewers to receive *audio* is being overcome by special equipment in the TV set. A video "hearing-aid" is being paid for by those who need it. The argument is sound indeed for *part* of the teletext technology. The argument offers no support for the teletext system.

If we do plan to make the TV set the information center in the home, then let us as quickly as possible seek a generalized solution. Let us have EIA recommend that the standard, at least color receiver, have an interface plug with standard characteristics. For example, the outputs from the TV set by means of a standard interface could be:

- Composite video
- Composite sync
- Regenerated subcarrier
- Audio
- One ampere of protected +12 volts (so we don't need a line cord on our associated gadget)

Via the same interface plug, we could provide inputs to the TV set that would allow:

- Tuning control from the external equipment
- R, G, and B video
- Audio
- Switching levels to select between external inputs and internal set signalling

I am certainly open to additional suggestions for signals at this interface as long as their cost is small.

This way, a single external adapter could provide teletext, Antiope, hard copy printing, or anything else our technologists can dream up and our marketeers market. The overhead added to the TV set would be nominal and the versatility enormous.

The suggestion that television sets be built with an appropriate interface is not a new one, but it seems peculiarly appropriate at this time when the proliferation of information services to the home has such wide interest and promises to be delivered over such a wide variety of carrier systems from a wide variety of sources. If we build the teletext equipment into the receiver on a truly modular base, we still do not accomplish the same degree of freedom of access as would be done were a proper interface provided. We should recognize that we are locked into NTSC, PAL, and SECAM and avoid being locked into any other systems, at least until the new wideband TV standards are ready and a brand conversion is initiated. **BM/E**

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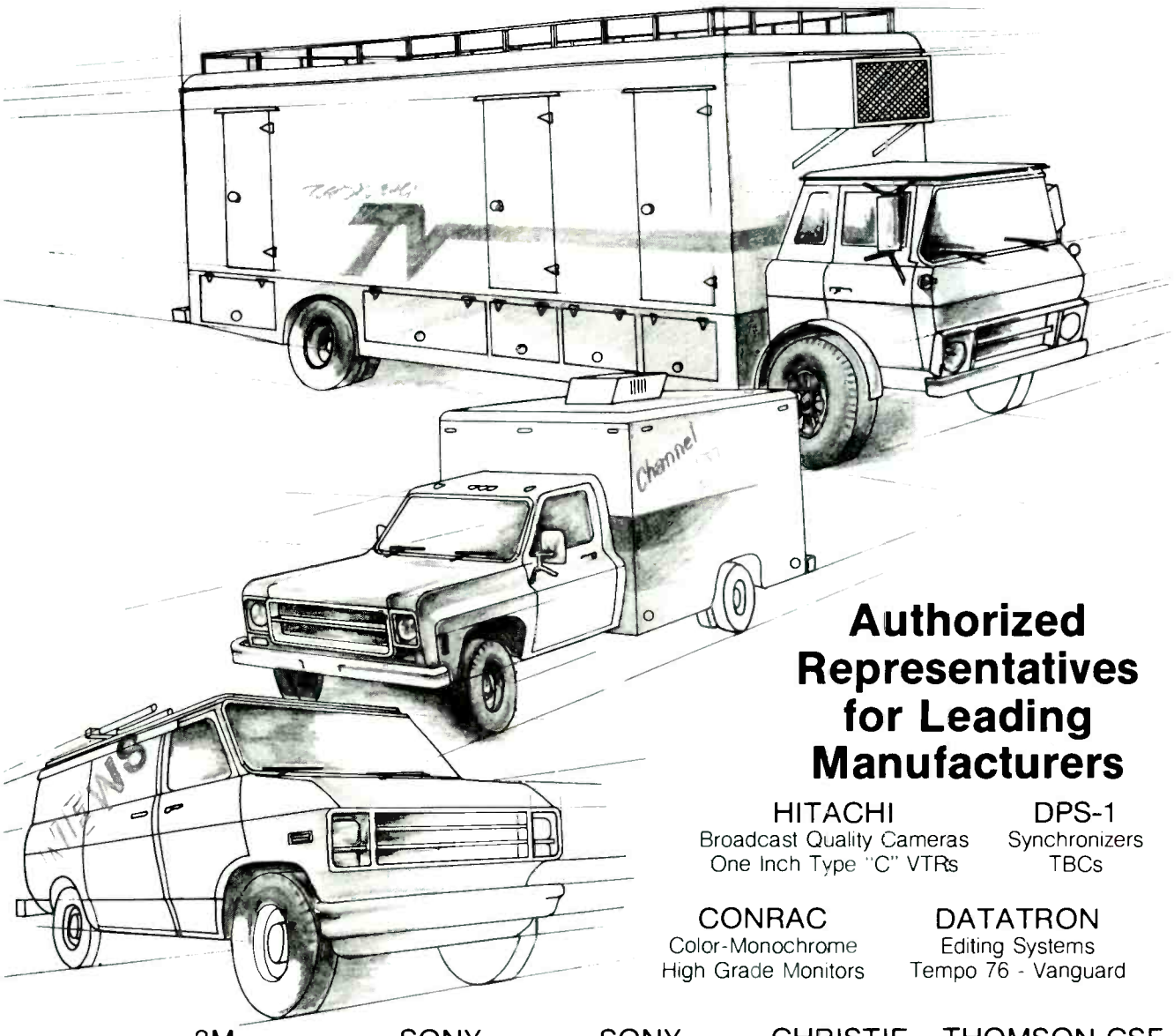

