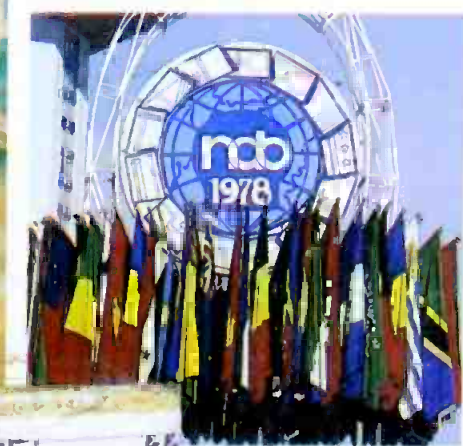


# BROADCAST ENGINEERING

May, 1978/\$2.00



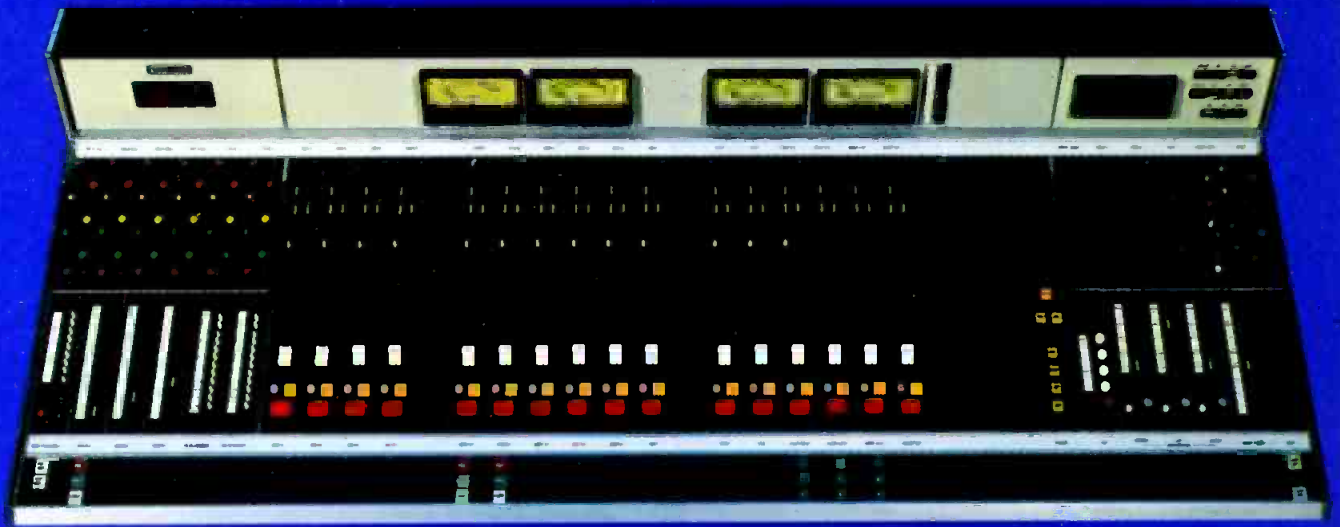
## NAB CONVENTION wrap-up issue



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WBS 2000  
showing some options.



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Ward-Beck Systems Inc., 6900 East Camelback Road, Suite 1010, Scottsdale, Arizona 85251.

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# and then some.



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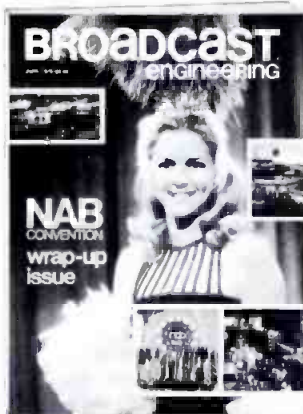
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# BROADCAST engineering

The journal of the broadcast-communications industry



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## About the cover

The theme of NAB '78 was "Broadcasting International," with exhibitors and attendees from around the world. Our cover reflects the wide array of products and sights at the convention. The brightly adorned "cover girl" is Robin Timm, who was photographed in the Thomson-CSF Labs booth, one of 10 booths whose lighting was set up by Imero Fiorentino Associates Inc. (Photos by Donna Foster Roizen.)

## Departments

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SBE Journal	.....
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Classified Ads	.....

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### EDITORIAL

Ronald N. Merrell, *Editorial Director*  
 Michael Scheibach, *Managing Editor*  
 Ron Whittaker, *Production Spotlight*  
 Howard T. Head, *FCC Rules*  
 Joe Roizen, *Video*  
 Peter Burk, *Radio Workshop*  
 Dennis Ciapura, *Audio*  
 Robert A. Jones, *Facilities*  
 Carl Babcoke, *Technical*  
 Hillary Manes, *Editorial Assistant*  
 Dudley Rose, *Graphic Designer*

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### ADMINISTRATION

George H. Seferovich, *President*  
 Mike Kreiter, *Publisher*

### ADVERTISING SALES

Jan Winters, *Production*  
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# DIRECT CURRENT FROM D.C.



June, 1978/By Howard T. Head & Harold L. Kassens

## New checklists published

Two new booklets published by the FCC Field Operations Bureau may be worth getting. One is an inspection checklist for AM/FM stations and the other is for TV stations. The lists are modified versions of the checklists used by inspectors for performing broadcast station inspections. Each item provides for a box to be checked and gives the applicable rule-number. There are 311 items on the AM-FM list and 212 in the TV list. While these lists will not guarantee a clean inspection, they will let you know in advance most of the things the inspector will be looking for. Copies may be obtained from your local FCC field office.

## FCC waives application processing rules

The commission has granted requests from two applicants to have their applications for major changes in AM facilities pulled out of the AM processing line and given expedited consideration. Both are said to be serving minority populations. In two previous cases, the commission waived its procedures to put minority applications on a "hurry up" cut-off list.

## NAB establishes industry committee

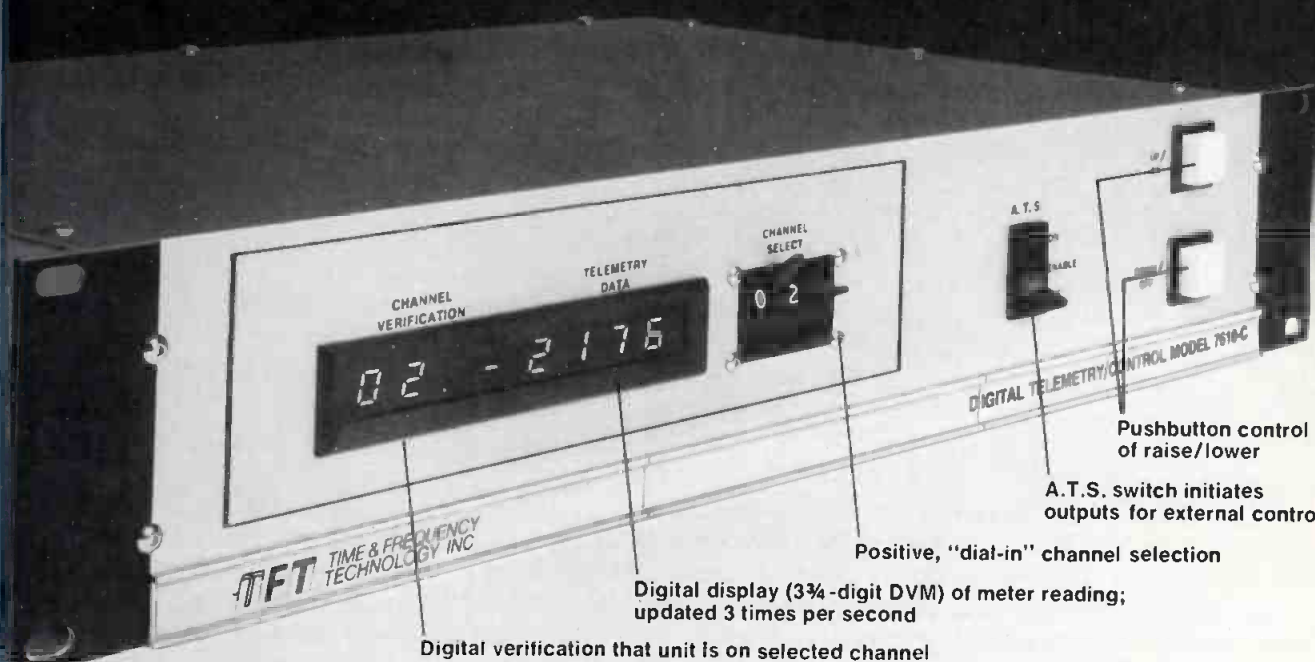
The National Association of Broadcasters has appointed a committee of industry representatives to study the rapidly growing subject of ancillary TV signal techniques and the impact these signals may have on the television industry. The recently published "Report of the Ad Hoc Committee on Television Broadcast Ancillary Signals" provides the basic information on the various types of ancillary signals (e.g., VITS, WIRS, SCAs, CEEFAX, ORACLE, etc.) which are in use or proposed for industry use and will provide the starting point for committee consideration of the extent to which ancillary signals should be used by the broadcast industry.

*continued on page*

BROADCAST ENGINEERING



# Digital remote control, priced like analog

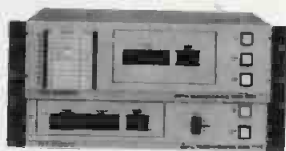


Now you can have ten channels of raise/lower and telemetry in a digital remote control system — the TFT 7610 — that costs only a little more than the most basic analog systems.

With the 7610, you don't have to twiddle calibration knobs or interpolate from meter scales. Instead, you get a positive, unambiguous data display. In addition, you get BCD (digital) outputs that make the 7610 compatible with computer and ATS systems. Most importantly, with TFT digital designs, you get increased data accuracy and fewer errors because of special closed loop data verification.

Along with a low price and digital convenience, the 7610 also gives you convenience features you'd expect to find only in much more expensive systems, if you find them at all.

Calibration, for example, can be done on site by one man. And unique, quick-disconnect barrier strip boards allow you to remove the equipment from the rack without interrupting any of the wiring to the transmitter or sampling points.



Model 7610 control point (bottom) and remote point modules.

You also have your choice of interconnect setups: telephone lines, STL and SCA or TSL. Data is transmitted via pulse code modulation (PCM) and data modems are built-in.

Modular versatility is another advantage, and a TFT exclusive. For example, when and if you want, you can add up to 60 more channels of telemetry and raise/lower, in 20-channel increments. Or, mate the Model 7610 with our Model 7615 Status Monitoring and Direct Control unit. That will give you direct on/off control and status monitoring — up to 30 channels of each. You can add modules at any time in the field.

So, whether you're upgrading an existing system or starting from scratch, specify TFT for remote control. It could be the start of something big.

For details and a demonstration, contact your TFT representative or call the factory. In Canada: Caldwell A/V Equipment Co., Ltd., Toronto (416) 438-6230.

Modular digitals for remote control.

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# DIRECT CURRENT FROM D. C.

*continued from page 4*

## FCC panels discuss noise figure

As we reported last month, the commission set aside one day to consider the question of a possible change in the permissible UHF TV receiver noise figure and set up panels of experts to inform them of the technical matters affecting receiver noise figure. Our reaction to the exercise is that the procedure was a good process for educating the commissioners on the complexities of the subject but it did not provide them with the answers they were seeking.

## FCC speeds up AM application processing

As we reported in the April issue, the FCC Broadcast Bureau established an engineering task force to process all AM major change applications filed on or before June 30, 1976 (the date of the freeze). We are happy to report that the procedure succeeded and the staff engineers are now working on applications filed after January 1, 1977. There's only one problem: the lawyers have 1,084 applications to process and there are only seven or eight available.

## Commission issuing policy statement

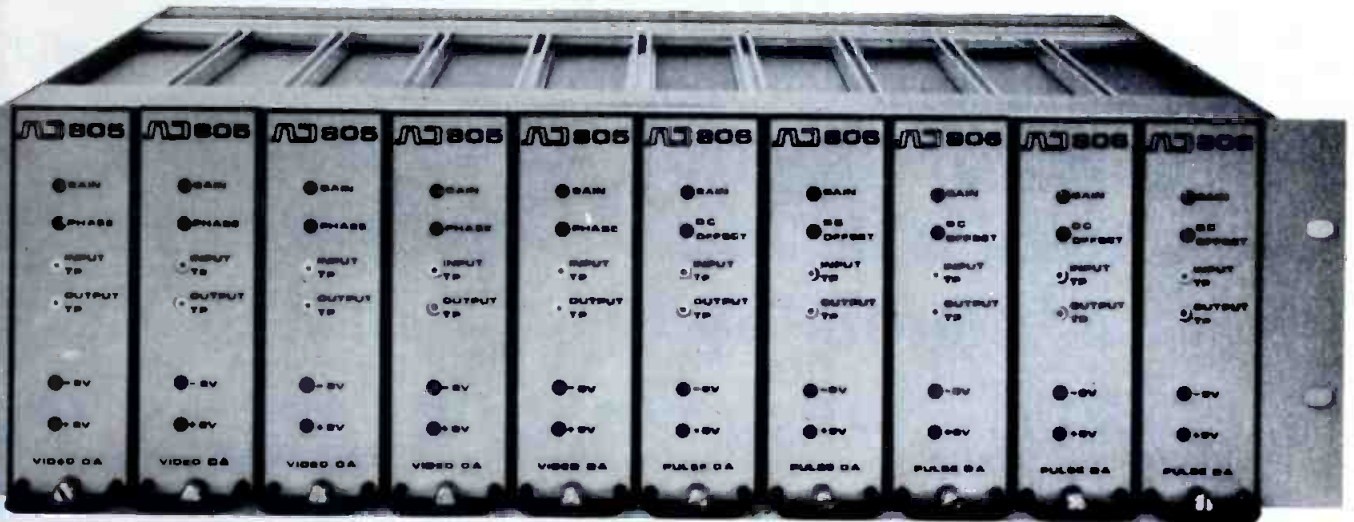
The commission has had several meetings with the staff concerning enforcement of its TV rules concerning proper synchronizing signals. It seems that some production houses and TV studios are being very sloppy in their production of videotape programs and commercials and the FCC Field Operation Bureau has been issuing notices for violation of the rules concerning improper synchronizing signals (Section 73.682 and 73.699). The stations reply normally is that the material was received that way. The commission is preparing a policy statement which is expected to say that the inspectors will be a little more lenient for about one year, but after that time the station will have to reject the material or shoulder all the blame.

## Short Circuits

When stations report to the inspector that they haven't received an EBS weekly test for ages, he will call attention in the violation notice to Section 73.932(c) of the rules which says it's the responsibility of the station to find out why, when a test signal is not received...A reregulation order should be issued soon permitting FM stations to change antenna, transmission line, and/or transmitter power without a formal application so long as the Effective Radiated Power and Height remain the same...The commission is still pleading with applicants not to send in application fees. Seems some are using out-of-date application forms which refer to the former fee.



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Series 800 Modular Distribution Amplifiers offer a totally new approach to systems flexibility. Up to ten audio, video, or pulse modules, in ANY combination, can be mounted in a single frame. Each amplifier features its own built-in regulated DC power supply for improved reliability. Front panel test points and controls make service adjustments a snap!



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Clamping Video D.A.
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We're speaking of the potential FCC claim that your broadcast signal is illegal.

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Cezar International has solved this silly problem for less than \$500.00, it's called the "Infielder"

Our new "Infielder" board bridges the gap. Off-line, it eliminates the *whip at the top of the picture*; it simply takes care of non-framed edits once and for all.

Also, a word about our service manual. You *could* build your own solution... it's that complete. Send \$495 for the manual and get an "Infielder" FREE. A neat package.

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# industry NEWS

## Television information system to premier June 26

A new system that can transmit information over a normal television screen, resulting in what may become the first "electronic newspaper," will have its first U.S. demonstration June 26-29 in Philadelphia.

The system, called INFO-TEXT, enables digital information to be sent to home and office television screens without interfering with normal picture transmission.

According to Micro TV Inc., who will demonstrate the device, INFO-TEXT adds a new dimension to the delivery of news and other information for business and the general public. It is currently being used in the United Kingdom by the BBC, developers of the system.

INFO-TEXT transmits its information between lines 14 and 17 on the television signal, normally unused in picture transmission. More than 3,000 pages of information can be sent over a given system and can be in the form of any material that can be placed in a computer. Thus, the pages can be alphabetical, numerical, or alpha-numeric printouts, figures, shapes and art forms, etc. Reception is possible only with a "decoder" attached to the TV receiver's antenna terminal. The decoder is made by Micro TV.

As an electronic newspaper, news will be fed into Micro TV's "Teletex" computer from wire news services or field reports, and then transmitted. By pressing a button on the decoder, the home owner selects the particular program desired:

## Hurley optimistic about SBE's continued growth

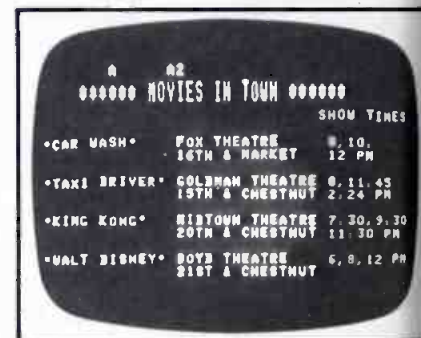
At the annual membership meeting of the Society of Broadcast Engineers, held during the NAB convention, it was reported that interest and membership are growing, and 1978 looks to be a landmark year for the society.

Much of this optimism was reflected by newly elected president James Hurley of WTAE-TV, Pittsburgh. Hurley replaces Robert Wehrman of the Cox Broadcasting Corporation, Atlanta.

Hurley listed his top five projects for 1978 as increasing SBE member-

hard news, financial news, stocks, weather, sports, or other information.

Attendance at the demonstration will be by invitation only on request from William or Leon Gross, Micro TV Inc., 3600 Conshohocken Avenue, Philadelphia, PA 19131; (215) 879-0600.



The top picture shows an example of a news page with movie listings transmitted through the INFO-TEXT system. Below is an electronic table of contents with special codes of where to locate further information.

ship, continuing the recertification program, raising membership dues and holding at least one national meeting of chapter chairmen.

In one of Hurley's first official acts as president, he honored Albert R. Hillstrom, KOOL Radio-TV Phoenix, as a Fellow member of the society. Hurley cited Hillstrom for his outstanding work and contributions to the SBE.

Pat Satter, assistant to the secretary-treasurer, announced in his report that there are now more than

*continued on page 7*



# The Best.

**New 5315/24 Console for Television**  
**Affordable 5402 Console for Radio**  
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**Custom Designed Consoles**  
**NECAM Computer Audio Editing**



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Take the 20 channel Model 5305 console pictured above. This is one of the most successful sound production consoles ever built by any console supplier. From Boston to Los Angeles, from Toronto to Austin, this range of consoles is widely used by network and independent broadcast facilities. And now we are introducing the 5315/24P, an expanded version with 24 input channels, 4 auxiliaries, 4 subs and stereo output. With these and other consoles, Neve offers you a real choice to suit your requirement. Standards, modified standards or custom consoles. Give us a call or drop us a line. You'll be working with the best!

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 **Neve**

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continued from page 8

3,200 members in the society, with 400 new members in 1978. The society now has 38 active chapters; 10 chapters have been formed within the last 12 months. The SBE has representatives in the United States and 10 foreign countries.

Also during the convention, the society held its first meeting of chapter chairmen. This was a prelude to a national meeting which Hurley listed as a top priority.

Overall, the new president and his officers were optimistic about the direction the SBE is taking, and the favorable response the society is receiving.

## AFA to build videocassette facility

A. F. Associates has been selected by Columbia Pictures Industries Inc. to design and build their new videocassette division facilities in Chicago.

The new division will engage in the duplication of ¾-inch U-Matic, ½-inch Beta, and ½-inch VHS cassettes. The Chicago facility will initially feature 100 duplicating units, an AFA master control console, three quality control areas,

and two of AFA's fully rebuilt Ampex VR-2000 VTRs.

The entire project is being constructed at AFA's Northvale, N.J., headquarters and will be shipped complete to Chicago for turnkey installation. Andre Macaluso has been named project engineer.

## Lindow keynotes MST purposes and goals

The annual membership meeting of the Association of Maximum Service Telecasters saw the final appearance of Lester W. Lindow as president. He plans to retire August 1.

In his address before the MST gathering, Lindow summed up his 22 years on the Washington scene of the association with the remark that MST has focused its energies on areas of fundamental interest.

He presented the membership with a statement of purposes and goals that would continue to assure the maintenance and development of an effective nationwide system of free over-the-air broadcasting, based on service provisions of high technical quality. He said that this protection against interference and degradation of the public's broadcast service also must occur at the local level.

Additionally, he cited purposes and goals such as maintenance and

development of an effective nationwide system of VHF and UHF side-by-side—with sufficient spectrum to meet both present and future needs free over-the-air broadcasting serving all Americans, rich and poor, urban, suburban and rural and the reflection of the needs and interests of local communities and areas (safeguarding against a few purely national voices) at the local station level.