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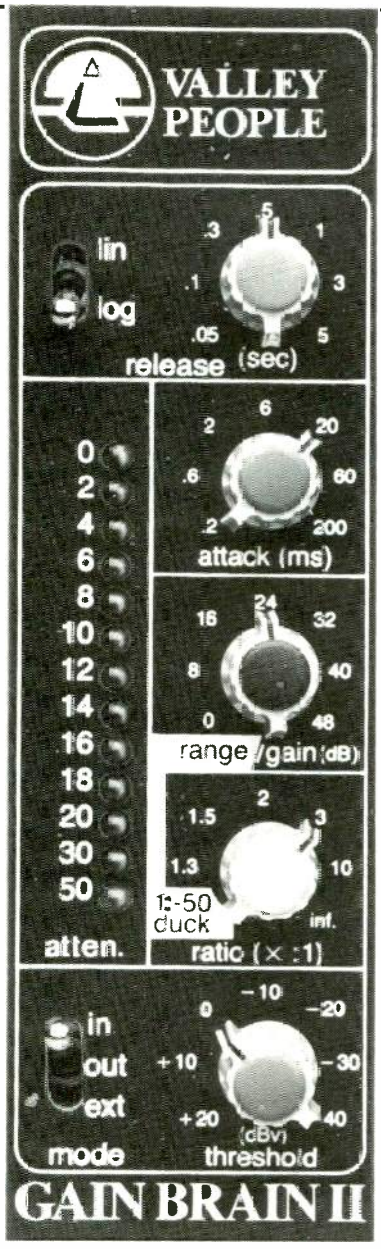

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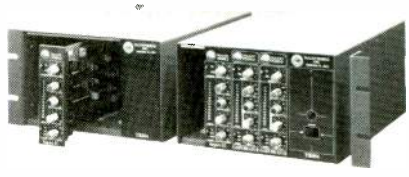
Travelling Goodies New for the 80's ... the TR-804 Processing package. It holds KEPEX II®, GAIN BRAIN II, and the host of unique processing equipment now under development at VALLEY PEOPLE. TR-804 combines all of the advantages of a portable "goodie box" for the freelance engineer/producer, with the benefits of multiple device rack mounting for the serious studio. Ample connections and powering assure its ability to accept future products.



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Editor's Note: Before attempting to implement any Great Idea involving the modification of equipment, station personnel should check with the equipment manufacturer to insure that no violation of warranty will occur.

If the Great Idea involves any technical standards governed by the FCC, stations should make sure that the idea will in no way cause a violation of FCC rules.

8. Triac Turntable Starting System

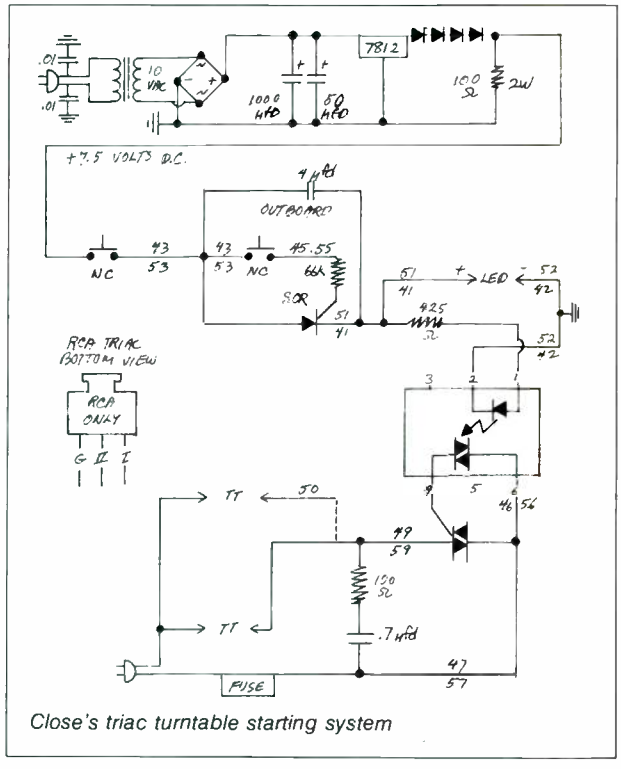
Jeffrey S. Close, Boulder, Colo.

Problem: To design a low-cost solid state turntable starting system.

Solution: These circuits have been in operation for over six months at WCWS, Wooster, Ohio, where I was chief engineer until returning to graduate school this fall. My triac controls are part of an entire home-brew IC console I built for WCWS last spring. The DJs at the station were accustomed to two momentary switches for turntable control. When I changed from relay control to solid state control I kept the momentary switches. The circuit is isolated to protect the operator and block RF. Although zero crossing is never assured, a triac does not surge or wear out like a relay. The cost of one circuit is less than $7.00, much less if you have an SCR and triac on hand (not including the cost of the switch).

The circuit is easily adapted for positive on-off control, which is the way I use it to turn on and off mic warning lights. The power supply is entirely uncritical and can be arranged to run on a 6 V bulb or an LED near the pushbutton or in the pushbutton controls. Low voltage dc control keeps ac voltages away from the console altogether.

If you use this circuit to start all your equipment, you can have one master on-off switch and then add a parallel collection of switches of the equipment in series with the main switch. Everything would turn on at once that way. The dc power supply would have to be regulated in this case.



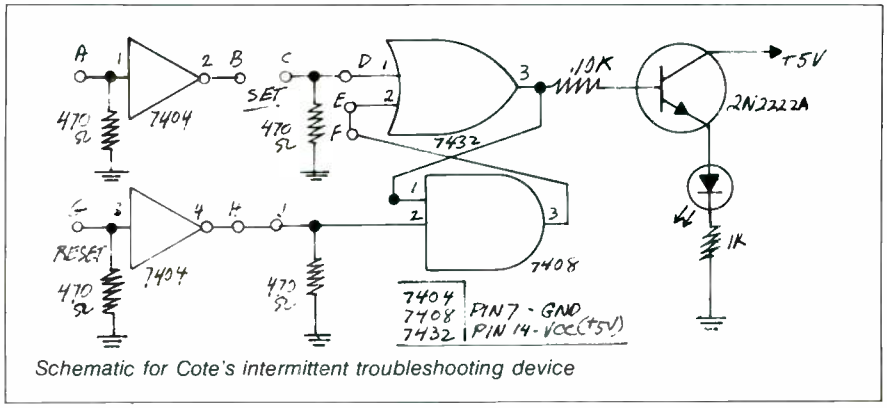
Close's triac turntable starting system

9. Troubleshooting Intermittents

Chris Coté, Maintenance Engineer
WJZ-TV, Baltimore, Md.

Problem: To design a unit that could be mounted on an ACR-25 card or any other logic device to indicate intermittent problems — the type that are so intermittent that it is virtually impossible to have the card you suspect on an extender at the time of failure.

Solution: Form a latch configuration with a 7432 and 7408 that can be used as a storage device of both positive



Schematic for Cote's intermittent troubleshooting device

and negative going pulses. The idea is to connect the SET input where you suspect the problem is occurring and the RESET to a point after the fact, for example: SET to cue command and RESET to play command. If the unit does not cue, check the indicator. Should the LED be out, the trouble is behind that point. If the LED is on, on the other hand, move ahead.

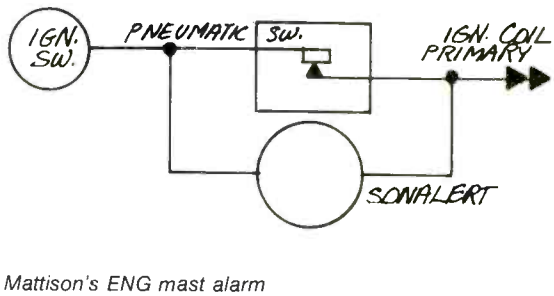
A series of small binding posts and wire jumpers may be added to the board to increase its versatility. As shown the unit will give an indication and reset on positive going pulses. If you wish to set on negative pulses, connect B to C and use A as the input. Reset on negative pulses. Break H to J and use J as the input. Or, you can disable the latch and use the unit as a simple high-low indicator by breaking E to F and jumpering E to D. C would then be the input and A the inverted input.

I constructed my particular unit on a 3½-by-one-inch PC board and backed it with a scrap of teflon. Note that the needed external 5 V supply can be derived from the board or machine being worked on. This will entail a total of four connections.

10. ENG Mast Alarm

Jim Mattison, Manager Audio/Video Services
Rio Radio Supply, McAllen, Texas

Problem: To design a device to stop the mast engine and sound an alarm when excessive pressure is applied to the ENG mast.



Mattison's ENG mast alarm

Solution: Use the pneumatic switch as illustrated to break the primary power lead to the ignition coil and connect the Mallory Sonalert across the contacts (n/c) of the pneumatic switch. This circuit will stop the engine when pressure is applied to the mast as well as inhibit starting with mast up. The Sonalert will immediately sound when the ignition switch is turned on if there is pressure on the mast.

11. Teletype Trouble Alarm

G.E. Channells, Chief Engineer
WAYB, Waynesboro, Va.

Problem: To design a device that will immediately turn off the teletype stepper switch when five, seven, or 10-bell alert signals are transmitted via TTY.

Solution: This teletype alarm works very well — and except for the stepper, it all came from the junk box! It counts five, seven, and 10 bells, alerting the operator

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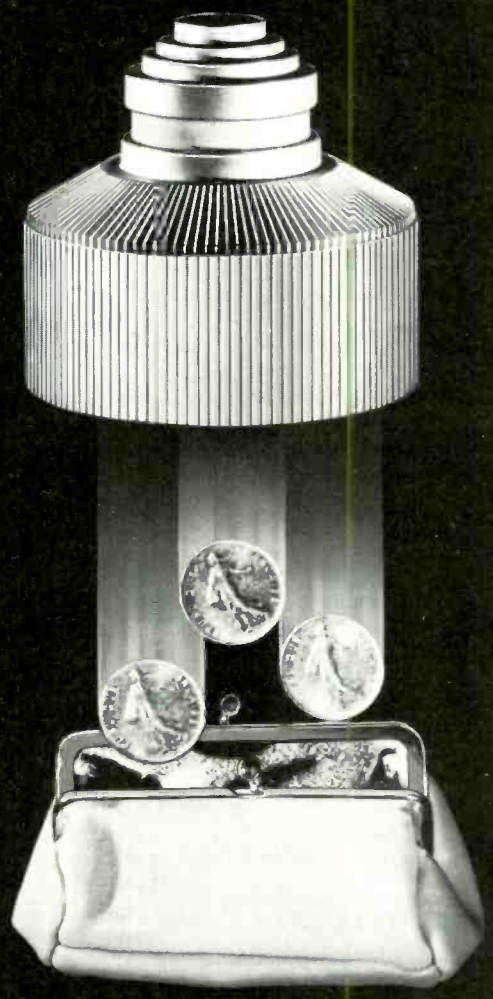