## Thomson-CSF supplier to 1980 Olympics

Further validating the collaboration between Thomson-CSF and the Soviet Union in the field of television, the 1980 Olympic Game organizing committee has named the French firm an official supplier.

Coverage of the games in color TV will be assured by the following equipment to be supplied by Thomson-CSF:

- A large picture and sound switching center which, when placed in service, will be the world's biggest
- A comprehensive range of equipment for live coverage and image processing in the SECAM system, including 100 TTV 1515 color cameras; 40 outside broadcast vans; 3 color telecines; and color video monitors, character generators and more.

continued on page 1

## log entries

July 12-16—The Colorado Broadcasters Association and the Rocky Mountain Broadcasters Association will combine for a meeting in Manor Vall, Colorado.

July 14-15—The Cook convention center in Memphis, Tennessee, will be the setting for the 21st annual Motion Picture Laboratories seminar. For more information write to Barbara Holley, MPL Seminar, Box 1758, Memphis, TN 38101.

July 16-18—The Association of Media Producers' annual program conference is being planned to give exhibitors maximum visibility. The conference, to be held in Arlington Heights, Illinois, marks the first time that attendees will have the opportunity to exhibit their wares. However, there is limited space available, and table locations will be assigned on a first-come, first-served basis. Program session will scan topics such as forecasting and budgeting; market research by media producers; learning and application of creativity; the role of creative suppliers; and many more. Additional information is available from AMP, 1707 L Street NW, Suite 515, Washington, DC 20036.

July 16-18—The midsummer meeting of the California Broadcasters Association will be held at Del Monte Hyatt House, Monterey, California.

July 16-19—The Fairmont Hotel in San Francisco will be the setting for the National Association of Farm Broadcasters' summer meeting.

August 17-20—North Shore, Coeur d'Alene was chosen as the site for this year's Idaho State Broadcasters Association summer convention. The convention chairman is Gerry Cornwell.

September 6-10—The highlight of the Information Film Producers of America (IFPA) 19th annual conference and trade show will be the gala Cindy Awards Banquet and Cindy Awards presentations for excellence in film, video, and filmstrip production. An association of Film, Filmstrip, Slide and Video Communicators, the IFPA show will feature a variety of seminars and workshops accenting the latest film, video, and audio-visual systems. Additional information on the Vail, Colorado, conference is available from IFPA National Headquarters, 3518 Cahuenga Boulevard West, Suite 313, Hollywood, CA 90068.

September 17-20—The National Radio Broadcasters Association's fifth annual convention will be held at the Hyatt Regency Embarcadero Hotel in San Francisco. An expanded exhibit floor of 150 is expected.

September 17-20—The 18th annual conference of the Broadcast Financial Management Association is scheduled for the Dunes Hotel and Country Club in Las Vegas.

September 20-22—The Atlanta Hilton is the site of the Radio Television News Directors Association international conference.

September 21-24—The Association for Multi-Image is holding its fifth national workshop on multi-image production at the O'Hare Inn in Chicago. Historical prospectives on the art of multi-image and presentations of group projects, as well as workshops, are highlights of the show.



# If your quad head fails today, we'll have a replacement to you by noon tomorrow.

*"If it can go wrong, it will."* A guy named Murphy said that, and he was probably referring to quad VTR's. Because when you least expect, when you can least afford it, and when you don't have a backup—one of your head assemblies will probably fail.

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.....  
continued from page 10

## Ward-Beck, Canada, forms Arizona corporation

Ward-Beck Systems Ltd. of Canada recently announced the incorporation of Ward-Beck Systems Inc., an Arizona-based corporation.

The new firm will be located in a design-built project in the Scottsdale Industrial Airpark, to be completed later this year.

According to Ron Ward, Ward-Beck president, the new facility will better serve the established U.S. market. Initially, the Arizona firm will offer sales and service functions; once in full operation, it will manufacture the newly introduced WDS 2000 series radio consoles and other standard products.

Ward-Beck of Canada will continue to specialize in the design and manufacture of custom television consoles and communication systems.

## MBS to buy WCFL

Pending approval by the FCC, the Mutual Broadcasting System will purchase Chicago radio station

WCFL from the Chicago Federation of Labor and the Industrial Union Council.

In a letter of intent signed by executives attending the NAB convention, an agreement in principle prefaces the acquisition of WCFL as the first owned and operated radio station for MBS, the world's largest radio network with more than 800 affiliates. Since its formation in 1934, Mutual has owned no radio stations.

## Harris, WWL-TV, finalize Cyclotron sale

The first "Cyclotron" CP antenna for circularly polarized television transmission, introduced at this year's NAB, was sold to WWL-TV, New Orleans, via a contract with Harris Corporation.

The order, consisting of a BTD-50L2 50-kW VHF lowband dual TV transmitter and the Harris TAV-6L (CPV) CP antenna, was made on the basis of stability, simplicity, reliability with minimum maintenance, while also providing improved fringe coverage area, according to Hugh Burney, WWL technical director.

By going CP it is felt that several major obstacles, such as the high percentage of viewers using rabbit ears and the 90-degree difference in

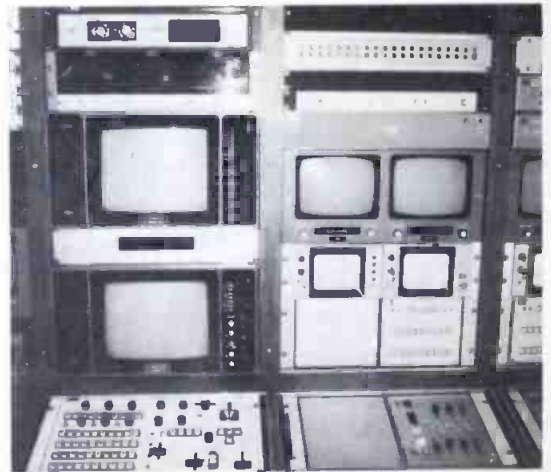
location from other stations in the area, will be solved and reception improved.

## Ampex acquires Duca-Richardson

Ampex's acquisition of the Duca-Richardson Corporation, a manufacturer of electronic switching systems for the broadcast industry, will enhance Ampex's expansion into new areas of technology.

Duca-Richardson, a privately held concern, was formed in 1975 by Robert F. Richardson, president, and James F. Duca, senior vice president and director of technology. Under terms of the agreement, the company will be operated as a wholly-owned subsidiary of Ampex, and will fall under the responsibility of Ampex's audio-video systems division located in Redwood City, California.

The Ampex division is a manufacturer and worldwide marketer of audio and video recording systems and related equipment for commercial and educational broadcasters, and for closed-circuit TV applications. The acquisition of Duca-Richardson will enable Ampex to offer a line of production switches that will complement their professional broadcast systems.



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Circle (114) on Reply Card

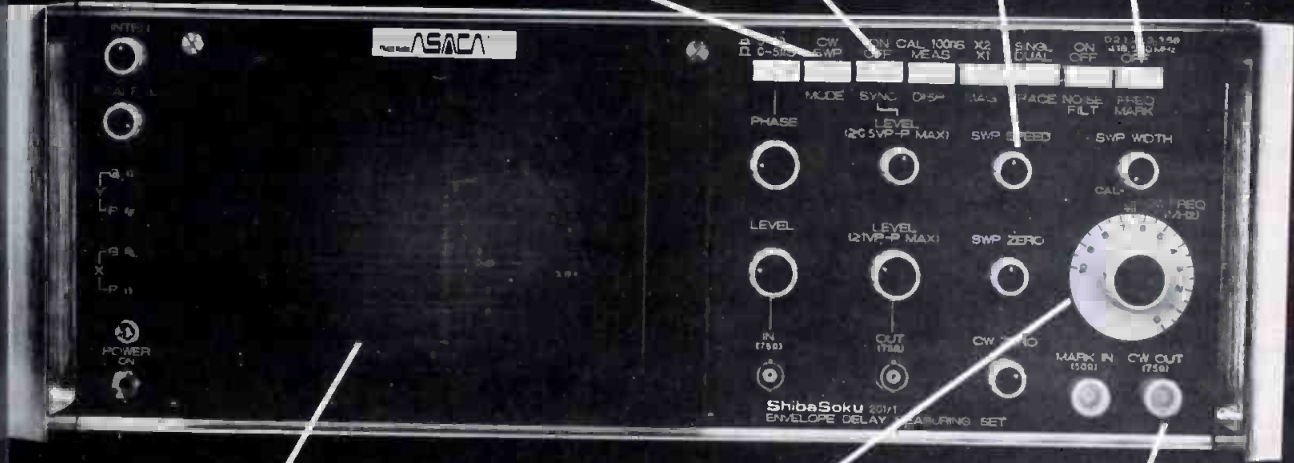


✓ **BUILT-IN SYNC AND BLANKING CIRCUIT**  
Measures Group Delay

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Has fixed internal marker as well as connector for external marker

✓ **BUILT-IN SWEEP GENERATOR**  
Determines sweep measurement and CW (point by point delay of discrete frequencies)

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✓ **Check the reasons we dare you to compare our set's performance with Envelope Delay Measuring Instruments selling for \$14,000.00. ✓ Our price—only \$5,900.00!**

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Used by Network stations of the Canadian Broadcasting Corporation.

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Large picture display tube (7-in. square) makes it easy to read the scale for envelope delay.

Built-in sweep signal generator (100kHz-10MHz) enables envelope delays to be measured up to 200kHz-10MHz. CW can also measure point-by-point delay.

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✓ Fixed frequency markers. Plus external marker input terminal; thus, points other than fixed can be accurately measured in combination with a signal generator.

✓ Dual-trace display possible. The envelope delay and the frequency-versus-amplitude response can be displayed simultaneously.

✓ Built-in sync and blanking circuit enables measurement of transmission systems which contain clamping circuits. (DC measurement).

✓ Check us out. Compare new model 201-1 with any other at any price. For a free demonstration, write or phone Asaca. Or in the far east, contact ShibaSoku Co., Ltd.

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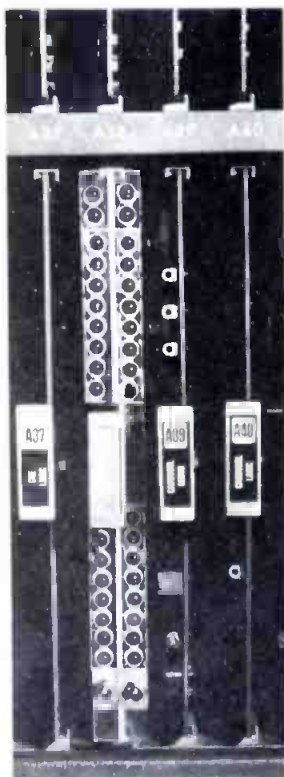


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## people in the news

### Radio/Television

David Williams, formerly the Christian Broadcasting Network's national sales manager, has been appointed general manager of the CBN spot sales division. The announcement by Robert E. Johnson, vice president of CBN's TV group, coincides with the formation of the new division which will represent the organization's owned and operated television stations.



WILLIAMS



FRASER



BROWN

In a runoff election, Adrian White of radio station KPOC in Pocahontas, Arkansas, became a director of the board of the National Association of Broadcasters. White will simultaneously serve as an ABA board member.

KOIN-TV of Portland reports that Ray Summers has returned to their news department, after a brief stint in New Orleans TV. Also, Denny Shleifer, producer of KOIN-TV's early evening news, has joined KMGH-TV in Denver in a similar capacity.

### Manufacturers/Distributors

R. Dennis Fraser has been appointed vice president of NEC America Inc. Fraser, formerly general manager of NEC's broadcast equipment division, will be responsible for operations involved in marketing sales and engineering of broadcast equipment products in the United States and Canada.

The CCA Electronics Corporation has promoted Don Powers to area sales manager for most of the central Atlantic states. Powers has been with CCA for two years as radio sales manager.

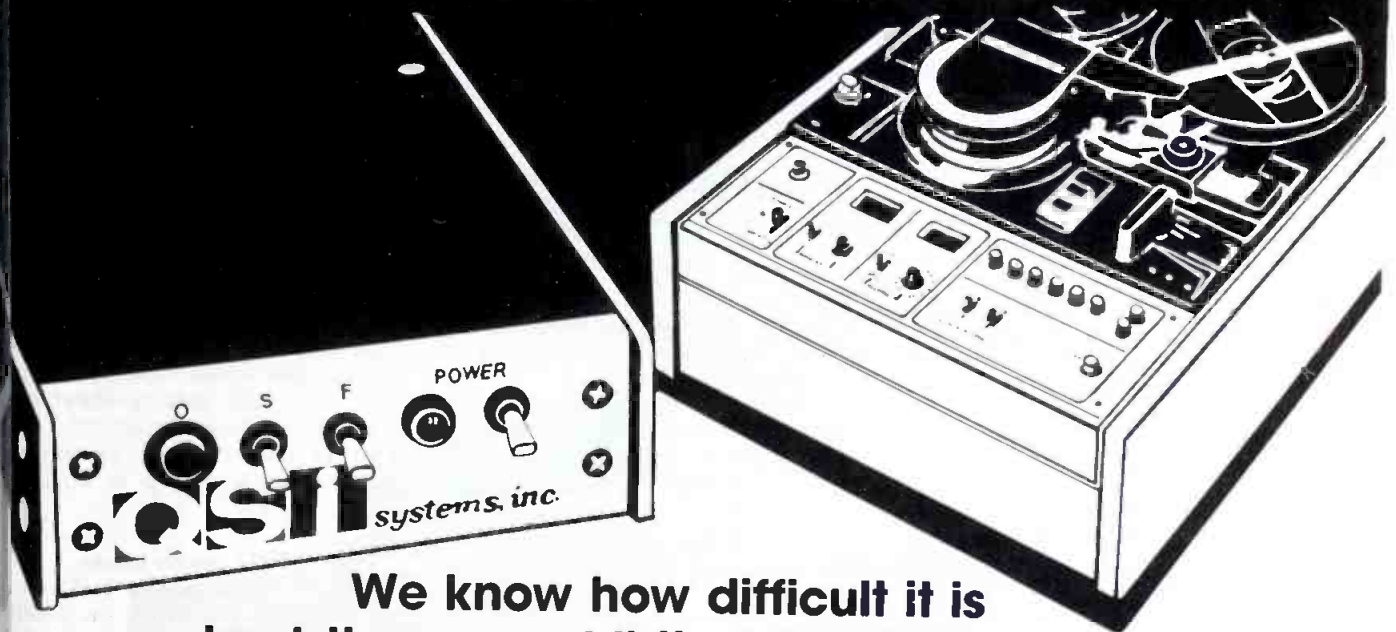
The two newly elected members of the board of directors of Cetec Corporation are Robert C. Sherburne, executive vice president of Royal Industries and Richard C. Campbell, vice president and general manager of TRW Communications Group. Sherburne and Campbell were chosen to fill vacancies created by the death of John J. Burke, and the resignation of Robert M. Ward.

The board of directors of Scientific-Atlanta recently elected William S. Brown vice president, manufacturing. In the newly created position, Brown will assume responsibility for the corporate manufacturing operations of the Atlanta-based communications and instrumentation firm.

Thomas Newman's appointment as manager of international sales development for RCA Broadcast Systems was announced recently.



# IN CASE YOU MISSED US AT NAB WE'RE GIVING YOU ANOTHER CHANCE



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Here's another chance to find out what you need  
to know about two of QSi Systems' newest products!**

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- Inexpensive video edge numbering  
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even portable VTRs
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# NAB '78 focuses on issues, answers and new directions

## Speakers take aim at issues

By Michael Scheibach

### Wasilewski addresses issues

In his "State of the Industry" speech before the radio session Vincent Wasilewski, NAB president, made it clear that broadcasters must let their positions be known to the federal government, especially concerning the rewriting of the 1934 Communications Act.

"An area of overriding concern to you," Wasilewski told the radio broadcasters, "and a subject much ballyhooed in the press is speculation over a redrafting of the Communications Act of 1934. NAB, as the broadcasting industry's voice, is on record. Our position is clear. We want all concerned to know where we stand—we will use every available resource to insure that the broadcasting industry is properly represented."

The two areas of greatest concern are the proposed special broadcasting tax to support the Public Broadcast System (PBS), and what some proponents have called "mandated access."

Wasilewski stressed that while the NAB supports the PBS, it does not, and will not, endorse a tax that discriminates against one industry (i.e., broadcasting). The NAB president said he believes the PBS should be funded from general tax revenues. "certainly not by the imposition of a special tax on one specific segment of the business community."

Concerning mandated access, Wasilewski let loose with a barrage of volleys that cut right to the real issue:

"Translated from bureaucratic gobbledy-gook to English, that (mandated access) means opening up a period of your air time to be used by anybody having anything on his or her mind. Under this scheme, you, the licensee, would have nothing

to say about who goes on the air, what gets said or done, or the relative importance or triviality of the information conveyed."

Presently, broadcasters offer free time to the public for presentation of their views on matters of public interest. However, licensees retain control; free access is voluntary on the part of the station. And, when the federal government moves into this domain, Wasilewski said the NAB will not budge.

"We are disinclined to permit radio stations to be federally converted into Electronic Towers of Babel," he said.

Another area of concern for the NAB is the proposed payment of performance royalties, under which



**Wasilewski: "We are disinclined to permit radio stations to be federally converted into Electronic Towers of Babel."**

stations would have to pay recording artists for playing their records—an apparently ludicrous idea that seems to be gaining interest among those well-intentioned government regulators in Washington.

Wasilewski said the NAB will continue to oppose such a move, and in fact, has already entered the fight at hearings held recently in Los Angeles.

On a more peaceful front in the NAB/FCC conflict, Wasilewski said it looks as if AM stereo may be approved by the FCC in early 1979. The NAB has played a major role in

urging adoption of AM stereo—the role that the NAB president is proud of.

In his concluding remarks Wasilewski called once again on NAB members to express themselves, to let their opinions be known to the FCC and other government agencies that affect the broadcasting industry.

"Let the public know where we stand on the issues," he said, "and I am sure they will let the members of Congress know that the people who vote are not interested in seeing the system dismantled...If we wish to preserve our system—the finest in the world—it is worth the effort."

### Ferris avoids issues

Despite Wasilewski's lambast of the federal government (in particular, the FCC) for proposals the NAB feels will inhibit and upset the present system, FCC chairman Charles Ferris, came back strong pointing out that the commission does not seek to exceed its authority.

Speaking before the convention Ferris said, "While I will carry out my responsibility under the law, I will not exceed my authority by intervening directly in your specific program decisions. Precisely because the pressures of society on broadcasting this past decade have never been more intense, the need for restraint by government has never been so great. Perhaps today the best definition of a democracy is that it resists the temptation and the pressure to control the mass media even when they are controversial."

*continued on page 4*





**For you,  
the new breed of  
video professional,  
the new breed of  
professional video from  
JVC.**



# If you're a video professional today, you're a tougher customer than ever.

## So JVC's rugged professional line delivers the quality and features you demand at prices you want to pay.

We know you've got a lean new attitude about the video equipment you buy, no matter how long you've been in the business. Or whether you're in broadcasting... a sophisticated corporate A/V operation... a top production house... or building your first video capability.

And that attitude is, with all the people vying for your video dollar, you want more state-of-the-art technology in equipment

that costs you less to own and maintain.

JVC's attitude is basic too. We build in engineering innovations—we don't add them on later. And we do it first. Which means you enjoy better picture and sound quality, easier operation, and sophisticated features you may not even find in equipment selling for twice the price.

For instance:

**You wanted faster performance and greater accuracy in 3/4-Inch video editing.**

**And JVC's new CR-8500LU Recorder/Editor System offers bi-directional fast/slow search from approximately 10 times to 1/20 time, with editing accuracy to  $\pm 2$  frames.**

It's a new generation of 3/4-Inch VCR editing—the fastest, surest way to get the frame-by-frame accuracy you need.

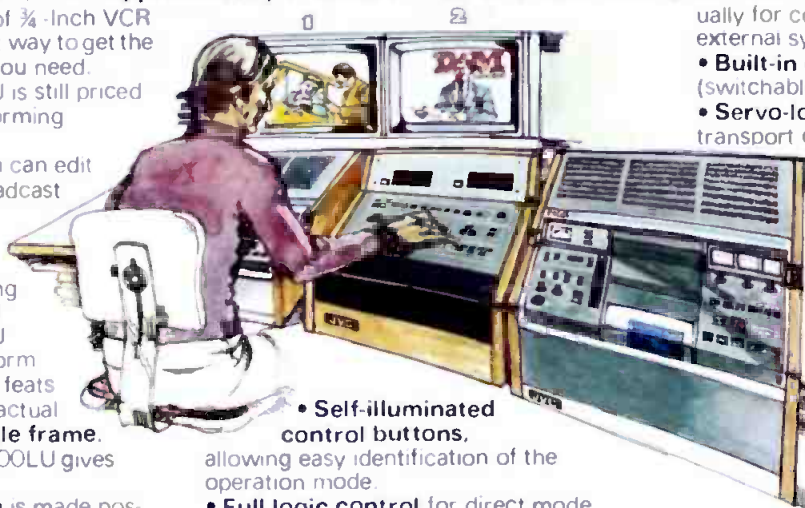
But JVC's CR-8500LU is still priced well below its closest performing competition.