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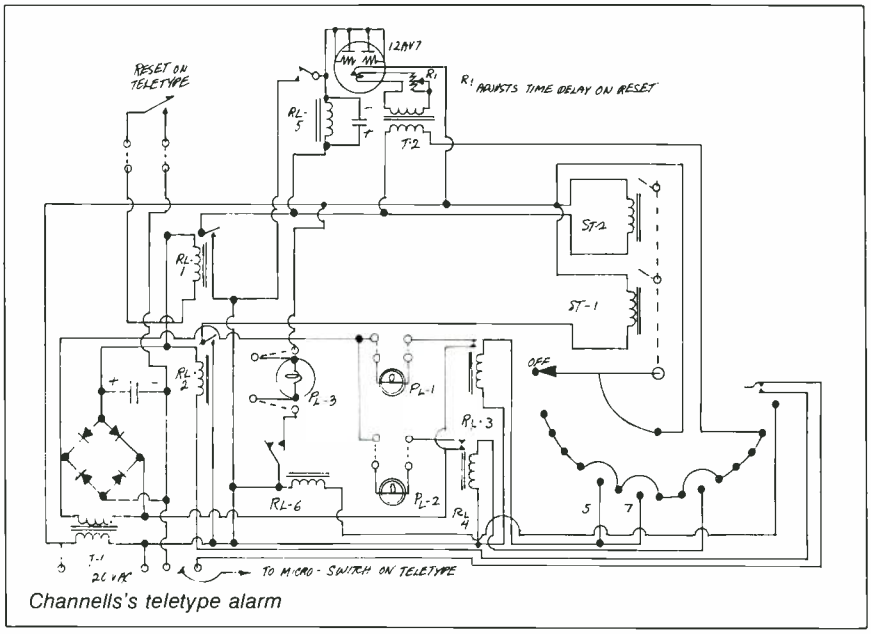

Channells's teletype alarm

when any of these are sent. It resets itself on these or any other numbers. If trouble develops in the teletype line it will turn the stepper off.

The parts for this circuit are as follows: RL-1, stepper reset relay, normally open, contacts 6 V dc coil; RL-2, same as RL-1; RL-3, news light relay, normally open, contacts 120 V ac coil; RL-4, EBS light relay, same as RL-3; RL-5, auto reset relay, 10k dc coil (Potter & Brumfield KCP11); RL-6, stepper off, same as RL-3; T-1, 120 V ac to 6.3 V; T-2, 120 V ac to 12.6 V; PL-1, #47 light for bulletin and urgent reports signal; PL-2, same as PL-1 (indicates EBS received); PL-3, regular 120 V bulb (indicates when stepper is off); ST-1, ST-2, Guardian stepper TM 22K190.

Rules for BM/E's 1981 Great Idea Contest

Mail to:
Editors, BM/E
295 Madison Avenue
New York, New York 10017

1981 Entry Form

Name _____ **Title** _____
Station Call Letters _____ **City** _____
State _____ **Zip** _____
Telephone No. _____
Licensee _____
Class of Station at which idea is used (check one)
TV _____ **FM** _____ **AM** _____
Category: Audio ____ **RF** ____ **Video** ____ **Control** ____

Objective or Problem: *(In few words; use separate sheet for details)*

Solution: *(Use separate sheet—500 words max)*

I assert that, to the best of my knowledge, the idea submitted is original with this station; and I hereby give BM/E permission to publish the material.
Signed _____ *Date* _____

1. Eligibility: All station personnel are eligible. Consultants to the industry may enter if the entry indicates the specific station or stations using the idea or concept. Manufacturers of equipment or their representatives are not eligible.

2. How to Enter: Use the Official Entry Form on this page or simply send *BM/E* a description of your work. State the objective or problem and your solution. Include diagrams, drawings, or glossy photos, as appropriate. Artwork must be legible but need not be directly reproducible and not exceeding three in number. Camera reproducible material is preferred. Length can vary, but should not exceed 500 words. *BM/E* reserves the right to edit material. Entry should include: Name, title, station affiliation, and the class of station—TV, FM, AM. Indicate if idea is completely original with you.

3. Material Accepted for Publication: *BM/E* editors will make all decisions regarding acceptability for publication. If duplicative or similar ideas are received, *BM/E* editors will judge which entry or entries to accept. A $10 honorarium will be paid for each item published.

4. Voting: Every reader of *BM/E* is entitled to rank the ideas published. This can be done on the Reader Service Card in the magazine or by letters or cards sent to the *BM/E* office. To vote, readers should select the three ideas they like best and rank them 1, 2, or 3.

5. Winners: Top rated entries in the year-long tally will become winners in each of the three major categories (AM, FM, TV). Final winners will be picked in February, 1982, and announced in the March, 1982, issue of *BM/E*.

6. Prizes and Awards: Three top prizes will be awarded; a programmable electronic calculator will be awarded for the highest rated entry in the respective categories of AM, FM, and TV. Ten engineering slide rule calculators will be awarded as secondary prizes for the highest rated entries in the following additional categories (top three winners are not eligible for these prizes): audio (three prizes, one each in the AM, FM and TV categories); RF (three prizes, one each in the categories of AM, FM, TV); Control (three prizes, one each in the AM, FM and TV categories); Video (one prize in TV).

"Our Auditronics on-air and production consoles pay off three ways",

says Chuck Cooper, General Manager of WKOR in Starkville, Mississippi. "When it came time to rebuild this station, we wanted to go first-class all the way to the tower. Of course, that meant starting with first-class consoles for both on-air and production. But when you own a 1 kW station in a small market, you've got a modest budget to work within, and you can't afford to make a mistake."

"So we took our CE, PD and Op. Mgr. to NAB to look at everybody's hardware with an open mind to make sure we got the best value for our money. We believe we got it in our two Auditronics 110 consoles. First, our on-the-air people love the Auditronics boards, and being able to show this type of equipment helps us to attract the level of talent we want."

"Second, in a small market like ours, the stations do most of the commercial production, and the quality we get out of this Auditronics production board has helped us capture 80% of the production work in The Golden Triangle. Third, the Auditronics boards give us an audibly superior on-air quality that sells very well to our advertisers, and that's the real bottom line."

If you'd like to know more of what WKOR's Chuck Cooper and 500 other satisfied users in both small and large markets have learned about Auditronics console quality and pay-back, circle reader service number or call us for complete information and the name of your nearest demonstrating Auditronics dealer.

auditronics, inc.

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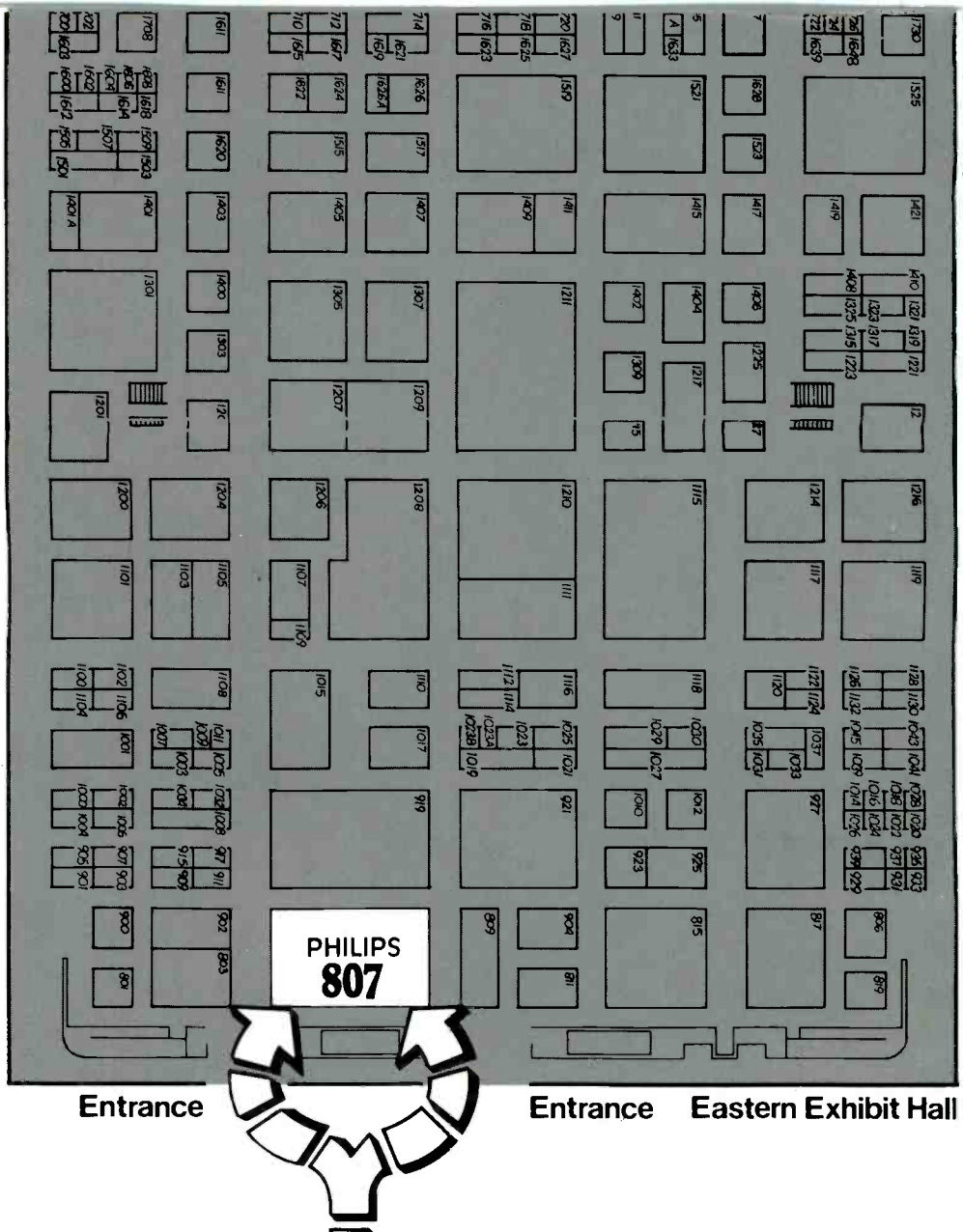
Circle 296 on Reader Service Card



Profitable Production starts here!

Profitable production in the 80's requires efficient, cost-effective operation...which *starts with cost-effective cameras.* And Philips offers the greatest value in field and studio cameras today!

At NAB, Philips will combine live and taped demonstrations to focus on:

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- **Demonstrations of production techniques** used by some of the most quality and cost-conscious broadcasters and production companies in the U.S. and Europe.
- **How to increase bottom-line profits** without sacrificing creativity or quality.
- **Financing** for equipment, van and studio.

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PHILIPS

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BROADCAST EQUIPMENT

Digital Mix Effects 350

The DME (Digital Mix Effects) System incorporates the maker's FS-15 frame synchronizer, described as the first to use energy efficient 16K RAM memory chips for maximum operational stability, plus the DVP-15 digital video processor and the DPC (Digital Programmable Controller). Special effects possible with the system include fixed and variable compression; expansion;

positioning; freeze frame/field; and flip, tumble, auto pan, and tilt of a video image, live or on tape. Action sequences may be broken down into a series of pretimed still frames with the incremental freeze control; exclusive posterization/solarization, split, and mosaic effects may also be created. Effects patterns may be programmed into the memory or controlled manually; a standalone control panel provides switcher independent operation. The modular design allows addition and expansion of capabilities at user discretion. NEC AMERICA INC.