With a single unit, you can edit with full functions and broadcast quality. Even if you don't happen to have special technical knowledge.

With a complete editing system of two CR-8500LU units and the new RM-85U Control Unit, you can perform the most advanced editing feats at approximately 10 times actual speed, then stop on a single frame.

Here's how the CR-8500LU gives you that kind of precision.

- **Frame to frame editing** is made possible with the capstan servo/built-in rotary erase head/blanking switcher frame servo design. A design that also ensures true assemble and insert editing with no distortion at the edit points. Plus horizontal sync phase compensation to minimize timing error at the editing points.
- **Variable speed auto-search** lets you perform both high speed and low speed search. You can search at approximately 10 times in fast forward or reverse to find edit points faster. Or slow speed search at 2 times, 1 time, 1/5 time and 1/20 time. Or use the special auto-speed shift feature to automatically slow you down from 2 times, real time, 1/5 time, 1/20 time.
- **Automatic pre-roll** enables you to pre-roll tape between edits, with an automatic on/off switch. Which can come in especially handy during successive assemble edits using camera signals.



- **Self-illuminated control buttons**, allowing easy identification of the operation mode.
- **Full logic control** for direct mode change without pressing the stop button.
- **Remote control** of all operations, with the optional remote control unit RM-85U.
- **Audio level control with meters**, preventing over-level recording without audible distortion, with attenuator. Also, manual audio level controls let you adjust the audio recording level by checking the level meters.
- **Auto/Manual selection for video recording level control**, adjustable by the automatic gain control circuit or manually by referring to an independent video level meter.
- **RF output** to connect an external drop-out compensator.
- **Patented color dubbing switch** for stable color multi-generation dupes.
- **S.C./sync input connector** allows connection of time base corrector and allows for two second pre-roll.
- **Chroma level** can be controlled man-

ually for convenient connection to an external system.

- **Built-in comb-filter** for playback (switchable on-off).
- **Servo-lock indicator** to check the transport condition.

• **Counter search mechanism**, permitting Auto Search of a particular section of the tape.

• **Solid construction for easy maintenance**: both side panels, top and bottom panels are detachable for easy access to the inside.

• **Tracking control meter** for maximum

tracking adjustment.

• **Heavy fan motor** for better circulation.

All that with one editing unit. But when you combine two editing units with our new RM-85U automatic editing control unit, you'll enjoy all the benefits of a total-performance system.

Starting with the kind of control JVC's RM-85U can give you:

- **Independent LED time counters** for player and recorder, read out edit points minutes, seconds and frames.
- **Edit-in and edit-out automatic control**. Four built-in memories let you control edit-in and edit-out points of both the player and recorder. And once start and ending points are determined, accurate editing is memory-controlled automatically.
- **Edit shift control** allows frame-to-frame edit point correction.





up time indicated for each insert edit with by LED display.

• **Bit preview mode available**, for "earsals" of actual edits.

• **Edit-in point search mechanism.** After an edit, a Return button rewinds the tape automatically to the edit-in point, so it's easier to check edit conditions.

• **Auto-shift search mechanism** to step in the tape speed automatically, and ensure quick and accurate location of the editing point.

• **Tape safety guard circuit.** Because turning the unit in the still-frame mode can actually cause damage to tape or video heads, a tape safety guard circuit places the unit into the stop mode automatically.

It demanded more versatility in a moderate-priced, broadcast-quality camera.

And JVC's value-packed CY-8800U goes with you from studio to location.

Our CY-8800U offers a lot more picture quality and stability that compares favorably with units costing twice as much. Thanks to JVC's technology, the CR-800U camera, offering



three 2/3" magnetic focus, magnetic deflection Plumbicon\*\* or Saticon\*\* tubes offer total flexibility. And a rugged die cast chassis in front and back to hold up under the toughest conditions.

With the Basic configuration, it's a compact ENG/EFP camera that's completely self-contained. No CCU required. Easy to operate, it plugs into our CR-400LU/CR-400U

portable recorder, with optional cables available up to 66 feet.

With the Studio configuration it's a working studio camera. Just add the CR-800U remote Synchronizing unit and a large screen, top mounted viewfinder. And as for big-ticket features, we've got what the others would let you add later.

if it is left in the still-frame mode for more than 10 minutes.

• **Selective editing modes**—assemble editing, insert editing for audio channel-1, audio channel-2 or video.

• **Versatile editing capability** offering techniques like "edit-in/out," pre-roll, and automatic pre-roll.

You'll find that nothing in its price class performs anywhere near the CR-8500LU/RM-85U videocassette editing system. And that you'd have to spend a lot more on the competitive unit that offers many of the same features.

That's what we mean by giving video people more of what they want, for less than they expect to pay.

• **Built-in horizontal and vertical contour correction circuits.**

• **Signal-to-noise ratio of 49dB, F. 4/3000 lux**

• **Resolution of 500 lines at center.**

• **Return video** in the viewfinder.

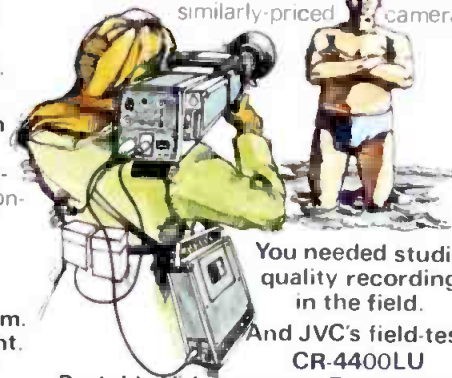
• **A built-in -G circuit** for registration.

• **Minimum illumination F 1.9/300 lux (+6dB switch on)**

• **A comfortable hand grip** to stop and start the recorder. With a switch to operate iris control and a switch for return video.

• **A built-in CCU.**

And that adds up to a lot more features than you'd find in similarly-priced cameras.



You needed studio quality recording in the field.

And JVC's field-tested CR-4400LU

Portable Videocassette Recorder with automatic editing lets you bring your recording/editing capability wherever you need to shoot.

If you spend time on location in either ENG or EFP applications, you need a portable video system that can shoot, edit, and give you something to show in no time, flat. Without awkward equipment hassles.

JVC's CR-4400LU is the one to take along when you can't bring a studio.

Because it's the lightweight machine with heavyweight features

• **Weighs in under 27 lbs.** So you can take it anywhere, and assemble edit on the spot. You enjoy total flexibility. Complete freedom. Fast results.

• **AEF (Automatic Editing Function)** gives you clean assemble edits.

• **Built-in, full color recording and playback circuitry.** No need to buy an adaptor.

• **Low-power consumption** that lets you operate on a miserly 13.5 watts, for longer battery life. A multi-purpose meter checks battery, audio, video and servo levels for precise control of all functions.

• **Flexibility to record with the CR-8800U** or other high quality color cameras.

So if you need a field-tested recording system with the features you want at a price you can afford, check out our CR-4400LU Portable Videocassette Recorder.

• **A built-in 1.5 inch adjustable electronic viewfinder** for the convenience of the operator.

• **A built-in battery warning system.**

• **A built-in tally light.**

• **A built-in VSI—video system indicator** for precision F-stop control.

• **A built-in color bar generator.**

• **A built-in +6dB, +12dB sensitivity switch** for low light level applications.

• **A built-in auto white balance.**

• **A built-in fast warm-up capability.**

• **A built-in electrical color temperature adjustment** for different applications (variable from 3000°K to 10,000°K).

• **A built-in filter system** (neutral density) for variable light levels.

• **A built-in level switch** (+50%, 0, -50%) provides 1/2 F-stop adjustment, letting you fine tune for added contrast.

• **A built-in time lapse meter** to show total hours of camera use.

• **A built-in intercom system** for studio applications.

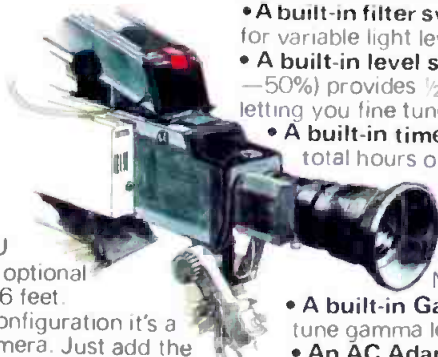
• **An RGB output**, and NTSC encoding (Y, I, Q).

• **A built-in Gamma control** to fine tune gamma level.

• **An AC Adaptor**—standard.

• **Lightweight—17.4 lbs.—portability.**

• **Optional 12-to-1 zoom lens** with automatic iris and power zoom.



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\*\* registered trademark of Hitachi Corp.

## **JVC's new breed of professional video. Backed by an old tradition of JVC quality and reliability.**

For the past fifty years, more and more professionals have turned to JVC for innovative equipment they can count on to perform.

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# **JVC Professional Video. The tough new breed.**

**JVC**  
JVC INDUSTRIES COMPANY  
DIVISION OF US JVC CORP.



Continued from page 16

Ferris deemphasized regulation and proposed changes in the Communications Act, while stressing the intent of the FCC to stay out of the private domain. Among his list of FCC policies being followed under his chairmanship were evenhanded justice for large and small licensees; no intervention in specific program decisions, but encouragement of uncontroversial-issue discussion and viewer feedback; independence from regulated industries; stimulation of diversity and excellence through substituting competition for regulation; support for equal employment opportunities, radio deregulation, and public broadcasting; and support for new technology and services, not protection of the status quo.

While not mentioning the proposed tax on commercial broadcasters to support the PBS, Ferris did stress that broadcasters should be aware of PBS' role:

"You should recognize the contributions public broadcasting has made, and can make in the future, to stimulate a healthy national communications service and a freer broadcast marketplace. Public broadcasting can increase viewers' choices by meeting specialized needs not fully satisfied by an advertiser-based system.

"A well-funded system of non-commercial television and radio," he continued, "can reduce the pressure for content regulation of broadcasting in general. It can also provide a useful 'marketplace yardstick' and a competitive prod, to you commercial broadcasters, to strive for excellence and experiment with new ideas and formats."

After running through his rhetorical obstacle course, it was evident that little of substance was really covered by Ferris. But, if the commissioner doesn't mention the hard issues, he doesn't have to answer the hard questions.

Although Ferris favors less regulation, praises the broadcasters, and seeks "evenhanded" justice, his commission is moving steadily and decisively on several fronts to impose needed restrictions and handicaps on the broadcasting industry.

Reagan: "Surplus Government" jumping into the fray from the conservative platform, former California governor Ronald Reagan expressed his own views on the relationship between the federal government and private enterprise.

continued on page 24

# There are few things in life designed like a Scully

Take our Scully 280B for instance... most broadcasters have.

If there is a standard recorder in the broadcast world, the 280B is it. You'll find it wherever professional performance and reliability are a must.

Scully's 280B series offers extraordinary versatility with all the other proven Scully professional features.

The 280B... another classic performance by Scully.

For complete details, write or call Scully Recording Instruments, Division of Dictaphone Corp., 475 Ellis Street, Mountain View, California 94043, (415) 968-8389 TLX 34-5524.



**Scully**  
Recording Instruments  
For classic performance.

# *...and what have we done for you lately?*

*14 years ago we delivered the original 30mm Plumbicon® camera tube that revolutionized TV broadcasting...*

*9 years ago we introduced the 1-inch Plumbicon tube that permitted the design of more compact broadcast cameras...*

*4 years ago — the 2/3-inch Plumbicon tube brought broadcast quality to portable cameras and gave us ENG...*

*Today, we bring you two of these popular pickup tubes with further improvements in performance.*

Ever since the original Plumbicon tube won the Emmy Award for having revolutionized color TV broadcasting, we've been keenly aware of the importance of the name Plumbicon to the TV industry which has come to depend on it as its assurance of consistent performance and quality. There's no disputing the fact that contemporary Plumbicon tubes outperform their original versions by a wide margin.

Two of the most recent improvements in the Plumbicon pickup tube line, (the 30mm XQ1410 and the 2/3-inch XQ1427) are described here. These tubes, like all Plumbicon TV camera tubes, offer unmatched resolution and sensitivity, superior color rendition... excellent highlight handling... low and steady dark current... high signal-to-noise ratio... minimal lag... stable operation over a wide temperature range... and long life.



**Type XQ1427:** Offers significantly higher resolution than earlier versions; modulation depth is 60% typical at 320 TV lines giving sharper, clearer pictures and allowing operation at lower light levels. New gun design and 1500-line mesh construction result in improved registration and geometry, reduction of flare by a factor of 3 and reduced beam landing error.



**Type XQ1410:** The XQ1410 gained immediate acceptance by the television industry as a significant advance over all previous 30mm tubes. This recognition is based on the XQ1410's dramatic reduction in lag (typically 37% below that of our XQ1020.) The XQ1410 ends color-fringing, greatly reduces picture-smear and gives better dynamic resolution — even under poor lighting conditions. With its internal bias lighting, all three channels can now be balanced for identical lag characteristics. New gun construction gives improved resolution, (60% typical modulation depth at 400 TV lines). New mesh construction results in better geometry and registration and significantly reduces microphony.

Make no mistake — these are vitally important improvements on vitally important camera pickup tubes... but these developments are only part of the answer to — "What have we done for you lately?"



# *...and now the next generation of Plumbicon TV camera tubes: with them begins the age of Electronic Cinematography.*



"Cinematography" once meant the creation of motion pictures on film, and film alone. But no more.

The next generation of Amperex Plumbicon TV pickup tubes, in combination with recent advances in new camera design and videotaping systems, is destined one day to reduce to near-zero the use of film in broadcast cinematography and in motion picture production. Now, indeed, begins a new era...and a new art form: Electronic Cinematography. All-electronic production will offer a technically superior product, and will permit shorter lead times between production and broadcast...and it allows motion picture directors to combine the creative aspects of single-camera film production with the immediacy of live-on-tape TV techniques.

All this has been no accident, of course. We, for instance, have been working toward this moment for fourteen years, ever since the introduction of the original Plumbicon tube...right through the advent of ENG, first brought to reality by our 2/3-inch version of the Plumbicon tube.

This steady stream of advances in TV pickup tube technology now culminates in a new generation of Plumbicon tubes that offers major advances in resolution and lag performance...advances that were prerequisite to the dawn of the age of Electronic Cinematography.

**Type S45XQ:** Developed for use in new studio cameras that will accept 30mm tubes, has limiting resolution of 1600 TV lines, with modulation depth of 95% at 400 TV lines and 40% at 1000 TV lines. Nothing like it has ever been offered in a broadcast quality tube. The S45XQ provides for external bias lighting; but decay lag, even without bias light, is typically only 7% after 50 milliseconds.

**Type S73XQ:** Physically interchangeable with conventional 1-inch broadcast Plumbicon tubes, can be used in existing studio and field production cameras with only minor circuit modifications. Typical limiting resolution of the S73XQ is 1000 TV lines, with modulation depth of 65% at 400 TV lines. Overall signal-to-noise ratio can be maximized in the S73XQ by a low-capacitance target contact. A revolutionary gun design in the S73XQ reduces lag; decay lag is typically 2% at 50 msec. with bias lighting.

Both of these new-generation tubes inherit all the finer qualities of the original Plumbicon pickup tube: near-zero dark current...high sensitivity...resistance to burn-in, even in highlights...precise geometry and registration...and long life. You can expect from them what you have learned to expect from Amperex Plumbicon tubes; performance at the edge of tomorrow.

For more information, contact: Amperex Electronic Corporation, Slatersville Division, Slatersville, Rhode Island 02876. Telephone: 401-762-3800.

## **Amperex**

TOMORROW'S THINKING IN TODAY'S PRODUCTS

A NORTH AMERICAN PHILIPS COMPANY

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In his address before a luncheon of radio broadcasters, Reagan told them to fight for the free enterprise system and against government intrusion into business.

"The problem isn't shortage of fuel in America," Reagan said, "it's surplus of government." He went on to criticize the growing number of costly government regulations affecting business. And, although not mentioned directly, the underlying implication for the broadcasters was that they should fight the intrusion of the FCC into their private industry.

**Banning ads is still popular**

Another government threat, according to Wasilewski and others, is the proposed banning of children's advertising on television.

Addressing this issue was Everett Erlick, senior vice president and general council of ABC. Speaking



**Shapiro: "TvB feels strongly there must be an aggressive strategy to prevent rulings affecting our industry from being framed and invoked without total broadcaster involvement."**

before radio broadcasters, Erlick warned that they have a major stake in the Federal Trade Commission's proposals on children's advertising on television.

"Today we are talking about advertising to children, but tomorrow we could be dealing with another discriminatory assault on any type of broadcast advertising," he said.

"Again the government is trying to resolve an issue at the wrong time and wrong place," he continued. "The ban on broadcast advertising of cigarettes did not produce a decline in smoking, and there is little reason to think that restrictions on the television advertising of sugared products will miraculously stop children from eating these products."

Integrating the domino theory with his own fears of government intervention into the private sector, Erlick told the audience to mobilize their opinions and let them be known to the public and to the FCC.

In remarks that reflected Wasilewski's, Erlick said, "When we are united and we are right, we can take a strong case to members of Congress and other decision makers and be effective. When we are divided or don't speak up, we should not be surprised at the unhappy results."

Marvin Shapiro, chairman of the Television Bureau of Advertising, also addressed the proposed ban on children's advertising in his speech before the general television session.

Shapiro stressed what appears to be the major concern of broadcasters: the dollar volume from this type of advertising. He cited figures showing that the investment of confections, appetizers, snacks, nuts, cereals, soft drinks, and toys and games in television last year was \$709 million.

"Though no one yet knows the proportion of this expenditure such restrictions could end," he said, "clearly a huge amount is at stake...TvB feels strongly there must be an aggressive strategy to prevent

rulings affecting our industry from being framed and invoked without total broadcaster involvement."

The Television Bureau of Advertising took a major step in this matter by passing a resolution urging the NAB to place the proposed ban on children's advertising on its priority list.

**Act, or we'll react**

Stating the government view toward children's advertising was Abbott Washburn, FCC commissioner.

Speaking before the television session, Washburn said he prefers self-regulation to rule-making, but that the industry must look more closely at further reductions in the number of non-programming minutes per hour, and must devise special protection for preschool children.

Specifically, he said studies reveal that reducing the number of minutes of non-programming material (currently 9½ minutes on weekends and 12 minutes on weekdays) could be done without affect-

ing profitability—a conclusion shared by all broadcasters. Shapiro pointed out that Post Newsweek Group W stations have already produced non-programming material six minutes.

It is his view that greater restraint must be taken by the industry relating to children's advertising, or federal action will be taken. However, he failed to outline what action would be taken.

Another defender of the industry was Richard Chapin, former NAB chairman, who urged affiliates of the ABC Radio Network to form a strong "grass roots" campaign to help prevent the adoption of regulations or legislation that could adversely affect the broadcasting industry.

Chapin aimed his call-to-arms at the ABC affiliates' recently-formed government relations committee, which he is chairman. He urged members to write and meet with congressmen from their districts to address the threatening issues, including performers' royalties, mandated access, and imposed taxes.

The question of federal regulation (or intervention) was raised by several speakers, both in support of the NAB and of the FCC. When the session was over, however, the question remained unanswered. As Wasilewski pointed out, only a strong united NAB will be able to combat further intrusion by the men in Washington.

**NAB honors Reinsch, Moseley**

The industry's highest honor, the NAB Distinguished Service Award, went to J. Leonard Reinsch, chairman of Cox Broadcasting Corporation, Atlanta, Georgia.

In presenting the award, Vincent Wasilewski, NAB president, said, "There is probably no greater distinction than for a man to be honored by his peers who have deemed him an individual worthy of recognition."

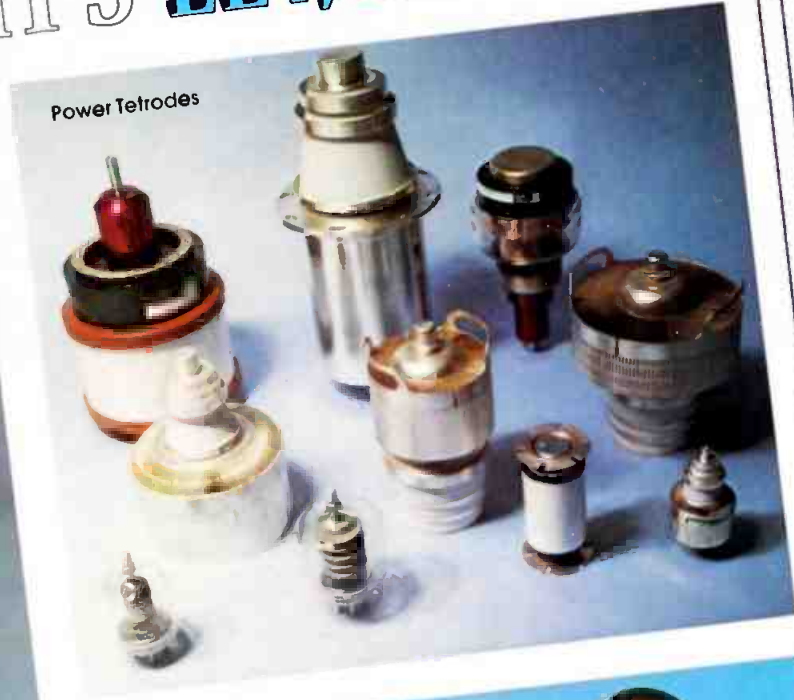
Reinsch began his career 54 years ago as a radio announcer while still a senior in high school. At age 26 he was hired by Governor James Cox of Ohio to launch WHIO—an association that eventually led to the development of Cox Broadcasting Corporation.