Video Distribution Amp 351

As an independent unit, the VDA 3027 is a high-performance, six-output video DA with a preset 0 dB gain selected by a slide switch on the PC board. One of the range of optional sub-units may be plugged into the VDA to modify its operation and provide cable equalization, preset video delays, a differential input, or other specialized functions. The 6 dB gain mode compensates for the insertion loss of any of the plug-in sub-units. This configuration provides an economical multipurpose function, quickly changeable at any time, based on a single standard type of amp. The amplifier is separately powered from an unregulated dc power supply that feeds all units within the same frame. It is built into a standard 3U high by 1M wide equipment module; up to 13 amps plus the MPS 3035 power supply can be housed in a single frame. Non-standard units may be available upon request. AVITEL.

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

Small Audio Mixer 352

The compact, portable MX80 mixer offers a wide range of features in a small package. Among the facilities available on the unit's front panel are: 6 dB midrange equalizer; peak overload indicator/VU meter; individual channel phase reverse switches; plug-in active components; high-pass filters that eliminate wind noise and low-frequency rumble (filter slope is 12 dB per octave); variable gain/attenuation controls for each channel; built-in line up oscillator; internal high-quality electret mic; powerful monitor amp;

two outputs (one unbalanced, one 600 ohm balanced and high-level); rechargeable or throwaway batteries (standard C cells); peak limiter; switchable meter illumination; and others. Four input jacks, four mic power controls, and several other features are located on the rear panel. Maximum gain is 90 dB; THD is 0.1 percent maximum; distortion is 0.005 percent maximum. The mixer measures 3½ by 9¼ by 7¾ inches and weighs 5 pounds, 3 ounces. COHERENT COMMUNICATIONS.

Tilting Camera And Stand 353

Manufactured to meet the demands of professional broadcast users, this new tilting camera and stand are now available and were shown at the SMPTE Exhibition. Built by Dage/MTI, the camera offers over 1000 TV lines of horizontal resolution, flatness of field, and a small lightweight head with full remote control. The stand, from Triple S, allows smooth and accurate positioning for the camera. SYMCO INC.

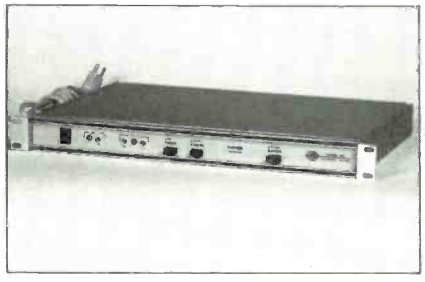
Broadcast Equipment

Camera Stabilizing System 354

The Helico camera stabilization systems are designed as lightweight helicopter stabilizers for video and 16 or 35 mm film cameras. Helico I suspends the camera from a pole mounted between the door frames of the helicopter; it weighs 12 pounds and can be transported in a compact case easily handled by one person. Setup time in a Bell Jet Ranger is three to five minutes, according to the manufacturer. Cameras up to 33 pounds can be moved in any free or fixed position when mounted. The Helico II, also weighing 12 pounds, is installed by attaching a base to the aircraft seat frame's existing holes. The systems can also be adapted to boat and auto applications. Both feature vibration-free shooting from most helicopters; counterbalance weight kits for nearly all film and video cameras; operator safety (operator remains seated normally in aircraft); and virtual elimination of wind-buffeting. Helico I, $8995; Helico II, $10,995. IMAGE DEVICES INC.

Videoscope 355

The PVS-430 videoscope is designed for certifying correct SCH phase relationship. It does this by accurately measuring the SCH phase relationship and comparing the video inputs of a switcher or mixer for precise and accurate system timing. Subcarrier-to-horizontal relationship (specified by RS-170A) is not affected. Two outputs of standard video format can be displayed on any monitor. A second video input allows comparison of two video sources, useful in timing multiple video sources. Input voltage is 120/240 V ac, 50/60 Hz, 25 W; the unit takes up 1¾ inches of 19-inch rack space. LENCO INC.



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

Sealed Lead Battery Packs 356

Model SL-125 On-Board™ battery pack mounts to the backs of Hitachi FP-40S and SK-91, Ikegami HL-79A, JVC KY-2000U, and Sharp XC-700 portable video cameras and is completely compatible with existing battery pack mounting brackets. It features sealed lead batteries, quick

hook-on, a quick-release latch, and firm electrical connectors, with no need for power cables. Weighing five pounds, two ounces and measuring 5 7/16 inches by 3 5/8 inches by 3 1/4 inches, the pack puts out 12 V dc, 5 AH and provides power for approximately two hours. It can be fully recharged in two hours or less with the maker's SLC-125 fast charger or overnight with the RTC-125 trickle charger. $135. FREZZOLINI.

Intelligent Autolocator 357

The microprocessor-based Intelocator XT24 interfaces with the 3M M79, Studer A80, and Ampex MM 1200. It utilizes two separate counters, master and intelocate, both operating in minutes and seconds. Other features include four pre- or immediate load memories; an inches-per-second speedometer for vari-speed reference; full standard tape transport remotes with LED indication; leverwheel numerics for faster location point entry with physical memory; high accuracy of ±2 seconds over 30 minutes of tape at 15 ips; and automatic master count freeze display for logging on tape runout. The two units that comprise the XT24—a small calculator-style control unit and a compact logic computer unit "brain" housed within the multitrack tape machine—are linked by a 26-foot miniature multicore cable. Special facilities include TILT, which restabilizes the computer if affected by external influence, and RESET, which resets all computer memories. AUDIO KINETICS (U.K.) LTD.

Broadcast Equipment

Headphones 358

DR-M5 headphones, intended for accurate monitoring of live recording, feature a lightweight, rugged design with a fold-up, swing-out mechanism for easy carrying and use. The newly developed driver has a highly efficient samarium cobalt magnet that permits weight to be decreased while improving the damping characteristics. The driver also uses a vapor-deposited metal film on the high-excursion diaphragm to minimize sound degradation. Frequency response is 15 Hz to 22 kHz. The unit will handle large input levels over long hours of use, according to the manufacturer. Variations between the two channels in terms of sensitivity and frequency characteristics were kept to a minimum, and a special cable minimizes crosstalk levels. $65. SONY.

Microwave Antennas 359

Two new microwave antenna systems for the 18.36–19.04 GHz fixed point-to-point band include two-foot and four-foot diameter high-performance shielded parabolics plus a full line of rectangular waveguide components. The antennas are center-fed and have continuous polarization orientation for ease of installation and field alignment. Both conform to FCC Part 94 and Part 21 (two-foot, Standard B; four-foot, Standard A) requirements. Each antenna comes with a long-life Teglar™ radome and a vertical tilt mount for attachment to the 4.5-inch diameter pipe. ANDREW CORP.

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

Weather Colorizing 360

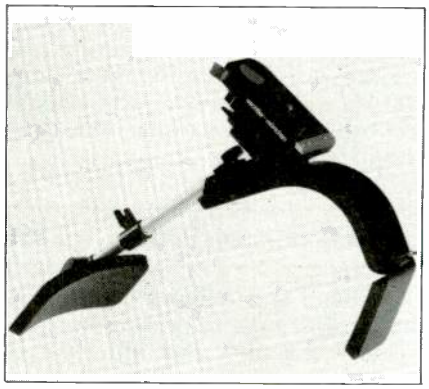
Paint Box is a new feature of the Sat-Weather line of colorizing weather satellite picture receivers. Now standard on all units, the feature gives users the ability to impart natural land-mass and water colors to any of the satellite weather picture formats supplied by NOAA. Sat-Weather receivers automatically receive, colorize, store, and deliver video-formatted weather satellite pictures received from NOAA as black and white signals. The units automatically colorize the two most popular pictures desired by the user. With the addition of Paint Box, a user may colorize and add to memory any NOAA-transmitted picture. ARVIN INDUSTRIES.

UHF Antennas 361

LPS Series low-power UHF antennas handle 1000 W and have a maximum gain of 12.2 dBi. Null fill and beam tilt are standard on the antennas, which are 5½ to eight feet long. Radome and structural support are provided by a complete fiberglass encasement. No guys are required. From $2950. BOGNER.

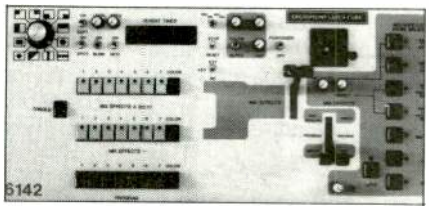
Shoulder Brace 362

The new Sachtler shoulder brace is suited for use with most ENG cameras, as well as all 16 mm and 35 mm flat-base motion picture cameras. Completely adjustable to conform to the wearer's body, it features a camera platform with a built-in, quick-attach/quick-release plate; eye-to-eyepiece and side-tilt adjustments; a three-inch wide foam-lined shoulder support with radius adjustable from 4½ to six inches; and a telescoping chest-support rod that extends from eight to 12 inches, removable if desired. The brace measures 14 inches long by 17 inches high by seven inches wide when extended, and collapses for storage to 12 by 5½ by 3½ inches. It weighs two pounds, nine ounces. ARRIFLEX CORP.



Production Switcher 363

Model 6142 video production switcher has eight inputs (including colorizer) and three buses with two fader handles, allowing flexibility in performing a dissolve to an effect and back again. The self-contained unit also features 12 patterns, including diamond, square, and circle with positioner; double reentry; variable soft wipe; and pattern modulator with level and frequency adjustments. Internal or external keying that can be mixed or wiped in, blink key, spot-lite, and event timer are also included. The colorizer is internally connected to input 8 and features LUM, SAT, and HUE controls. The switcher requires sync and subcarrier drive inputs and offers black burst output, loop-through video inputs, and a blanking processor. All input signals receive dual back porch clamping. Each input also accepts synchronous, nonsynchronous, color, mono, composite, or noncomposite signals. $4800. CROSSPOINT LATCH.



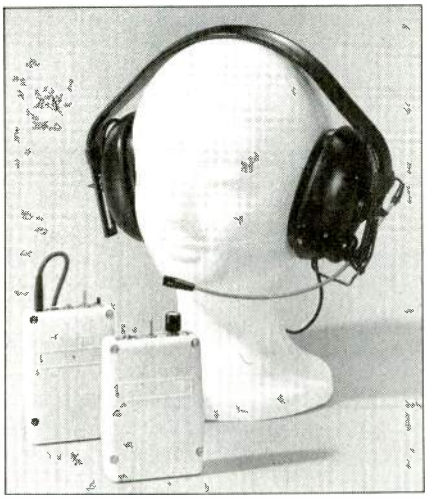
Program Controller 364

"Jock-Mate" is a cassette controller that random-accesses commercials or music from any part of cassettes in any sequence of six Eumig FL-1000 cassette decks. In addition, it will activate five auxiliary sources (any combination of reel-to-reel or cart recorders). The device, intended for live assist (not automation), can cue up music or commercials tightly within 1/3 second, even by an inexperienced performer, according to the manufacturer. CLIFF GILL ENTERPRISES.