Reinsch told his fellow broadcasters that their responsibility "are fearsome—ranking next to those of our elected officials and our courts. You have grown in importance and stature with each passing year. You must never knowingly mislead or breach the confidence of your auditors; the gravest of offenses."

continued on page 22



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American body politic."

Also honored was John A. Moseley, president of Moseley Associates. He received the Engineering Award in recognition of his contributions in the field of communications technology, and for his efforts to foster advances in the art of broadcasting.

**Redmond outlines  
broadcasters' challenge**

Broadcasters must adapt to changing conditions (particularly increased leisure time and technological advances) and absorb the functions of older methods of communication as they are overtaken by economic events.

That was the warning of James Redmond, director of engineering of the British Broadcasting Corporation (BBC). Speaking before the broadcast engineering conference luncheon, Redmond said there is "a demand for more information which is reflected in the success of local broadcasting and a growing interest in electronic alternatives to the disappearing newspaper."

To satisfy this demand, adequate resources must be available, he said. Two of these are frequencies and money.

Redmond said the scarcity of frequencies "will force careful consideration of the bandwidth and signal-to-noise ratio which is needed for a new service. The quality of the signal will have a definable cost in frequency terms and careful consideration of the appropriate modulating system will be necessary."

Also of great importance is money, primarily needed to invest in more sophisticated broadcast equipment. To provide the public with additional information without additional on-air "noise," the BBC is looking into the possibilities of adding inaudible signalling to radio broadcasts. These signals, providing station identification and other information, would be displayed on the receiver's LED. Although this may not be feasible in the U.S., with manufacturers hesitant about raising receiver prices, Redmond feels costs should not be a deterrent.

"This (inaudible signalling) is particularly important on the FM band which is much less used than we would wish, because listeners find tuning and station identification difficult," he said.

"There is vast room for improvement in receiver design," he continued, "and the inclusion of a liquid crystal display to give station

call signs, frequency, or other useful data would add very little to the cost when mass-produced integrated circuits are used."

**Global implications in  
shortwave broadcasting**

Despite advances in satellite transmissions, shortwave broadcasting remains the only broadcasting medium with global reach: capable of direct, universal, personal, and immediate communication between the peoples of the world.

That is the view of George Jacobs, director of engineering of the U.S. Board for International Broadcasting (BIB). BIB is the federal agency which funds and oversees the operations of Radio Free Europe and Radio Liberty, both broadcast on shortwave.

Speaking at the engineering conference luncheon, Jacobs pointed out that AM broadcasting on medi-

um and long wave is limited groundwave during the day and co-channel skywave interference at night; and, FM and TV stations are limited to more or less line-of-sight.

He said that "the worldwide popularity of shortwave broadcasting has risen to the point where present bands are severely overcrowded and interference often intolerable. It has been estimated that, on the average, between two and three transmitters are competing today for the same frequency the same time. It is hoped that World Administrative Radio Conference to be held in 1979 will allocate additional spectrum space to shortwave broadcasting to alleviate this condition.

"All signs continue to point to shortwave bands as the world arena in which international broadcasting will continue to take place at least for the foreseeable future," he concluded.

**Sessions cover "hot" technologies**

By Ron Merrell

**Satellites up front**

Satellites and satellite communications were up front this year. Instead of a few dishes being parked behind one of the convention hotels, they were never more in evidence than this year. Their presence added another dimension to the international theme of the 56th NAB convention.

An early morning workshop pointed out that radio has been taking the lead in satellite program delivery. Mutual already is fully committed, and PBS and National Public Radio are in the countdown process now. NPR probably will form the largest network around when their entire satellite hookup is completed.

Even independent stations are utilizing satellites. They are paying for delivery services that allow them to cover local sports teams when they are on the road, and to bring in other programming.

James Darr of United Press International presented a paper on "Wire Service Satellite Delivery" in which he traced AT&T's rate hikes and where UPI has stood on these increases. He proposed an alternative to AT&T's terrestrial facilities for delivery of news: distribution by

satellite to small roof-top earth stations. The way it looks now, program distribution will lean more and more on satellites, and in the sight of a small dish atop the station facility will become a common sight.

Answering the audio distribution challenge of satellites, Bell Telephone Labs' Paul Wickliffe said "Bell System's objective of their new video signal multiplexing was to give one 15 kHz audio channel in an existing TV transmission facility that would have the capacity of adding a second channel later should the need arise." He explained that since mid-February audio signals of the three major networks have been duplexed or combined with video signals for transmission over the same circuit. A low pass filter in the transmitter clears an area in the video signal for an FM audio subcarrier. A similar filter in the receiving station removes the subcarrier after transmission.

**Automation invasion continues**

Bill Kessel, chief engineer of KTVT, Fort Worth, detailed his experiences at the independent station when it made the change

*continued on page*





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# The Sony BVH series. Consider the accomplishment.

Two years ago, 1" helical-scan recording was just a gleam on the broadcast horizon.

Now, there's the new SMPTE Type C Standard.

We're kind of proud of that. From the start, Sony Broadcast was a leader in the 1" revolution. We pioneered many of the technical innovations incorporated into the 1" helical-scan VTR. And it's good to be part of a movement so beneficial to the broadcast industry.

How does our new SMPTE Type C machine differ from the more than one hundred BVH-1000's already in use across the nation? Frankly, very little.

And we're proud to be able to offer you SMPTE-standard 1" machines that maintain all the unique advantages of the Sony Broadcast equipment already in the field.

Consider the advantages. Advantages like BIDIREX, which gives you full bi-directional search capability in both shuttle and jog modes. And that means 100% post-production creative freedom, with all the ease and flexibility of 35mm film techniques.

Advantages like the incredible economy of the 1" tape format. Far lower acquisition costs. Smaller size, so you save valuable studio space. Lower maintenance costs. Plus major savings in 1" videotape alone.

Advantages like three high fidelity audio tracks. Color framing, to maintain perfect timing continuity during editing and animation

sequences. And more.

Consider the possibilities. Think about the local programming capabilities that open up with the BVH-1000 and portable BVH-500. Capabilities quad can't match. With an economy that leaves film far behind.

Think about creating your own documentaries. Taping your own commercials. Think about taking 1" tape out into the field, then bringing it home and going directly on the air without the need for converting to another format.

Think about the kind of panoramic production once possible only on film. And think about what single-camera film editing techniques will mean to your creative effort.

Consider the source. There's one more thing you should think about as you consider the move to 1".

The source of your equipment.

And when you consider Sony Broadcast, you'll find benefits no other source can give you.

Like our years of experience in research, engineering, and production of advanced video systems.

And access to a complete family of professional video equipment from a single manufacturer. With the kind of reliability and performance only a single manufacturer system can guarantee.

The BVH Series, from Sony Broadcast.

All things considered, it's quite an accomplishment.

## Sony Broadcast

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automation. Kessel explained that one of the key considerations was the people-interface with the system.

Kessel explained that each chain break is a 100% ARC-25 break. During busy commercial seasons, they run as many as 500 or more units per day on that machine. Through its interface with the Vital computer programs, the machine searches through the carousel and informs the computer what bin number each piece of material is located in.

According to Kessel, automation at KFVT has meant fewer human errors, fewer makegoods, happier clients, and increased revenues.

Ogden Prestholdt, a consultant with A. D. Ring & Associates, told engineers attending his session that computers also are being used for significant technical assistance. Prestholdt explained a unique computer service offered by A. D. Ring that takes the pain and strain out of accurately plotting ground systems for medium-wave AM directional antennas. "We have provided a method of demonstrating the actual nature of these ground currents," Prestholdt said, "so systems can be designed to support them." He said the result should be a significant improvement in performance.

John Burtie and William Price (Broadcast Electronics, Quincy, Ill.) presented a paper called "Advancing to the 'Intelligent' Program Automation System." They described their first entry into radio program automation and declared that software is what gives today's automation system its degree of intelligence.

The Broadcast Electronics system overcomes the basic problem of early automation systems, because it can communicate with the engineer.

John P. Jenkins, executive vice president of International Tape-tronics Corporation, took the automation view that the era of audio library storage has arrived. He said that automatic access to over 8,000 audiotape cartridges is now possible along with minimal access time and the flexibility of playing any two carts back-to-back.

Of course he was referring to ITC machinery, but Jenkins said that the new large capacity machines can be integrated into new or existing program automation systems or used as stand-alone disc jockey assist units. Through faster, more efficient retrieval, loading and re-

placement of carts, these new audio library storage machines free the operator for more productive jobs.

#### Intelligence and memory

Today's engineer knows that so many capabilities have been digitally added that the bells and whistles could just end up in confusion. In his paper on "Learn Mode Programming: Its Application To Creative Production Switching," B. L. Rayner of The Grass Valley Group explained that his company attacks this problem with E-MEM (for effects memory).

The effects memory system uses a microcomputer and a "distributed intelligence" modular approach, where a separate microcomputer is used for each mix/effects system. The user can add as many E-MEM systems to his switcher as he feels his operation requires. "The operator's creativity," Rayner said, "should be enhanced, not hampered by CRT displays, keyboards, or special operating conditions."

Rayner also said Grass Valley is working on developing a magnetic card reader. With this approach, a standard plastic credit card with magnetic striping is inserted in a slot on the switcher panel, and the contents of eight of the E-MEM registers are written onto a single stripe on the card. To reprogram the switcher, the card is read, then placed over the lower row of buttons (holes are provided on the card). The card now forms a convenient write-on label for the new function in each of the registers.

Carl Hollstein of Consolidated Video Systems told his session audience that an advanced "dual port" computer technology makes possible a reliable and economical system for storing thousands of video frames for instant recall and use as slides, free of dust and fingerprints.

Hollstein said the size of a video slide library would then be limited only by the storage space available since new discs, controls, and frame memories could be added when discs are filled to capacity.

#### AM stereo going strong

All indications are that AM stereo is picking up steam among both station engineers and industry manufacturers. Just about everyone on the audio side had something to add to the AM stereo shopping list.

At NAB, Chris Payne moderated an AM stereo panel including: W. D. Mitchell of Continental Electronics; Dave Harry of Potomac Instruments; James Loupas of James

Loupas Associates; and Ed Edison, Hammett and Edison, consulting engineers. The panel reviewed past AM stereo happenings and offered guidance on how to get ready. In an address to the convention, NAB president Vince Wasilewski said the NAB supports AM stereo. He expects it to pass early in 1979.

#### TV CP antennas

Neil Smith of Smith & Powetank moderated a session on TV circularly polarized antennas. Panel members included Peter O'nigan of Jampro, Dr. Matti Siukola of RCA, and G. W. Collins of the Harris Corporation.

After years of extensive testing to determine the impact of using TV CP antennas, the Commission was petitioned. The Commission has amended its Rules to permit the transmission of circularly polarized TV signals, and several stations already have received authorization. The panel reviewed the test results and commented on CP techniques.

#### Transmitter update

"A Modernization And Power Increase Program For UHF Klystron Transmitters" was the title of a paper presented by George Townsend, president of Townsend Associates.

Townsend questioned the wisdom of replacing the older UHF transmitters at considerable expense "when only 15% of it is out of date." Townsend said it is fair to say that the major klystron amplifier components in transmitters produced in the '60s can attain another ten years or more of operation if properly maintained.

The Townsend program involves replacement of the tube-type excitors with a new, all solid-state, modulated exciter, modifications to control circuitry in some makes of transmitters, and replacement of klystrons with high-efficiency counterparts.

Mark E. Rubin, president of Electro Impulse Laboratory, Inc., addressed the area of measuring transmitter power output. He reviewed direct and indirect methods of measuring power and said the method he favors is the calorimetric technique. This involves measuring the input flow temperature versus the output flow temperature in water-cooled dummy loads. When the flow rate is established, a simple formula can be used to find the output power in watts. The indirect method (multiplying rms voltage against current) is the less expensive. Townsend also said the

continued on page 27



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Here's the widest wide-angle, closest focusing studio zoom lens on the market. It can make your smallest studio look like a concert hall. It can get you in closer, without attachments, than any other studio lens. And it does it all with a lot less light, too.

The "wide guy" is Fujinon's 10 x 15 f/2.8 zoom for 1¼ inch Plumbicon\* cameras. With its 59° field of view, you get wall-to-wall coverage. You get an M.O.D. of less than 1 foot throughout the full 10X zoom. What you don't get is distortion. Edge to edge, corner to corner, the image is distortion-free.

There's more. The "wide guy" delivers outstanding performance with extremely high resolution and contrast. It gives you the spectral and flare

characteristics that have made Fujinon the envy of the industry. See for yourself. Ask for a side-by-side demonstration. The "wide guy" will convince you.

Meet the "wide guy's" little brother. There's no wider, closer focusing studio zoom for 1 inch Plumbicon cameras. (10 x 11 f/2.1)



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If you know our CP-16 — the 16mm sound camera that is recognized worldwide as the standard in TV-newsfilm — you know Cinema Products!

You know of our responsiveness to the needs and requirements of the working TV-newscameraman... our sensitivity to his input from the field.

And you know of our commitment to provide him with the most reliable, highest-quality, cost-efficient TV-news gathering tools: lightweight, rugged and dependable equipment, with a minimum of downtime.

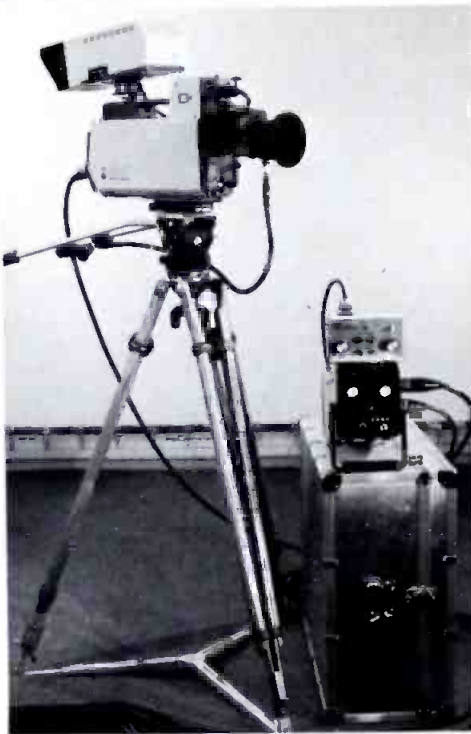
We are therefore extremely pleased to introduce the all-new MNC-71CP — the only ENG camera that bears the Cinema Products logo.

### **A breakthrough in ENG camera design**

Manufactured by NEC, Japan's largest manufacturer of broadcast equipment, the MNC-71CP is, without a doubt, the finest and most advanced camera of its class — specifically designed from its inception to be used both as a compact, lightweight, fully self-contained ENG



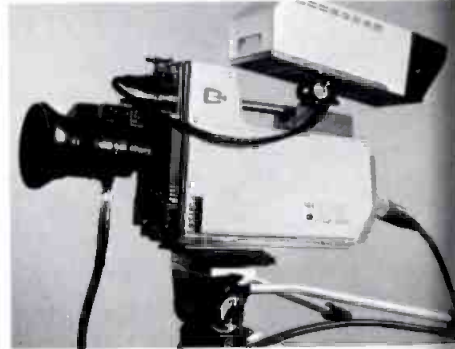
Lightweight and compact (no backpack), the MNC-71CP is ideally balanced for on-the-shoulder operation.



camera as well as a broadcast-quality, versatile field production camera (with sophisticated remote production control capabilities, such as the ability to balance the MNC-71CP to match the colorimetry of other cameras in the field or in the studio).

### **Optimum performance**

Extensive use of LSI micro circuits developed uniquely by NEC dramatically reduces the number of individual components in the camera. As a result, the MNC-71CP is significantly more stable in performance, 7 to 14 times more reliable in circuit operation, as well as considerably lower in its power consumption.



MNC-71CP with 5" viewfinder, mounted on Universal 2030 fluid head tripod (equipped with double handles). Also shown: Remote Production Control Unit and Remote Control Panel ("Paint Box" camera case and related accessories).

### **Logical functional design**

Everything about the MNC-71CP has been designed from the ground up for simple operation and easy maintenance. It is therefore logical and simply laid out in terms of control placement, fast set-up and registration, and accessibility of parts.

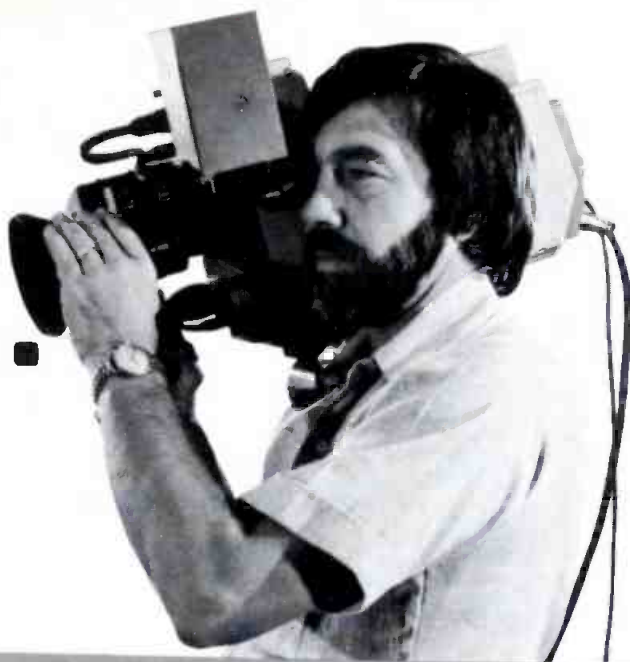
For example, merely opening the camera sideplates exposes all internal circuit boards without requiring the use of a module extender, and the removal of just six screws permits access to the pickup tubes for quick replacement even in the field.

### **Service and parts availability**

Behind the MNC-71CP is Cinema Products' outstanding reputation for after-sales service. The same consistent and dependable backup we have always provided our CP-16 line and Steadicam™ — an extensive dealer organization and full factory support.



# camera...



Since NEC directly manufactures all circuit components for the camera, you are guaranteed a full supply of replacement parts for the camera. And we will make these available anywhere in the United States within 24 hours!

### Unprecedented 1-year warranty

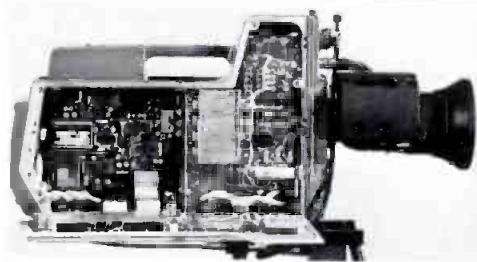
So confident are we of the MNC-71CP and its reliable performance, that it is covered by the standard Cinema Products full 1-year warranty (unprecedented in the broadcast industry!). And, there is no service charge ever for warranty work.

### Available here and now

Make the most of your ENG camera with the all-new MNC-71CP — a reliable ENG/EPF camera with a full CP backup. What's more, it is available here and now to take care of your immediate needs.



The MNC-71CP (Universal Model) enhances your ENG/EPF production capabilities in the field: providing utmost flexibility and fluidity as well as saving time and reducing costs. It is ideal for TV specials, documentaries, and commercials.



Merely opening the sideplates of the MNC-71CP permits checking all internal circuits without using a module extender.



## OUTSTANDING FEATURES & OPTIONS

- High-transmittance prism optics (maximum aperture f/1.4).
- 3-tube RGB system features Saticon® or Plumbicon® 2/3" tubes, as desired.
- Built-in linear matrix for high fidelity in tracking colors from high-to-low light levels.
- Three-position gain control: 6 to 12 dB additional gain for greater flexibility in boosting for extremely low light levels.
- Built-in, easy-to-use filter wheel arrangement.
- Automatic white and black balance circuits.
- Built-in microphone and intercom amplifiers.
- Signal-to-noise ratio: 51 dB.
- Complete accessibility of circuit boards and pickup tubes for easy maintenance.
- Fast set-up facility for converging the camera.
- Remote production control capabilities include the ability to balance the MNC-71CP to match the colorimetry of any number of cameras in the field and in the studio, as well as genlock, master pedestal control, servo-iris control, etc.
- A full range of options and accessories further enhances the MNC-71CP's capabilities as an outstanding ENG/field production camera for battery or AC operation.

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# There are few things in life as durable as a Scully

Take our new, rugged 250 Recorder/Reproducer for instance.

The die-cast Scully 250 will take on all assignments. For portable needs, just plug in the mic preamps for news, sports, or whatever. Solve your studio needs and use only 19¼" of rack space. Configurations include full or half track mono, two or quarter track stereo. The 250 is loaded with lots of other Scully professional features, including full front access for easy alignment.

For Reproducer needs only we've designed the compact Scully 255... same Scully dependability, engineering, and durability... perfect for your automated system.

Prices? Much less than you'd expect.

The 250/255... another classic performance by Scully.

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Recording Instruments

*For classic performance.*

NAB '78

*continued from page 30*

is acknowledged as the least accurate method.

Forest Cummings (Collins Broadcast Products) reviewed the series switching modulated AM transmitter in his paper on "State-Of-The-Art AM." Cummings covered high efficiency circuits, a modern band-pass RF output network, feedback techniques, and several other innovations that result in a more reliable transmitter.

An alternative technique for generating a composite on-the-air television signal using "improved" power amplifying devices was presented by Nathaniel Ostroff, Acrodyne Industries. According to Ostroff, this technique permits the simultaneous amplification of the visual and sound carrier in one common amplifier. This technique already is being used (IF diplexing) on a worldwide basis in low and medium power transmitters up to 10 kW RF output.

While there are some disadvantages, the advantages include precision generation and control of the vestigial sideband signal at low signal levels without regeneration of the lower sideband; elimination of the aural transmitter and its power supplies; precise control of envelope delay distortion in subsequent mixer and amplifier stages; and lower initial investment and operating costs. These transmitters, says Ostroff, offer a viable alternative to the medium power broadcaster.

Other technical workshops included interference to broadcast reception; the WARC panel; transforming an ENG camera to studio production (RCA); the FCC/Industry panel; 1-inch videotape production (Eastman Kodak, PBS, Ampex, Telegen, and Video Corporation of America); improving microwave coverage; and AM/FM quality. They were all interesting sessions, and ones offering plenty of feedback opportunities.

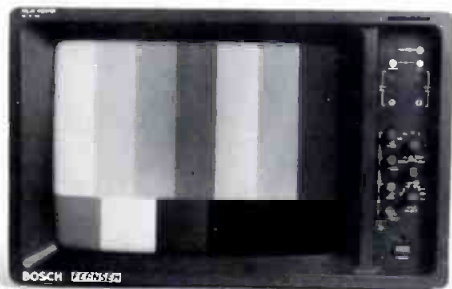
Digital is now the byword in broadcasting. And understanding digital circuits was made easier by RCA's John Wentworth. His session "Living With Digital Broadcast Equipment" was a vital input for broadcast engineers. Sessions like this one are what help make the engineering side of the NAB convention so important. Still, there were areas of high interest that were vacant: fiber optics, microprocessors, and deep remote ENG. Surely these will be included on the next session schedule for the convention in Dallas. □



# Two in-line monitors from Bosch that will not hide picture defects

A finely textured mask structure in the tube will show you what your VTR is really putting out.

Bosch Fernseh  
MC 37 BA



Bosch Fernseh  
MC 37 BB



ertain in-line monitors are noted for their stability and pretty pictures. But they also have a reputation for hiding defects.

When you evaluate our selection of Bosch Fernseh in-line units, however, you will be face to face with the reality of your VTR's true capabilities. You will get all the picture stability inherent in the tube concept.

That you will also get a fine mesh texture to help you catch video tape defects such as electronic moire and certain upper frequency noise and ringing problems.

## The difference is in the mask

The secret of this remarkable resolution lies an eighth-inch behind the tube face in an extremely fine slotted mask structure.

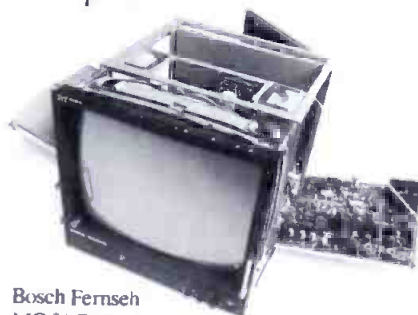
It was designed for Europe's 625-line PAL system. But by applying its fine texture to the American NTSC system, you can often see video tape defects another leading in-line tube might miss. That's because the defect will dissolve in the more coarse mask of the other picture tube.

Similar defects passing through the fine grille of one of these Bosch Fernseh in-line monitors will strike the screen undistorted.

control functions include contrast, brightness, synchronizing mode, chroma and input selection.

## High resolution in a delta gun monitor

For exceptionally high resolution in 20-inch CRT, Bosch Fernseh offers the MC51BA system, our top-of-the-line with a superior quality delta gun picture tube. Circuitry covers a band width of up to 6 MHz for a test margin 1.8 million Hertz beyond legal broadcast specs.



Bosch Fernseh  
MC 51 BA

## Precision and high quality units offered

The MC37BA is a precision monitor with a 15-inch CRT and a band width of 4.2 MHz. It has three 75-ohm video inputs, two of which can be superimposed for lining up chroma key shots. A three-position raster size switch gives you large, normal and small sizes. Vector output lets you do phasing and other applications.

The MC37BB is a high quality monitor designed for picture evaluation. It has two video inputs, a two-position raster size switch, and switchable color temperature.

Decoder boards convert both monitors from one television standard to another. Servicing is just as simple. Many PC boards swing out on connector hinges so operation can continue. Remote

For further information on the Bosch Fernseh line of color monitors write: Robert Bosch Corporation, Fernseh Group, 279 Midland Road, Saddle Brook, New Jersey 07662. Or call collect to 201/797-7400. For inquiries outside North America contact: Robert Bosch GmbH, Geschäftsbereich Fernsehanlagen, Postfach 429, D-6100 Darmstadt, Federal Republic of Germany.

### The Full Bosch Line

The color monitors discussed here are only a small part of the comprehensive monitor program offered by Bosch Fernseh. It includes 20 different B/W and color models developed for all television applications.

Quality	B/W or Color	Type
Precision Monitors	B/W	M 24 BA M 38 BA
	Color	MC 37 BA MC 37 BAB MC 51 BA MC 63 BA
	B/W	M 24 BB M 38 BB M 50 BB
High Quality Monitors	Color	MC 37 BB MC 51 BB P12 (67 cm)
	B/W	T 14 BC T 31 BC T 50 BC T 61 BC
Standard Monitors	Color	C 21 (67 cm) C 31 (67 cm)
	B/W Viewfinder	K BB (2.5 cm) K 14 BB

While there was a lack of "sold" signs on equipment this year, the activity in the booths was excellent. All reports from our interviewing editors indicate that quotes and second and third visits from buyers for further information was as good as or better than the last few conventions. Several manufacturers reported high order volume.

Sharing the flavor of the equipment exhibits, several portable cameras were taken to the Merv Griffin Show where they were demonstrated on stage at Caesar's Palace. And if you flipped your hotel TV set to another channel, you couldn't avoid the NAB influence. Closed-circuit channels included professionally produced tape demonstrations of video equipment.

The shopping was easier this year, mainly due to the convention center, where all exhibits were under one roof. As you'll see from all our editors' reports, there wasn't much on display you'd call revolutionary. But there were some surprises, and all the signs pointed to the fact that foreign manufacturers were serious about their sales potential in the U.S.

As I said in the March pre-NAB issue, this would be the biggest and best convention to date...and it was. In fact, the industry showed its professional maturity

even in their booth designs and operation. For example, Imero Fiorentino Associates, noted for lighting everything from Neil Diamond tours to the presidential debates, set up the lighting in 10 booths and directed the live production of six. In most booths the girls weren't bored and neither were the broadcasters.

This section kicks off our convention coverage with a combination of audio and video products. More complete segmented reviews of other manufacturers have been divided into audio and video, and they immediately follow this first tour of the exhibits.

Let's move on down the aisle and see what was happening in the booths. Keep our reader reply card handy, and use the appropriate circle number following each exhibitor listing for more information.

ADDA definitely had one of the hits of the show. They unveiled a frame synchronizer that sells for under \$20,000. Called the VW-1 Digital Frame Synchronizer, it's a fourth harmonic, digital synchronizer with the ability to lock remote, network, ENG and satellite feeds to the station reference. It also functions as a TBC for heterodyne color U-matic recorder formats. Freeze frame for the VW-1 i

# NAB equipment marketplace was the hit of the show

By Ron Merrell



ENG cameras were borrowed from the convention center and demonstrated on stage during the Merv Griffin Show. (Photo by Donna Foster Roizen)



Optional. A jittering 3.58 MHz CW output is available for recorders designed for this type of signal.

With a fourth harmonic of color subcarrier sampling rate, the signal-to-noise is +56 dB (P-P signal to RMS noise). It accepts NTSC or NTSC-type 25 line 60 Hz. Front panel controls include video level, chroma level, hue, setup, TBC, bypass, and gain.

Of course their electronic still processor—the ESP-100—was demonstrated; this was the first showing on the floor. With the ESP-100 you can put all your slides on floppy discs, and record upcoming artwork and copy directly with a television camera, bypassing the photographic process.

No doubt about it though, ADDA's synchronizer was one of the hits at the show. [341]

Amperex has a new 1-inch Plumbicon™ TV camera because they say will increase the level of performance of portable cameras to that of the highest quality. Designated the S73XQ, it is interchangeable with conventional 1-inch Plumbicon pickup tubes with only minor circuit modifications. Its limiting resolution is 1000 TV lines. Modulation depth is 65% at 400 lines, a 50% advance over 1-inch Plumbicons.

Increased beam acceptance of its photoconductive layer reduces signal decay lag, even at low light levels. Decay lag at 50 Msec is typically 2% at signal levels down to 50 nA. [300]

Arvin/Echo had already unveiled their low-cost, high-band Slo/Mo machine at a SMPTE meeting in Los Angeles, but it drew crowds again at its NAB showing. While going for under \$50,000, this slow motion machine is broadcast-quality. In fact, to show immunity to vibration, it was demonstrated at NAB on a wobble table.

Another introduction was their SS-2 Slide Station, using two EFS-1A video Discassette® Recorder/Reproducers, the system can give random access to instant on-air switching of 400 stored images and with preview capability. The system also uses a remote control unit and a time base corrector.

Extending their EFS-1A even further, they showed a Dual Disc System that allows the operator to use the keyboard of a character generator to control two EFS-1As. The operator can control the visual and audio operations at the same time, giving the operator on-line control of 400 pictures or visuals while simultaneously controlling the character generator information.

Arvin Systems showed the new Tel-Weather® receiver, a unique unit that accepts radar generated weather information from the National Weather Service over a voice grade phone line. It provides a synchronized 24-hour video display of the radar scope, changing every 90 seconds.

Animated weather is possible by taking time-lapse video inputs and storing them on an EFS-1 Frame Store Cassette® Recorder. Played back on the air, the viewer will see a weather front moving across the screen. [301]

The Bird Electronics booth included their usual lineup of wattmeters and loads. But this year they showed four new products: a digital calorimeter, air-cooled loads, air-cooled loads, and additional Thru-line® wattmeters.

The 1000 to 80 kW digital high-power RF calorimeter is designed to measure RF power quickly

## Automation systems continue to gain ground in the broadcast industry

after a simple setup. It automatically processes all sensor inputs and displays power directly without charts or calculations.

The ThruLine® series includes RF directional wattmeters built to handle high-power in rigid lines. [302]

A new microprocessor-based program automation system, dubbed the Control 16, was demonstrated at the Broadcast Electronics booth.

Control 16 can give the operator information on five separate CRT displays. Its low-profile keyboard includes only those keys necessary for full system operation. The keyboard is portable, but up to four keyboards may be set up in different locations for start-up, operation, and interrogation. While based on incorporation of their own electronics, the cart side is complemented by the IGM Go-Cart, and the reel-to-reel machines are supplied by Scully.

Broadcast Electronics also showed their full lineup of cart machines and consoles. [303]

CEI demonstrated their CEI-310 camera. But it isn't just a camera, it's a system. Depending upon how you configure the 310, it can be carried on the shoulder or put on a tripod for ENG or EFP (with monitor viewfinder), or it can be used with a hood and 8-inch viewfinder in the studio.

Remote units allow operation of the 310 up to 2500 feet when the System Integration Unit is used. The production remote control unit normally operates up to 50 feet. In the field, the 310 can operate on just one cable at up to 400 feet from its electronics.

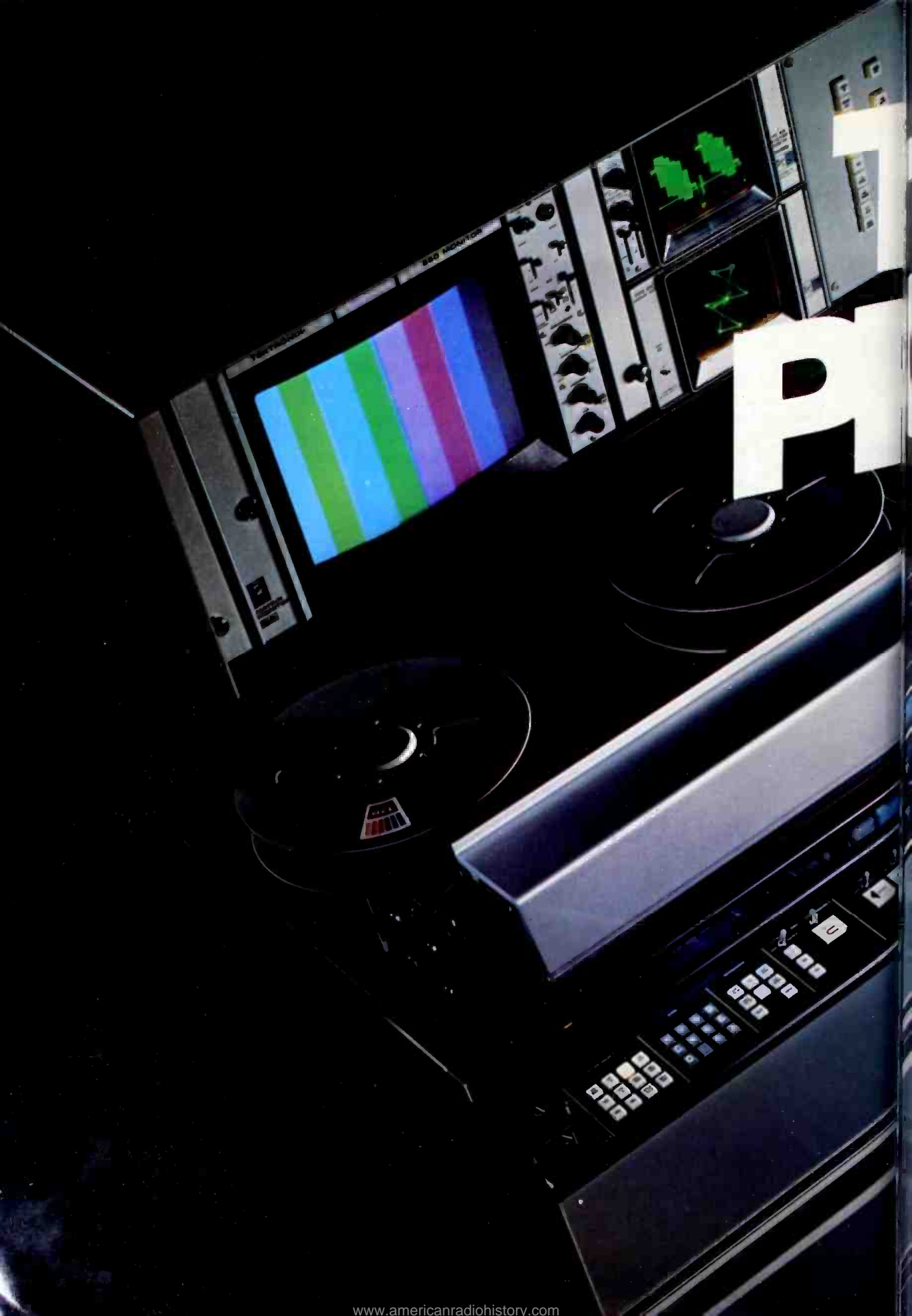
The camera head, at just 7 pounds, has a sealed prism optical assembly and a 3-inch viewfinder. And, it can be operated from a variety of power sources from DC to 250 VAC. [304]

Consolidated Video Systems unveiled their two latest products: a portable production console and a TBC for non-segmented heterodyne VTRs.

The EFP-1 console is designed for use on multi-camera remote telecasts, to replace or back up a van, complete a shoot in a poor-access location, and to give additional studio facilities. The EFP-1 includes audio mixing, video switching, intercom, system timing, test signals, and monitoring for remote broadcasts. For servicing, both front and rear panels are hinged. Its microprocessor controller puts all routing, wipes, and script assistant functions under a simple key pad control.

CVS also made an addition to their TBC line with the introduction of the 516. This model was designed

*continued on page 40*



7  
P



# THE PRODUCER

## AVR-2

Production recording is a joy with the Ampex AVR-2 quad video-tape recorder. This is the versatile quad from Ampex, big enough to do everything for small stations, and small enough to take on special tasks for big stations. No wonder the investment and operations economies of the AVR-2 make it today's best selling quad recorder.

Options are the secret. Continuing development of quad at Ampex has made possible switchable selection of high band color or super high band pilot. And growth in editing capability all the way to the stand-up EC-2 edit controller. And a really wide choice of configurations from the basic modules all the way to a full studio console. And more to come.

Start small and add as the need arises. Add more horsepower to your existing quad capability. Consider 7½ ips recording speed for important tape cost reduction. Keep your production shop as modern as your programming. AVR-2 does it all at once, or a step at a time.

Regardless of configuration, you'll have the transport and electronics that put today's quad performance and reliability under the fingertips of thousands of television producers.

# AMPEX MAKES IT EXCITING.

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

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

for ENG, teleproduction, and VTR backup. Correction of chroma/luminance delay problems, a 3 dB chroma noise reduction, and velocity and color dropout compensation are among its features. There are also a gen-lock sync generator; automatic VTR advanced sync; and a built-in, completely adjustable processing amplifier.

They also offer EPIC, a computer-aided on- or off-line editing system. Designed for multiple VTR editing, EPIC is a highly flexible system using a floppy disc that can store almost 10,000 edits. [305]

System 21 was the hot item at the **Dynair** booth. In case you missed it in our pre-convention summary, the System 21 is a microcomputer-controlled matrix switcher. It will handle video, audio, data, and machine control.

Actually, System 21 is a family of routing switchers for complex multi-level operations all the way from 10-input by 10-output to 1000-input by 1000-output. The system's design is based on a 10 by 10 matrix building block. Each switch matrix module provides 100 cross-points. They get their flexibility for matrix construction by using a single-module frame housing (two families of frames are available) and unique combinations of module interfaces, including motherboard and frame-adaptor assemblies.

Its multi-level control (up to eight control levels), microprocessor touchpad, CRT terminal, and computer automation control are all standard. Another important feature is its self-diagnostic control system. Modules can be replaced without the need to power down.

All switch modules include data storage latches for "preset" and "on-line" addresses. This enables any part of the switch matrix configuration to be updated at one time. This salvo feature can also be used to change the entire matrix in microseconds.

The system also allows a redundant power interconnect. Should one power supply fail, the other can be jumped to supply two frames. A relay alarm contact is closed when this condition exists. [306]



BE Editor Ron Merrell gets a hands-on demo during a lull in the Cinema Products booth.

## Microprocessor controls add built-in muscle for routing switchers

**CMX Systems**, an Orrox Corporation company, announced an exclusive licensing agreement with Vidtronics. In keeping with the agreement, CMX will manufacture and market Videola™, and it was demonstrated at NAB.

Videola is a system which collects time code and other information from an edit controller and converts it into a CMX-compatible edit decision list. In fact, Videola can interface with existing edit controllers such as Convergence, EECO, Sony, TRI, and others. So Videola allows the user to take advantage of CMX editing at a low price. This makes it a low-cost bridge between simple time code or back space editing and the versatile computer assisted CMX editing systems.

It's easy to learn, and to operate. The demo showed that. But the key is that it allows any television operation with any type of edit controller to output a CMX-compatible edit decision list, including wipe, fade, dissolve, and key information.

Along with their previously introduced and accepted editing lineup, CMX introduced an SMPTE/EBU time code generator, and a time-code reader display. [372]

New at the **Dynasciences** booth was their downstream linear chroma keyer, a video graphics system, and a video source identifier.

The 7220 downstream keyer generates chroma keyed output from any color in the spectrum. The 7220 will produce a chroma-keyed output from two encoded video input signals; and, a separate insert keyer is not required. The unit includes a comb filter to minimize noise and chroma crawl at the edges of the image.

The 9048 video graphics system is software-based using a floppy disc for program control and page storage. The standard model contains six fonts. Along with preview output, text editing allows transfer of information from one page to another for further editing, without destroying the original.

Their source identifier sends an identifying signal from an ENG remote unit so the source is identified. The signal is removed with a processing amp before it hits the program line. [307]

At the **EEV** booth, new Leddicon® tubes were introduced with a control on the socket (P-8400). It was designed for use with the GE P-350, TK-44, TK-45, TK-46, Thomson 1515, Norelco 60's and 70's, or any camera operated under low light-level conditions. The socket control pot sets light bias levels and allows adjustment for reduction of smearing, especially at low light levels.