Broadcast Equipment

Wireless Intercom System 365

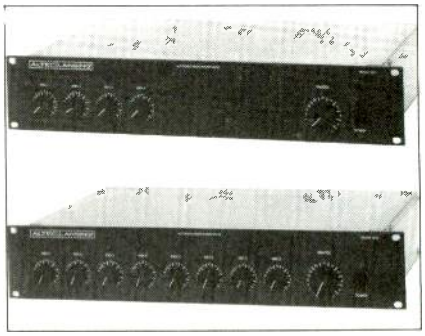
This new wireless intercom equipment allows the user to custom-design a system offering person-to-person intercommunication at distances up to 1000



feet. One-way, two-way, and multiway modes are possible. The system offers unrestricted movement and avoids potential shock hazards, suiting it for broadcast applications such as cuing for sound, camera, and lighting crews and direct instruction of crews and performers. The QT-1 transmitter and QR-1 receiver are housed in compact, impact-resistant cases. Power comes from 9 V batteries. The transmitter is FCC approved and operates in the 150–216 MHz range, avoiding interference from CB users. Audio performance is high voice-grade quality, according to the manufacturer. A complete line of accessories, including single and double muff headsets or separate earpieces and electret mics, is available. CETEC VEGA.

Automatic Mic Mixers 366

Model 1674 (four-input) and 1678 (eight-input) automatic microphone mixers incorporate the manufacturer's patented gain-sharing principle, which allows the system to deliver maximum acoustic gain while helping to prevent feedback in multi-mic operations. Analog circuits compare the level of each input channel to the total of all inputs and adjust the gain of each input so as to hold the overall mixer gain constant. The mixers are also designed to accurately compensate for the difference between coherent and non-coherent signals. Other features include balanced mic or line level inputs with



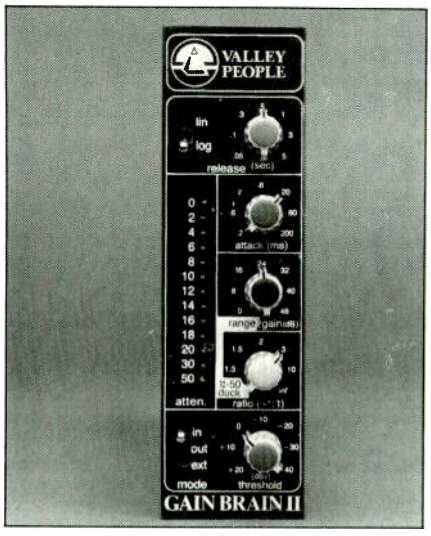
phantom power for condenser mics; TTL-compatible logic outputs for logging recorders; remote muting and priority override control; switchable 200 Hz high-pass filters; and auto/direct bypassing in each channel. ALTEC LANSING.

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

Limiter/Compressor/Ducker 367

Gain Brain II is a limiter/compressor/ducker with proprietary waveform recognition circuitry that allows it to "comprehend" the performer's intent

in terms of optimum output loudness for each note. The effect claimed is a significant improvement in the preservation of dynamic integrity during limiting and less "limiter sound" than for conventional peak or RMS responsive devices. Front-panel controls include



interactive gain control and controlled impact accentuation on percussive tracks. Provisions have been made for stereo intercoupling, side chain operation for frequency-dependent gain control, and remote VCA and/or remote GR metering. $380. VALLEY PEOPLE.

Single Wire Control 368

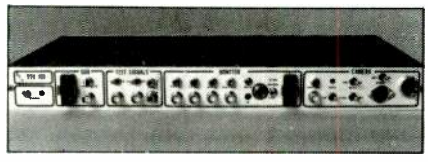
These encoded control modules eliminate the large quantity of multiple conductor cables required between a telecine or VTR and a remote control panel. Up to 14 separate machine functions and 14 tallies are encoded on one pair of wires. No special control panels are required. The unit does not use a party-line approach, eliminating possible interaction, simplifying servicing, insuring modularity, and permitting a phased-in approach to utilization, according to the manufacturer. The user may convert to the encoded system as new equipment is purchased without affecting existing installations or may change to encoded signals throughout the plant. TORPEY CONTROLS & ENGINEERING.

Low-Cost TV Monitor 369

This low-cost color receiver/monitor comes in two versions: the 13-inch VM-13 and 19-inch VM-19. Features include the latest IC circuitry, quick-start in-line picture tube, slotted mask, black matrix, automatic fine-tuning, and automatic gain control. A toggle switch changes the set from receiver mode to video monitor mode; the set accepts standard composite video in the monitor mode. Looping inputs (with switchable 75 ohm termination) allow multiple sets to be linked. An audio input is also provided. VM-13, $449; VM-19, $575. V.A.M.P. INC.

Video Test Center 370

The VTC-100 video test center is designed as a central junction point for test signals and reference information used in the testing and repair of video equipment. The unit provides rear-panel inputs for color bars, convergence, multiburst, test pattern, off-air or cable RF, 1 kHz audio sine wave,



and (optionally) black burst. The rear panel also has an eight-pin connector for the bench monitor. Front panel sections permit VTR interface and monitor interface. Any test signal may be selected to be fed to either a VTR or monitor under test via switches and/or jumpers on the front panel. The unit occupies 1¾ inches of 19-inch rack space. CANTER-REDMAN TECHNOLOGY.

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SS8900

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Our experience gained in over 30 years of engineering broadcast audio systems has been incorporated in the design of the SS8900 console, ensuring the inclusion of the reliability, quality, features and systems compatibility expected by the modern broadcaster.

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