Also displayed and demonstrated (in the new Marconi MK IX camera) were the P-8136 High Light Overload Protection tubes. And, for the first time, EEV

continued on page 40



# For the truest picture of transmitter performance available.



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an essential piece of equipment. With the proper video and audio measuring set-up to monitor not only the quality of the transmitted signal, but even the modulation depth.

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# PHILIPS

## Marketplace

continued from page 40

is offering their complete broadcast product line to North American radio and TV markets.

EEV's new high-brightness character display tube has an output as high as 2000 foot Lamberts. The tube operates from a 12-volt input and is available in sizes from 3 to 25 inches. Characters other than the seven segment number and 35-dot matrix are available, and examples were displayed at the booth. [308]

EMCEE exhibited their UHF, VHF, and microwave low-power television stations, including transmitters, translators, and antennas.

Their translator line now extends from 1 Watt out to 1000 Watts out. On the high end, their TU-1000U translator features solid-state modular construction with all circuits for automatic unattended NTSC, SECAM, and PAL operation.

EMCEE also handles Bogner low- and medium-power TV broadcast antennas. On the MDS side, they offered a 10-Watt transmitter and a 100-Watt amplifier, along with a preamp and down converter.

Popular this year is their model TTV-5, a portable TV transmitter that operates on any VHF channel

general purpose switching systems designed for master control room applications. The 1600-1T has 16 inputs; the 1600-4T has 24. Either can be operated manually or, optionally, with an APC-2000 series automation system.

The real excitement this year came from E-MEM, or an Effects Memory system. This system "remembers" specific effects and can reproduce the operator's movement of the lever arms, provide frame-accurate automatic transitions, and perform a special function called Effects Dissolve. E-MEM also can be used as an intelligent interface for use with videotape editors or other peripheral devices.

The primary function of an E-MEM system is to store, then recall any effect that a single switcher effects system can create. It's extremely easy to use, since it does not require a data entry keyboard or readout. E-MEM simply monitors the control panel and "learns" the positions of all switches and controls that the operator has selected or set.

There's no secret about how it works. A micro-computer contains all the E-MEM functions, and logic is located on a single plug-in CB. Switcher functions are stored digitally in a CMOS memory. When a recall is made, the memory dictates which crosspoints are to be set and outputs new analog levels via a reverse D to A process. If that isn't enough, try their E-Card. Put it into the system, and it will record your effects. With the card reader located at the switcher control panel, the switcher programming can be changed between or during shows.

Grass Valley also now has a shadow chroma key and an analog borderline system as 1600 series options. Another new product was their 1600-1A/1L AFV system. It's an option that's a complete audio system to complement the 1A and 1L video switchers. The system accommodates 15 input sources—10 AFV and 5 audio-only.

If you missed the M200 series automation system, it's a building-block approach to television automation. You can start with a minimal system and build up your capability as you can afford it or need it, jump into a halfway point, or go all the way. Nine levels of operation are available. Building up from the 1600-4S switcher through 1-, 20-, and 200-event storage and editing as well as log printing, the system adds traffic, data manager and printout, and a material identification system. The last move is an expansion of the 4S switcher inputs by automatic assignment of sources through a Grass Valley routing switcher. [311]

The big news on the IVC booth was that it was there! After a Chapter XI experience, the company showed that they are well on the road to recovery and that the product lines that served them so well in the past will not disappear. Under the direction of Roy Woodman, Jack Watts, Dave Edmonds, and Fred Ramback, the activity around the booth verified that IVC is coming back strong.

Chief among their displayed products was the IVC-7000, a versatile broadcast camera system. The 7000's prismatic color separation system provides direct imaging onto the tube faces, eliminating intermediate field or relay lenses. It uses 1-inch separate-mesh tubes that average 45% modulation at 400 TV lines before enhancement. Other features include contour enhancement, flare correction, switchable RGB/YRB

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### Switchers battle for spotlight with new digital video effects

from 220 to 310 MHz. With selectable outputs from 1 to 5 Watts, its built-in rechargeable batteries also supply power for a camera. Range is up to five miles, depending upon terrain. [309]

Already supplying portable electronic power belts for a wide line of ENG cameras, **Frezzolini Electronics** introduced two new Frezzi Belts at NAB. The dual voltage model F-12-P6 features high capacity (6 AH) and full recharging in 45 minutes. This belt was specially designed to work with the TK-76.

Another new power belt, the F-12-1277, will work with the Ikegami HL-77 and 100W Sun Gun or the Frezzi FLH-100 (a 100 Watt 11.5 VDC lighthouse). All Frezzi chargers are line isolated, except for a lightweight reactance model (EXF-25-2). [310]

**Grass Valley** drew heavy crowds at last year's NAB with a unique digital effects system that simulated effects previously available only through optics. This year there was even more to see, including expansion of the 1600 series switcher line, E-MEM, and the M200 series television automation system.

Grass Valley starts out with a switcher (1600-1A) that's compact enough for vans or small studios, but it also can be used in post-production rooms. From there they have models especially designed for every switcher use up to and including the 1600-7K for the largest TV studios and production centers.

Their newest products include the 1600-1T and 1600-4T master control audio/video switching systems.





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The historic photographs used in this advertisement were actually recorded from space on this type of disc recorder and transmitted worldwide over network television.

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# What others promise, the Ikegami HK-312 has been delivering for 2 years.

The Ikegami HK-312 is a high-quality broadcast studio color television camera with unusual capability. In addition to delivering superb pictures, it can be easily interfaced with a microprocessor-computer control unit that automatically performs a complete camera setup in 45 seconds or less. This is not a vague promise, it's what the HK-312 computer has been doing at leading stations such as WABC, WGBH, WLS, KABC, and KGO. They've put the HK-312 and its computer through the testing and evaluation wringer—the HK-312 cameras you buy today are based on two years of on-air field experience and incorporate the suggestions of a variety of users.

By itself the HK-312 is a state-of-the-art camera with Ikegami performance, quality and reliability.

**Performance** designed-in by the engineering group responsible for the well-known Ikegami HL-33, HL-35, HL-37, and HL-77.

**Quality** assured by 30-mm Plumbicon® tubes, preamps furnishing a signal-to-noise ratio of -53 dB minimum, precise video signal processing, and an excellent detail corrector. For the very cleanest first-generation VTR masters a -3 dB gain control delivers pictures with virtually invisible noise.

**Reliability** built into every HK-312 and verified by complete testing before delivery.

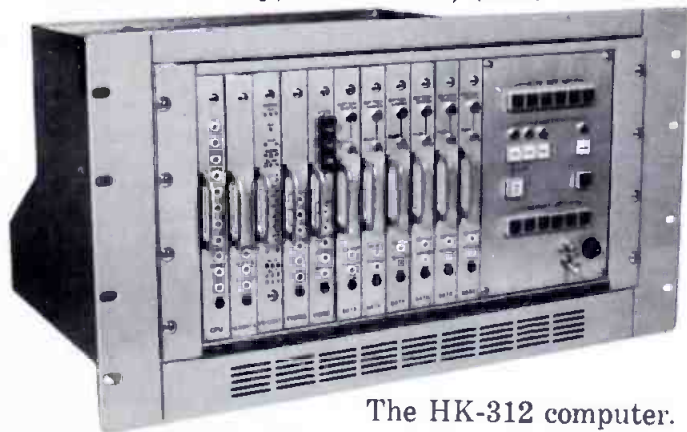
The computer is available for instant installation and operation. Plug it in and the HK-312 camera can be automatically interrogated and set-up to produce an essentially perfect picture: centered, aligned, registered, skew-gamma-flare-corrected, black-balanced, color-balanced, set-up completely and double-checked in

about 45 seconds. A single computer can sequentially serve up to six HK-312 cameras. A single push-button starts the entire sequence; the computer can be programmed to skip any camera or any function.

The HK-312 computer quickly pays for itself by liberating your talented personnel for more-productive work. Its automatic adjustments are consistent and do not vary with the taste and judgment of the operator. The HK-312 camera head can be connected to its camera control unit with any TV-81 or TV-81 mini cable.

A second Ikegami computer-compatible color camera, the HK-357A, suitable for field or studio applications, is now available. It features one-inch diode-gun Plumbicon® tubes for high resolution and lowest lag as well as a choice of self-contained camera operation or connection to a full-function base station by multicore or triax cable. Full monitoring capability and a chroma-key signal are available.

For details or a demonstration, ask Ikegami Electronics (USA) Inc., 29-19 39th Ave., Long Island City, N.Y. 11101; (212) 932-2577.



The HK-312 computer.

## Ikegami

Circle (23) on Reply Card

matrixing, automatic white pulse gain stabilization, B&W level color paint controls, and continuously variable gamma correction.

IVC also showed their 1070 portable teleproduction color recorder with electronic assemble and insert editing. It's a 1-inch VTR in the low-cost range with two broadcast audio channels. Existing 1-inch libraries can be played back on the 1070. All tape motion controls and editing functions are C-MOS logic compatible and fully remotable.

The 9000 was demonstrated again, and IVC is still happy with its sales records. Meanwhile, look for IVC to continue their strong comeback. [312]

**3M Company's Magnetic Audio/Video Products Division** introduced a new master broadcast videotape for professional applications in the 1-inch format. Scotch brand 479 has higher RF output (3 dB), signal-to-noise ratio (2.5 dB), and color improvement (3 dB) when compared to a standard high-density videotape, according to 3M.

Offered in 30-, 45-, 60-, and 90-minute lengths, the rugged base of 479 permits stop action, frame-by-frame editing, jogging, and slow motion. 3M says the tape's low abrasivity will help extend head wear. [342]

Stepping up its broadcast products activity **3M Company's Mincom Division** introduced a studio production switcher with built-in microprocessors event memory. The model 9000 video production switcher's memory allows for preparation and storage of up to eight panel setups that can be recalled for difficult production sequences. Its 20 effects are selected by a 10-key input bank. Twelve inputs, including black burst and color background, are available. A chroma-key feature is optional.

Mincom replaced their D-3000 character generator (four-page memory) with the D-3016. It features a 16-page memory capacity. Three font styles are available in upper and matching lower case. The D-3016 will display up to 22 characters in a row and 10 rows per page. It has three-speed vertical roll and horizontal crawl, and automatic centering.

They also added an image enhancer/decoder with an internally generated output suitable for chroma-key applications. For chroma-key operations, an auxiliary output provides RGB keying signals which may be applied to the RGB chroma-key input of a switcher for chroma key effects.

The Comtec line of production and routing switchers was displayed in the booth, including the models 3100 and 3300. [343]

**Memorex** introduced an improved version of its "advanced-formulation" videotape line, called MRX-716. It's a top-of-the-line tape for the company.

According to Memorex, MRX-716 was specially designed for the new generation 1-inch segmented and non-segmented helical VTRs. It can be used to meet such demands as slow motion, still framing, manual jogging, and editing.

Features explained at the booth include enhanced durability as a result of a new generation binder system, a stabilized oxide formulation that insures signal and coercivity stability, and ultra-smooth tape surface and permanent lubricants which are aimed at reducing the coefficient of friction for extended head life.

MRX-716 is available in 34, 64, and 96-minute

lengths in a plastic shelf box or a flame retardant shipper.

## Editing systems make cassette VTRs even more flexible

Also sharing the spotlight was a full line of professional and video products, including the Q<sub>2</sub>HD videocassette lines. [371]

**Marconi** launched their MARK IX family of color TV cameras at NAB. The family members are two cameras, a common-control unit, and a host of optional features. According to Marconi, the power drain is so low that these cameras can be battery-operated for long periods. When fitted with triax cable, they can be operated up to 5000 feet from the CCU. With choices such as multicore or triax cable, camera tube type, battery or mains operation, size and type of viewfinder, local or remote control of the CCU, and size of lenses, a flexible camera system can be tailored to the user.

Introduction of a switched-mode power supply helped reduce the size of the CCU (in a 19-inch rack, it's just under 9 inches high). Power consumption has been reduced to 350W for the studio version, and 250W for the portable.

As options, Marconi has a system for automatic registration using a diascope and automatic centering, auto black balancing, and auto iris. An entirely new feature is the dynamic gain control circuit provided in the coder. This circuit enables the picture content to be improved when detail would be lost in the near black or white regions. This feature was dramatically proved during the live demonstrations.

The MARK IX portable model comes in automatic or manual versions, and a choice of 1-, 3-, or 7-inch viewfinders, and it includes a program microphone circuit. The portable was demonstrated on a cameraman's shoulder and on a Vinten Portaped and Fluid Head. [373]

If you're monitoring VITS manually, **Marconi Instruments** (a division of Marconi Electronics) can solve that problem with their automatic signal insertion analyzer, the mi 2914A. It works with NTSC, PAL, and SECAM systems.

The mi 2914A interfaces directly with telemetry control systems. Combined with the mi 2915 optional Limits Comparator and the mi 2917 Data Selector, it becomes a complete monitoring, measuring, and alarm system. Even complex VITS measurements can be performed at the push of a front panel button. The result is on a digital front panel meter.

Also new at Marconi Instruments is an AM/FM Signal Source, model 6158. It covers from 8 to 12.4

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# Hitachi's Latest from NAB... Plus More!



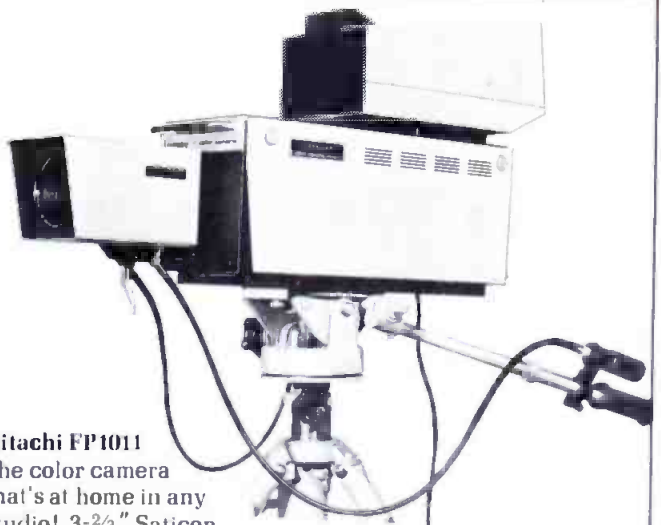
**Hitachi FP1020**  
Performance PLUS from  
a self-contained 3-  
Saticon (3/3") ENG/EFP color camera. Low  
power consumption, built-in vertical enhancer,  
plug-in PCB, auto white and black balance circuits,  
and much more.



**Hitachi FP 3060**  
For professional quality pictures from a modestly priced,  
one-piece ENG color camera! Features new tri-electrode  
Saticon™ tube, low power consumption, aluminum  
die cast body, tiltable and adjustable viewfinder, and an  
optional single coaxial power supply system.



**Hitachi SK-90**  
Superb, broadcast  
quality ENG/EFP color  
camera (self-contained).  
Features 3-2/3" Saticons  
with extra small prism optics, built-in ABO  
(Automatic Beam Optimizer) circuit, 2H Contour  
corrector and Masking Amplifier, and low power  
consumption.



**Hitachi FP1011**  
The color camera  
that's at home in any  
studio! 3-2/3" Saticon  
tubes, multifunction RC panel, optional kit for conversion  
self-contained use, tiltable and detachable 7" viewfinder.

- Plus:**
- Hitachi SK-96: our newest broadcast convertible.
  - Hitachi FP3040: the new economy convertible.
  - Hitachi FP3030-G: a self-contained Gen-lock economy portable.



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Circle (24) on Reply Card

## Marketplace

continued from page 46

GHz. It uses yttrium iron garnet (YIG) Gunn Oscillators as active RF elements. [553]

**Micro-Trak** exhibited their lineup of control room and studio desk/equipment configurations, a complete operations concept. New at the booth was their model 6405 Pro-eminent turntable preamplifier.

The 6405 is RFI suppressed, with individual level controls. Micro-Trak specs show low-noise and low-distortion figures and promise precision equalization. It's a stereo preamp discrete and IC component circuitry. [313]

**Moseley Associates** displayed their full line and added the TSC-2 Telecontrol System. The TSC-2 provides independent command, telemetry, and status reporting capabilities. It meets the FCC requirements for radio broadcast transmitter control, but it also can be used for ENG applications. Provisions are included to allow operation of two TSC-2s over a single interconnecting circuit, or to permit the combining of the TSC-2 and TSC-1 Telecontrol System on the same circuit.

At the convention, Moseley announced that their ESC-10 earth station control system is being supplied for use in the Public Television satellite interconnection system. The non-collocated (10-meter antennas) ground terminals will use the ESC-10 for remote control, telemetry, and status. [314]

Make no mistake about it, **NEC America Inc.** was a strong contender for broadcast video sales at this convention. Already established in the world market, NEC this time gave full attention to U.S. and Canadian broadcasters. A host of delegates from other countries dropping by the booth probably included a lot of familiar faces.

### NEC becomes full time contender in the U.S. marketplace

NEC announced that their new PCN-1000 series TV transmitters incorporate solid-state RF power amplifiers and air-cooled tubes. Both exciters and drivers were solid-state. Since the same type of tube is used for both visual and aural power amplifiers, replacement inventory is cut in half. Power consumption is reduced by using high-efficiency avalanche-type silicone rectifiers. Remote telemetry and automatic changeover control equipment are available.

Maintenance is simplified by plug-in modules, while built-in program input equipment offers easy adjustment and eliminates the need for an external cabinet rack. Pre-correction for phase distortion is made by an active circuit which can be compensated to the minimum value of the group delay response.

NEC also showed their 7000 series FM transmitters

that are designed for unattended operation. The 150W through 1 kW models are fully transistorized. From there to 20 kW, only one tube is used. The DCFM circuit is broad-banded, and transmits stereo and SCA programs without requiring a mixer or multiplier.

The company also has a digital video compressor option for their frame synchronizer. The new DVC-151 compressor, working with the FS-15, is capable of compressing non-synchronous video input to one-quarter normal size. A variable joystick control handles compressed video location. Using a TH memory and a vertical-direction spatial filter, the output signal obtained through compression retains all the information of the input signal. While we're on the FS-15, it's the first frame synchronizer to make use of 16K RAM memory chips. If RAM failure should occur, it is covered by data rotation. A built-in memory analyzer locates the defective chip within 60 seconds, using LED readouts.

NEC also showed their NTC-5000 second generation time base corrector. It can be used with quads and high-band helical VTRs, as well as U-matic types. The NTC is light enough for field use; and mode switching, video gain, chroma gain, and hue set-up can be controlled remotely.

Other introductions included their NBC-61A, a DC-powered field camera checking in at under 20 pounds. The MN-61A has complete weather and temperature seals for use under rugged field conditions. The company also will market their editing controller/VTR combination that allows fast, precise editing and a noise reducer that improves ENG quality under low-light-level conditions. In later issues, look for more on their 40 GHz microwave video relay system, 12 GHz DOMSAT gear, and the TVPC-16 automatic video delay line. [315]

Along with the really big boards they are noted for, **Rupert Neve** displayed their new 5402 system console for AM and FM. Using the modular approach, the flexible 5402 can be used for AM stereo. The main frame is wired to accept 12 mono or stereo channels, and it's equipped with 10 mixing busses accessible from all channels.

Neve also showed their 5305 four-bus console for broadcast and music recording. This console was designed for four-track recording, sound reinforcement, broadcast production, and television production, yet it is not too big for mobile applications. Standard frames in this series have 12- or 20-input channels, each with independent mike and line-input transformers. In each case, a single rotary switch provides sensitivity settings in steps of 5 dB. All insertions have balanced, floating send and return lines conforming to the same specifications as main inputs and outputs.

Neve is now promoting NECAM computer editing. [316]

Since ENG became an industry target, **Nurad** has been coming up with antenna innovations annually. This year, along with their line of antennas, they showed the Superquad®. It's a microwave antenna system with quad polarization, featuring low side lobes. It's a pan-only system (no tilting required) that is available in both single- and dual-band versions.

Enclosed in a radome, the Superquad® is digitally controlled with remote operation optional. It's available in the 2, 2.5, and 7 GHz bands as well as dual

continued on page 50



# Looking for full camera mobility with "on the air" picture quality? Find it...in our Hitachi FP1020!

If you need professional performance from a hand-held color camera, Hitachi FP1020 is your answer.

No matter what the assignment, the FP1020's three  $\frac{2}{3}$ " Saticon® tubes deliver broadcast-worthy resolution and colorimetry. And like all Hitachi portables, the FP1020 combines lightweight handling with heavyweight performance features such as: auto white and black balance controlled by an 8-bit digital memory... three-way power via 2-hour battery belt, AC, or 12V DC... built-in color bar generator... vertical enhancer... and a 5-position color temperature filter disc.

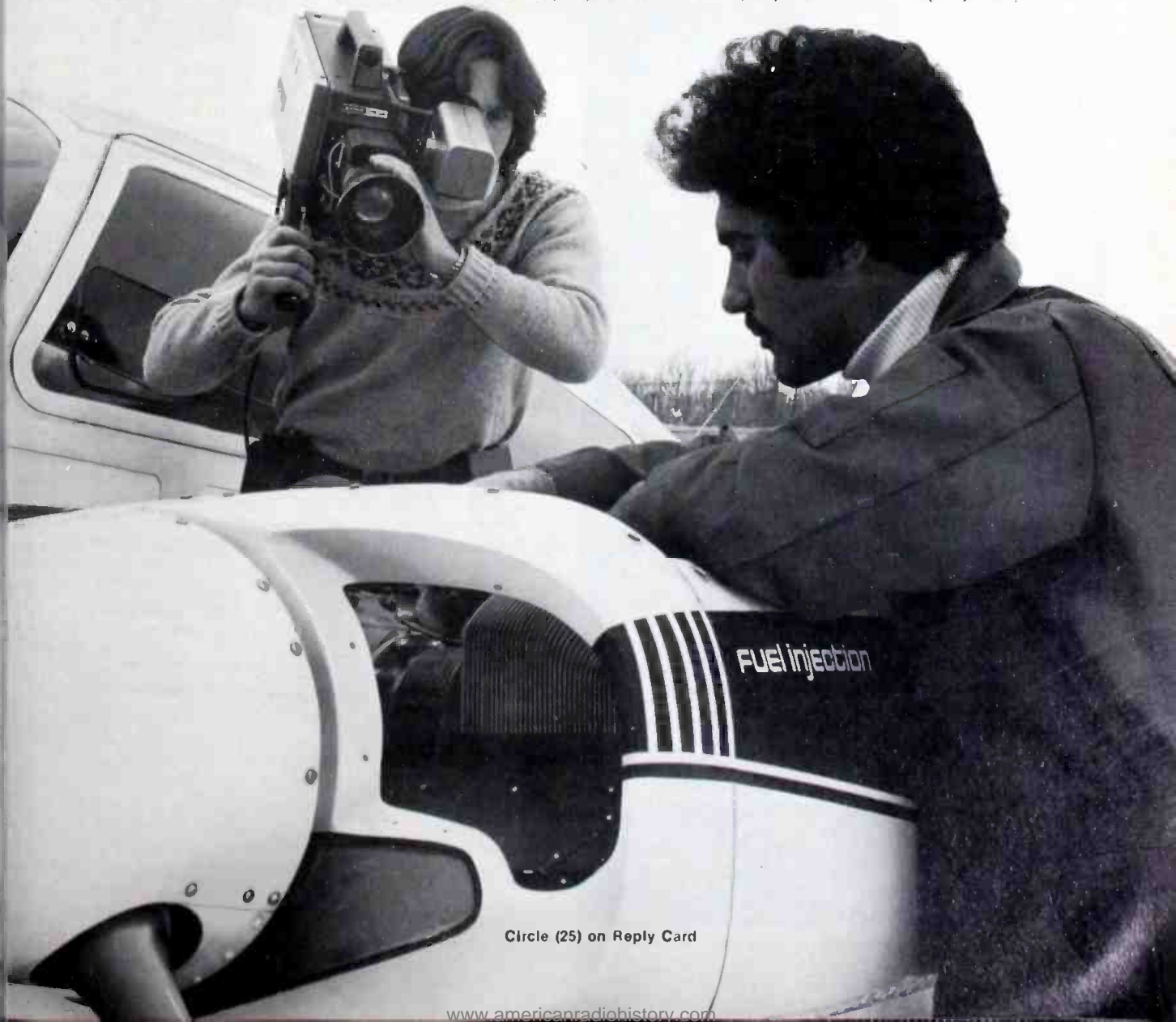
Two key options extend the versatility of the FP1020: built-in Gen-Lock for multi-camera system use and a remote Operation Panel which controls camera functions from up to 150 feet away.

For documentaries, for training programs, for any field production applications, see the Hitachi FP1020 first. At your Hitachi dealer.



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# WEIGH ALL THE OPTIONS BEFORE YOU MAKE YOUR DECISION!



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SONY CVM-1720

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Cost: \$950

VACc Isolator  
SONY KV1204

Weight: 29 lbs

Cost: \$571

SONY KV1711D

Weight: 55 lbs

Cost: \$691

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most Sony receivers

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Weigh all the options before you send your crew out for that ENG assignment. Will that lower-priced monitor/receiver your technical crew is using have that SONY performance and reliability? Too heavy you say... or maybe too expensive. Do yourself a favor... install a Video Aids electro optical isolator in a Sony receiver. In less than 30 minutes you have a high quality color monitor while still retaining the receiver function. You only add 8 ounces to the receiver's total weight instead of the typical 12 to 18 pounds most monitor/receivers add. Try it... not only will you like that solid reliability and performance... you'll save money... and your crews will love you for not having to carry those heavy monitor/receivers. Yes, weigh all the options before you make your decision...

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## Marketplace

continued from page 48

bands. With elevation beam shaping, it can cover locations virtually underneath the antenna out to the limits of its range without tilting. [317]

Orban, already established with their Optimod-FM showed their Optimod-AM system that includes a connector to accept an AM stereo adapter chassis.

The Optimod-AM pre-processes audio signals to compensate for limitations in frequency response. The unit consists of seven signal processing blocks. An input filter eliminates frequencies below 100 Hz and above 11 kHz. It uses a gated broadband compressor to ride gain and has an equalizer that can produce extreme preemphasis which complements receiver rolloff.

A six-band limiter measures signal levels across the usable spectrum. It automatically equalizes standard program material. It also makes use of a soft-switching polarity follower and a smart clipper that prevents overmodulation. This circuit contains a computer which is programmed with a model of the human hearing mechanism. The output filter prevents splatter and interference to adjacent channels. [318]

Panasonic Video Systems showed its first ENG color camera and added a broadcast-quality color studio camera to its line of color video production equipment. The ENG camera is dubbed the AK-750, and it's designed for broadcast applications with minimal power consumption. Buyers can select a 3/8-inch Plumbicon® Newvicon, Vidicon, or equivalent tubes.

The AK-920 fully self-contained studio camera is available for immediate delivery. It meets NTSC standards, and includes a new color trap circuit in the encoder and level-dependent circuit for reduced color noise under low-light conditions. A recommended illumination of 150 footcandles at f/4 is an indication of its sensitivity. However, the camera will operate at 15 footcandles at f/1.8 with a +6 dB gain switch.

Panasonic also showed their videocassette editing system, including the NV-A950 Editing Controller and their videocassette recorders. They also showed Omnivision II™ 2 1/2 hour industrial videocassette recorders. [319]

Philips Test & Measuring Instruments displayed their new TV demodulator, the PM 5560. It's a lab quality demodulator designed to measure the picture quality and modulation depth.

The PM 5560 features include direct channel selection for easy shift to other RF sources, AFC that corrects for transmitter offset, a synchronous detector for accurate demodulation, and an automatic gain control that eliminates measuring errors caused by drift of the output level. Front panel meters include IB level, sound deviation, and vision rest carrier.

The unit also has tight amplitude and group display profiles for precise analysis and adjustment of transmitters and modulators, and quadrature output for incidental phase modulation. [527]

Potomac Instruments demonstrated their AT-51 Audio Test System. It includes the AA-51 audio analyzer and the AG-51 audio generator.

Designed primarily for mono and stereo proof-of-performance measurements, it also is a workhorse for equipment maintenance. In fact, the AT-51 is specific high enough for use by labs and design engineers. The audio analyzer and generator are packaged separately for remote measurements where physical separation is required.

continued on page 50



# HITACHI SK-70

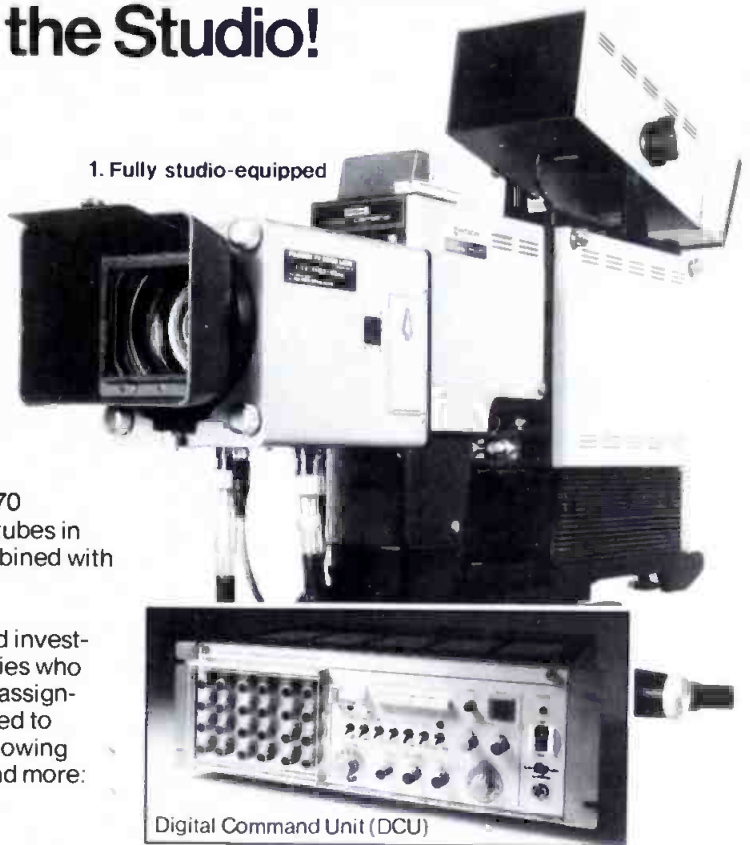
## The One Camera That's Right for Both Field Production and the Studio!

The modular SK-70 converts easily from a fully equipped, self-contained color studio camera to a modified studio camera. In the field, the studio version of the SK-70 can be connected directly to a VTR with only a co-axial cable. And for hand-held portability, the camera head features a shoulder mount, an auto-iris portable zoom lens, and a 1.5" viewfinder, along with a DC and process pack. The Digital Command Unit (DCU) with up to 3000 feet of single co-axial cable strongly enhances the capability of the SK-70. Another striking option is a 22:1 zoom lens that can be used for the studio version of the SK-70 in the field.

No matter which configuration you choose from those shown in the photo and three diagrams, the Hitachi SK-70 offers the precision and reliability of three 2/3" Saticon tubes in the camera head to insure excellent picture quality, combined with all the latest advances in broadcast camera technology.

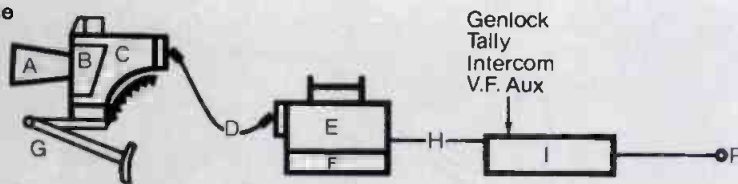
As you can see, our outstanding Hitachi SK-70 is a sound investment for broadcasters, production studios, and universities who need broadcast quality performance in a wide variety of assignments, all for the price of a single camera. We'd be pleased to arrange a demonstration of how the SK-70 can fit the following camera requirements inside or outside your TV studio, and more:

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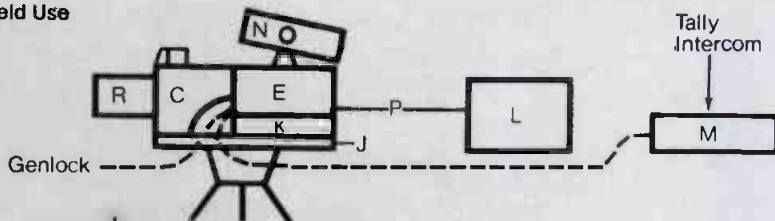


Digital Command Unit (DCU)

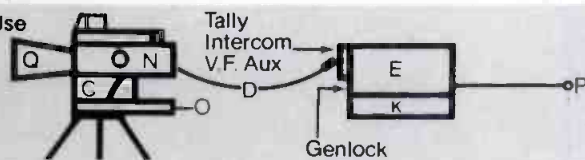
2. Portable Use



3. Field Use



4. Modified Studio Use



A)	Portable lens
B)	1.5" viewfinder
C)	Camera head pack
D)	Camera cable (300 ft.)
E)	Process pack
F)	D.C. pack
G)	Shoulder Mount
H)	Co-axial cable (3000 ft.)
I)	DCU
J)	Mount adapter
K)	A.C. pack
L)	VTR or FPU
M)	Operation panel
N)	5" viewfinder
O)	5" V.F. Mounting Plate
P)	Co-axial cable (video)
Q)	Portable lens w/ conversion adapter
R)	Studio lens



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**Marketplace**

*continued from page 50*

tion are required for looking at the signal and signal source.

This combo system will measure harmonic distortion, IM distortion, voltage, dB, signal/noise ratio, wow and flutter, stereo phasing, and differential gain in stereo channels.

Potomac also showed a unique ATS system that we'll get to in our next issue. [320]

The hits of the **Ramko Research** booth were their DC-38 and DC-12 consoles. The DC-38 series includes six models that run from 20 inputs with a 5 mixer, dual-output configuration to the 10 mixer, dual-output stereo (40 inputs) arrangement.

DC controls all audio attenuation and switching, which allows less wiring and reduces outside interference. Since all audio switching is DC-controlled, all internal and external functions (air lights, remote start, mute, etc.) are programmed by setting internally located switches. Options include a clock/timer and machine start/stop remote control.

Nearly equal interest was shown in their DC-12 remote control console. The DC-12 remote audio electronics may be located close to the control head or up to 60 feet away. The electronics are housed in two rack mount assemblies, making for a compact control head. This is a modular system with extender frame and remote start/stop options. [321]

As you'd expect, the **Shure Brothers** booth was loaded with a deep line of microphones, cartridges and accessories. But this time around, two products were standouts. Shure displayed their new SM81 unidirectional condenser microphone that's designed for applications in studio recording, broadcasting, and sound reinforcement. It features a selectable 10 dB attenuator and a three-position, low-frequency response switch. According to Shure, the SM81 shows very low RF susceptibility.

They also exhibited their V15 type IV cartridge. It features stabilized tracking, a hyperelliptical stylus tip, electrostatic neutralization, and ultra-flat response. [322]

**Technics** by **Panasonic** demonstrated their audio lineup of speakers, tape recorders, and amplifiers designed for broadcast applications. But it was the SP-10Mk2 quick start-up turntable that attracted most of the attention.

The SP-10Mk2 uses a quartz-controlled design with phase-locked servo circuitry that reduces speed drift to within  $\pm 0.002\%$ , which means that the playing time of a 30-minute LP side will be accurate within  $\pm 0.036$  of a second. The unit is designed to protect against voltage fluctuations and ambient temperatures. [323]

**Telemet** had several new products on display. The most unique was their fiber optics Video Transmission System. This is the same system now in use at KSL where fiber optics has become a key down link in their ENG system. Called the model 4210, this system consists of a transmitter and receiver that transmit video and wideband data signals over optical fibers. The units are free of the equalization and correction circuitry normally associated with conventional coax transmission lines. Two key features are long hop without amplifiers or repeaters, and negligible envelope delay.

Telemet also showed their new video distribution amplifiers, a new modulator, and a demodulator. The

*continued on page 51*



**First Hitachi developed the revolutionary Saticon tube. Then Hitachi designed the perfect camera for it...**



## The portable **HITACHI SK-80**

The remarkable new SK-80 has three superior  $\frac{2}{3}$ " Saticons at its heart, for unexcelled image and color fidelity. Hitachi's sophisticated electronics coupled with the high resolution capability of the Saticon set a new high level of performance for a portable EFP camera under the most demanding conditions.

Moreover, the SK-80 feels and handles like a true portable should. And its 2-hour battery belt with 1-hour charge time assures you of adequate power for continuous long-term shooting when you're on location. The standard C-mount and optional Arri adapters give you the added versatility of selecting the exact lens that fits your shooting requirements.

But performance is only half the SK-80 story. A special training tape on videocassette is available with complete camera set-up and maintenance instructions, to help you keep your SK-80 making its excellent pictures. Beyond this, our six Hitachi regional offices are all staffed with qualified engineers and fully stocked with parts. They stand ready to back up our vast national network of servicing dealers.

We urge you to check out the performance features of the SK-80, as well as its low price, before specifying any other camera. Arrange a demonstration with your local Hitachi dealer or call the Hitachi regional office nearest you.



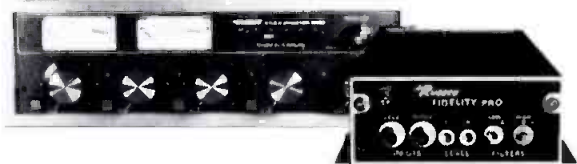
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## Marketplace

continued from page 52

4420 modulator features FCC required chrominance luminance precorrection for origination, plug-in crystal-controlled converters, and a vestigial sideband SAW filter. The 3710 demodulator has synchronous and envelope detectors, multiplexed output with a built-in Hi/Lo filter, and a built-in input attenuator and demod tester. [324]

Tentel's sales were up on their VTR tape tension gauges, based partly on the great interest in the helical format standards and a deepening variety of VTR manufacturers bumping in the market place. Better known to the industry as TENELOMETERS, these gauges help isolate and correct tape tension problems.

New at the booth was a gauge that can be used with the new Sony recorders. They work on both open reel and cassette video recorders. And, they were one of the few items at the show going for under \$200 [325]

At the Time And Frequency Technology booth, three new products were on display. The model 7640 Telescan is an advanced data acquisition, logging and alarm system. Reading out on a 15-inch CRT display, it monitors up to 120 telemetry and status channels. Up to 20 channels can be logged periodically, on command, or upon alarm conditions, with multi-size capability. Operator annotations can be included with a standard keyboard, and both the CRT and keyboard are easily rack mounted.

TFT also showed their 7700 studio transmitter link a fully redundant STL system. It features direct FM modulation with frequency synthesized carrier, and a high-efficiency transistor power amplifier stage that provides 12 Watts output.

Wholly new to the TFT line is an ENG antenna controller that switches quadrants and verifies commands. The system uses all-digital data transmission techniques. Control and status functions are updated every 300 milliseconds. [326]

UMC Electronics demonstrated their Actuality Retrieval Terminal (ART) and a new modular audio console, along with their standard line of cartridge recorders and accessories.

The ART is a unique retrieval system for recording and dubbing audio wire service stories on cartridge tape. Using a specially designed computer logic system, the unit will handle all incoming new actualities on its own. Access is through the control panel which provides three priority override routines for sequencing. The cartridge being recorded and the number of carts still available for recording are displayed on two front panel digital displays.

Through tally light indicators, station personnel are kept informed as to the state of each cart inserted, including aborts or losses due to any malfunction. However, the system includes so much backup circuitry that losses should not occur.

Expanding their product line even further, UMC displayed a new modular 8-channel (expandable to 16) stereo audio console. Designed for easy maintenance, each channel module has three selectable inputs, allowing a maximum of 48 hard-wired inputs for the console. A Waters log taper fader (attenuator) is featured on each module. [327]

The headliner at the Video Aids booth was the introduction of their downstream VIRS generator inserter phase meter. Labelled the model 4000, it's

continued on page 53



# The Stars of NAB's **INNOVATION** **'78**



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**LDK-14** ... exciting, NEW, 2/3" broadcast camera for ENG/EFP/Studio versatility... years ahead of the competition.



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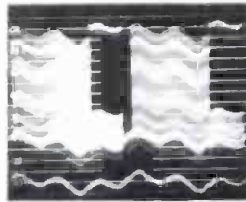
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- On long runs in Buildings
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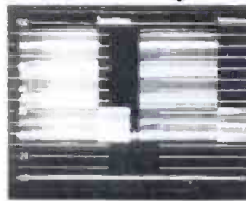
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## Marketplace

continued from page 54

production tool designed to let the TD look at VIRS, H-phase, and burst phase on an analog meter, virtually replacing the vectorscope in production.

The 4000 automatically sets VIRS phase coincident with burst phase, and allows the user to insert VIRS signals into his own system. Direct meter readings (at the flip of a switch) will detect the discrepancy between VIRS and burst phase, making it a key to solving differential phase problems. H-phase is read directly on a separate meter. While the model shown was in a rack configuration, they can supply the 4000 in a stand-alone cabinet. The cost was quoted at \$1,200.

Another new Video Aids product was their Edit Aid II, also rack-configured, for use with 3/4-inch machines. It has automatic preview, and a joystick control for fast forward or rewind. A cross-pulse generator is built-in for verifying correct field edits.

Their full line of products, including the video line isolator, distribution amplifier, and video power switch also were exhibited. [328]

Videomax didn't pull any surprises with new equipment. After all, they're in the VTR head-re-furbishing business. What they did do was to bring along techs who spent the exhibit hours working on parts so small that a microscope had to be used. A video camera was attached to the microscope so visitors could see how exacting and intricate this work really is.

The company is now offering a Maxi Service. When you need a fast head replacement, you call their Maxi Line and they'll air freight one out the same day. [329]

Wilkinson Electronics scored with their solid-state transmitters. Notably, they showed a .5/1 kW FM transmitter (FM 500 SS/FM 1000 SS), and FM 2000 SS 2 kW transmitters.

The .5/1 kW rig uses 500-Watt solid-state power amplifier modules, and like the FM 2000 SS, it uses a unique to the industry cooling system based on fluid pumped past the driver and amplifiers. This allows the transmitters to operate in nearly any temperature or altitude at slightly above ambient temperature. Also, these transmitters are VSWR protected with automatic power reduction. Pressure and flow of the cooling fluid also is controlled and designed to protect the transmitter in case of failure.

These new transmitters are designed so that if any of the final transistors fail, the power amplifier will continue to function at reduced power.

Among the array of Wilkinson products were the TAMM-1A AM modulation monitor and the PPF-1A positive peak flasher. The AM monitor gives continuous direct readings of modulation percentage and provides constant indication of carrier shift. [330]

World Video added to their line of monitors with an AC/DC 8-inch model that should find its way into EFF and studio use. It's a compact rack model, called the CDR 8000, and all its controls are front panel located for setup, pulse-cross, underscan, A or B, and others. It comes with a fully regulated high-voltage power supply to eliminate blooming, and has a keyed back porch clamp for accurate black level.

The addition of the 8000 brings World Video's broadcast monitor total to nine, running from 5-inch to 17-inch CRTs. They also showed the NOVA-Com speaker intercom system. It has a 14-station capability, and an optional feature is a telephone interface. [331]





- Take One or Two
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Typical NTSC sync generator system comprised of two 1410 Option 01 mainframes with SPG2 sync generator modules, and one GVG 3257A Automatic Changeover Unit.

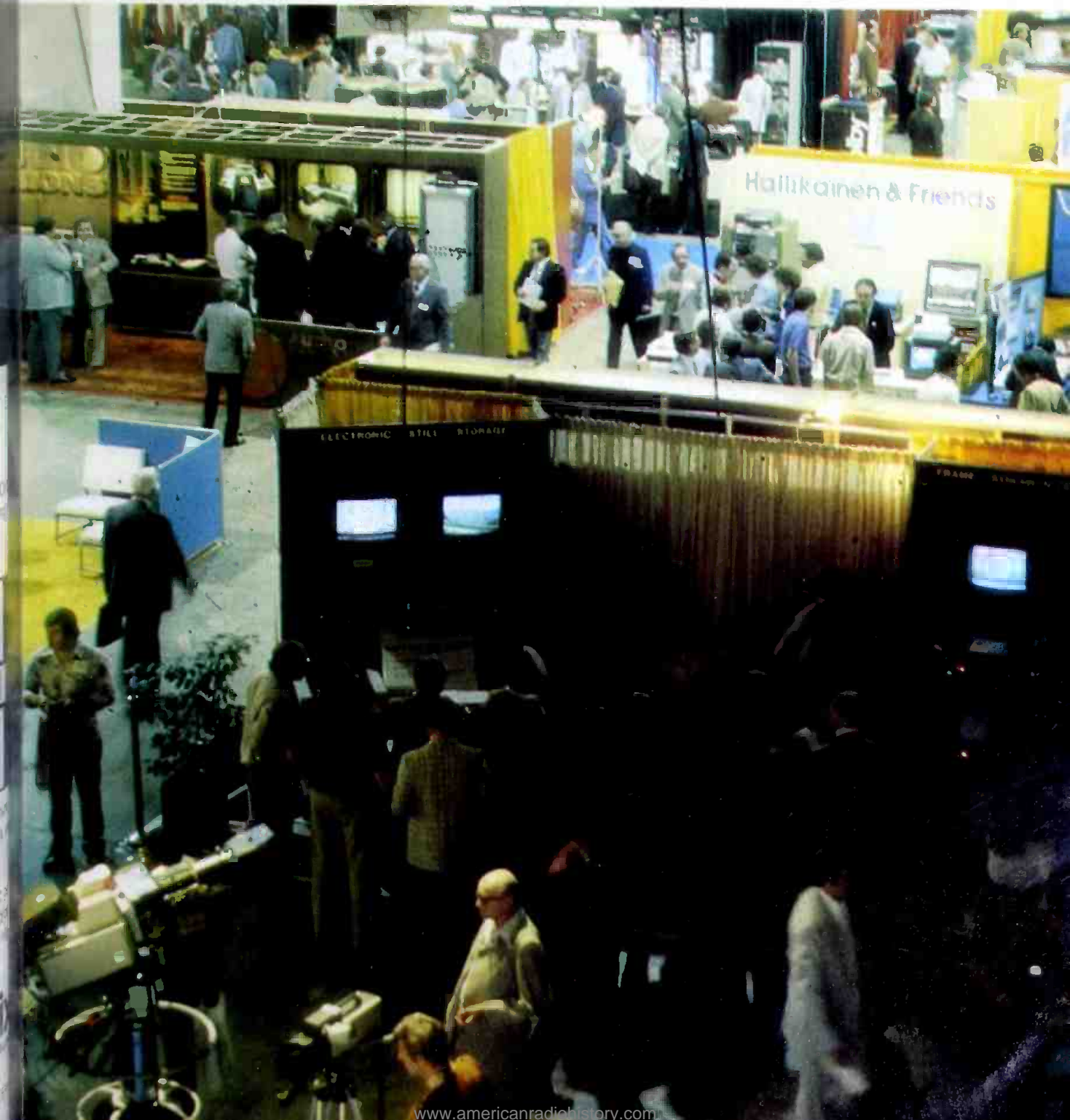
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# NAB VIDEO ROUNDUP

*Broadcast Engineering's  
video editors take us  
down the aisles for a  
close-up view of this  
year's convention.*





(Photo by Donna Foster Roizen.)

# Once over lightly on the hardware

By Joe Roizen,  
*BE's Video Editor  
and President,  
TELEGEN*

The NAB never had it so good! Most of the delegates were delighted, all of the exhibitors were exuberant, and it was easy to see why. Gone was the endless pavement pounding between three hotels that the Washington convention imposed; instead, a single, spacious exhibit hall comfortably housed everything from audio amplifiers to zoom lenses. Meeting and eating facilities were nearby; and, with the extra hours at the beginning and end of the convention, every visitor could manage a tour of the 300 plus exhibitors without track shoes and a jogging outfit.

If you're all set, let's move on past the entrance and see what was happening in the exhibit area. After each booth coverage, we've included a number. Circle the number on your reader service card, and more information will be sent by the manufacturers.

Acrodyne's line of television translators, transmitters, and accessories was on display; and, according to Nat Ostroff, vice president of operations, the two hottest items this year were the 5 kW IF diplexer transmitter and UHF transmitter with a power output of 1 kW.

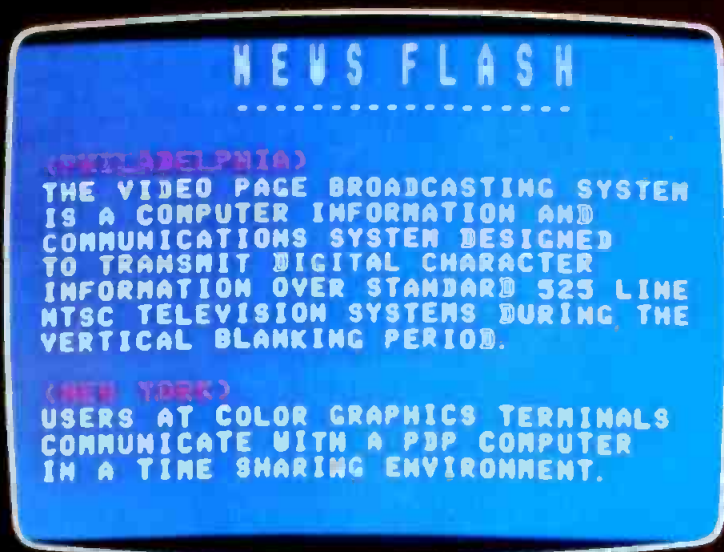
Acrodyne brought three new products to the show. A series of new modulated translators which adhere to the latest FCC rules is available on 30-day delivery. The 1 kW UHF IF diplexed transmitter also has been type-accepted by the FCC; although it was making its first appearance at an NAB show, these units are in operation in Canada, Korea, and other countries.

Their 5 kW redundant transmitter was also new to the show, but has already received acceptance by clients in Canada and the Philippines who are awaiting delivery.

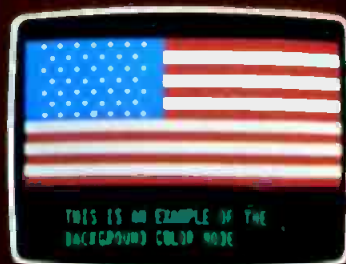
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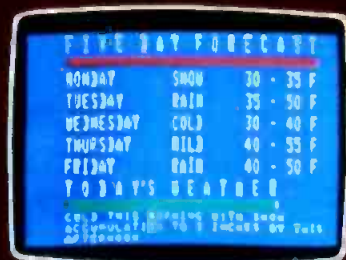
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ART WORK



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Circle (37) on Reply Card

## Digital effects and microprocessors are winning bit by bit, byte by byte

No single product was so innovative that it emerged as the unchallenged hit of the show; instead, a variety of products in basic categories were now functioning as accepted TV production devices, with good track records and bright futures.

### Digital television

Digital television is obviously here to stay, and perhaps the most significant indication of this was not just the many booths featuring eye-dazzling special effects, but also the marked reduction in frame-store prices. Since digital memory is at the heart of all digital video devices, cheaper memory means more affordable digital equipment. This principle applies to TBCs, field and frame synchronizers, digital video effects systems, digital noise reducers, and even to the new breed of production switchers that all seem to come with interfaces to these electronic kaleidoscopes. There is also no shortage of suppliers at every level of complexity and function.

In today's television operation, the flexibility of digital video devices is limited only by the creativity of the people controlling them. Almost anything you might want to do with a variety of non-synchronous inputs seems possible if you have the right unit and its associated accessories. Digital video has penetrated television production bit by bit, and is now expanding byte by byte.

### ENG / EFP cameras

ENG and EFP cameras were also in evidence at more booths, and they all looked better than ever. What is astounding is the number of these portable cameras already in the field. At least two suppliers claim 1000-plus units, and the rest are in the multi-hundreds. Compact design, better tubes, lighter optics, and even gyroscopic supports have contributed to the popularity of these units as basic production tools.

### Studio cameras

Studio cameras are also alive and well, with new models sporting the latest in automatic features, self-diagnosing circuits, improved geometry and resolution, and slightly higher prices. Coupled with an ever-growing range of variable focal length lenses, these cameras all produce a picture quality that defies the human eye's ability to discern any specific superiority. It's hard to tell the very good from the excellent without a scorecard generated by a computer readout defining the yoke characteristics of an ultra-modern color camera. Modularity, auto setup, long mean time between failures, and digital (triax) accessories are all characteristics of this new breed; and for the broadcaster looking for a replacement camera, the choice was wider than it has ever been.

### 1-inch VTRs

One-inch helical recorders have fully emerged from the format controversy of a year ago and now have a suitable SMPTE stamp of approval with Type B and Type C listings. In practical terms, this means that recordings now made on the Sony or Ampex 1-inch recorders will interchange with each other, as well as with NEC's announced Type C VTR, (just as the Type B Bosch/Fernseh recorders supplied by themselves, Philips, IVC, and RCA already do).

A tour of the VTR suppliers' booths and private suite showings revealed a wide array of studio and portable Type C configurations with flexible editing capabilities and slo/stop motion possibilities never even dreamed of on quad VTRs (which currently dominate video recording in broadcast television). The Type B machine, with a frame store attached, also produces digital special effects in addition to slow motion and freeze frame. It is also the only 1-inch VTR at present that comes in a lightweight cassette version for field acquisition.

### Editing equipment

Any videotape editor on a busman's holiday was in for an orgy. Mushrooming video production seems to have attracted a few more entries into the editing equipment market, both from well-known entities and a few completely new ones. Every level of VTR editing was catered to by a wide range of products that started with non-time-code back spacers from under \$7,000 to \$100,000, plus computer-assisted, floppy-disk, paper-taped monsters that corrected decision lists, spun tape reels, commanded switchers, and assembled programs at the touch of a keyboard or the wiggle of a joystick.

It was hard to find anything in this field that wasn't either microprocessor-controlled, PROM-implemented, or computer-assembled. The overall trend is to build VTRs with partial edit capabilities that interface easily with outside controllers made by the recorder manufacturer or the editing equipment supplier. In addition, the functional side of VTR editing is shifting more toward film-style operation, much in the manner that TV production has been doing recently.

### Video disc recorders

There was also a variety of video disc recorders available from at least five sources. Here, too, the range in price, performance, and function was quite wide. Rigid, fixed metal discs with manually manipulated controls provided slow, stop, and accelerated images in forward or reverse with full broadcast quality. The next category was insertable floppy discs that served as still-image stores or, in other configurations, rivaled the rigid discs capabilities and performance.



ice has a solid-state memory which counts the number of resets in a 10-minute interval and determines if

on-site maintenance is needed.

Acrodyne provides transmitters and translators in a wide range of

power outputs from 1 Watt to 5 kW. They also cater to the CCIR and

*continued on page 64*

### Still stores

Last, but certainly not least, are the electronic still stores using computer-type disc packs, employing digital recording techniques, and holding large numbers of fixed images (slides, graphics, titles, etc.) that can be random-accessed very rapidly using numbered addresses.

### Switchers

New or upgraded production and touring switchers were all over the exhibit area. The sophisticated production units look like they need an ex-747 flight engineer to operate them. At least one supplier even stated that these super switchers have become so complicated to operate that they have designed memory systems to alleviate this problem by providing repeatable preset of the endless button, knob, slider, and thumb-wheel settings.

The upper echelon studio switchers also interface with the digital video effects available from the frame-store devices. In some cases, the same manufacturer makes both in an integrated system; in most cases the switcher is married to a separate frame store via an accessorized control unit that fits into the operations panel of the switcher.

Many of the presentations put on by these switcher/DVE combinations challenged the credulity of even experienced broadcasters. Often, the live presentations were assumed to be pre-taped segments because it seemed impossible to accept that what was happening on the monitor screens was in real time. The visual results carry a heavy impact, and the flexibility of video operations is expanded.

Routing switchers were also in prominence. These basic building blocks of video signal distribution around a studio complex have also gone modular and modern. Crosstalk is down; reliability is up; and LED, LCD or CRT readouts give comforting assurance of correct circuit identity or diagnostic information if anything goes wrong, goes wrong, goes wrong....

Even the complexities of quoting switcher prices, because of the wide range of configurations, was overcome by one supplier. Their software expert had programmed a home computer to ask a prospective buyer the appropriate questions, then after a short delay, bring which the CRT displayed "Wait, I'm thinking," a full bill of materials and a price for minimum and maximum configuration were sequentially shown on the computer's terminal.

### Color monitors

Color monitors may by now be a fairly mundane product with most users, but NAB '78 had a few new wrinkles even in this area. Screen sizes have gone both ways, with 15-inch vision portable color for ENG or EFP applications and a 30-inch direct-view Trinitron which was on display but not yet available

statewide. Other developments included better comb filters for crisper NTSC pictures; special high-resolution monitors for precision applications; and a wider range of suppliers, screen sizes, configurations, and prices than ever before. Everything from do-it-yourself receiver/monitor kits, converted TV sets, performance classified monitors, and custom-built units were available at an appropriate cost.

### Large-screen projectors

Large-screen projectors were also in more evidence than at any previous NAB. Two major exhibitors used the granddaddy of TV projection, the Swiss-made Eidophor, which produced theatre-size color pictures in their own booths. Several smaller GE units were in evidence at a few other stands, using both front and rear screen setups to display five- or six-foot wide color images.

### Earth stations

Satellite earth stations and their range of applicable components took up a lot of space, both in the exhibit hall and out on the parking lot in front of the convention center. Steerable and fixed dishes, with diameters from a few to a few dozen feet, were installed; some of them were actually working, bringing in pictures that one exhibitor billed as "out of this world."

It was evident from some of the published earth station maps that were being handed out that this area of television and sound communications is growing.

Broadcasters depend upon a whole range of peripheral products, which, while hard to categorize in a single bracket, are nevertheless important to the user. There were indeed scores of such displays covering test and measuring gear; microwave equipment for ENG applications; magnetic tape, tape cleaners and evaluators; character generators; signal processors that enhance or improve video displays; optical gear; telecine projectors; and even a first display of a practical fiber optic system, to name a few.

A number of companies that provide refurbishing or updating services for VTRs, video heads, studio equipment, and the like, were also well represented by booths dedicated to these activities. And, no NAB show would be complete without a whole range of audio, AM and FM radio exhibits that are being covered separately.

### Summary

All signs in Las Vegas pointed to a healthy industry looking to a banner year. Virtually every exhibitor interviewed rated the Las Vegas Convention Center as an excellent place for an exhibition, and expressed the desire to return. Most confirmed that product interest was high and that a good percentage of the equipment on display was either previously committed for or sold off the floor. □

## Once over lightly

*continued from page 63*

PALM formats found in most 50 Hz countries, in addition to the NTSC requirements in North America, Japan, and elsewhere. [332]

**American Data Corporation**, although a wholly-owned subsidiary of the Philips company, had a separate booth at the NAB. Bill Powers, marketing administrator, ran through an impressive set of switcher operations using a combination of their own Key Effects Processor and an interface with a Quantel (Micro Consultants) frame store synchronizer.

American Data offers switcher customers two levels of digital video effects. The combination of their 558-4 production switcher and the Key Effects Generator permits them to achieve digital video effects without a synchronizer. They do use a digital memory and can store, cut, or key from a mono video pattern source. In this way, effects like turnovers, zooms, wipes, etc., can be accomplished. (The KEG will be available mid-1978.)

Their production and master control switchers are modular, with addable options. They can do multiple-production effects on single images, including titles over chroma key over quad splits. There is a frame-accurate auto fader feature available that works from a thumb-wheel preset defining the duration of the fade by frame numbers.

American Data also has small production switchers in the 2100 series and distribution switchers called the 3900 series. [333]

Of greatest interest at the **Ampex** booth were the second-generation 1-inch helical VTRs which for the first time adhere to the SMPTE Type C format: the VPR-2 and VPR-20 (portable). The studio model comes in various configurations and performed well in all modes, including continuous slow motion and still frame (which are broadcastable), and accelerated motion for editing. Built-in editing features, which include transient free jogging and a variable speed shuttle control, make the VPR-2 well suited for production and post-production. Ampex offers an Automatic Scan Tracking (AST) accessory which makes it possible to air slow and still pictures coming from a VPR-2 so equipped. Deliveries for the Type C VPR-2 are scheduled for September 1978, but Mark Sanders, product manager of AVSD, pointed out that more than 450 VPR-1 machines are already in use around the world. Ampex also offers an updating service for the

VPR-1 to make it compatible with Type C.

For VPR-2's equipped with AST, Ampex has provided a new accessory: the SMC 60 Slow Motion Controller. The SMC 60 makes it easy to run a VPR recorder as a variable-slow-motion or freeze-frame machine, with appropriate cue marks and manual control.

The VPR-20, a portable Type C acquisition VTR, comes with full confidence heads, backup/assemble editing, built-in color playback into a TBX, and a "quick look" mono feature.

The full range of Ampex quads was also on display, as well as the HS-100 rigid disc machine. In addition, their color camera line now includes the BCC-10 studio camera which features a system of automatics (white/black/iris/centering) all with digital memories. The camera gets 54 dB S/N ratio and can use the new diode gun Plumbicons. There also was a new digital time base corrector, the TBC-2, with 10 full lines of correction window in NTSC.

*Bouyed by the  
new standards,  
1-inch VTRs join  
hit parade.*

In the audio recorder field, Ampex displayed the multi-track MM-1200 and the studio-type AG-440. But perhaps of greatest interest was the new ATR-100, a professional audio machine which according to Sanders has a 10 dB S/N advantage over any other audio recorder in its class. [334]

The **Bosch/Fernseh** stand included a large-screen Eidophor presentation which made their show visible from quite a few areas in the east hall of the convention center. While they had their line of cameras like the KCK, KCA, and TCX on hand, the emphasis this year was on the Type B 1-inch helical recorders: the BCN series.

The BCN recorder, which Fernseh has been producing and selling for at least three years, is a segmented helical machine. To achieve slow and stop motion, it uses a digital frame store; however, this accessory also permits a wide range of

digital effects and addressable single-frame recording, and this was what Fernseh was displaying with theater-sized pictures above their booth. The effects achieved were certainly eye catching, and the combination of high-quality pictures manipulated into myriad forms showed the capabilities of the BCN system.

Henry Zahn, Fernseh's director of technical development, reiterated his company's commitment to the Type B format which has SMPTE approval. He pointed out that only the BCN system has a cassette version portable at present. The rumors that Fernseh would show an all-digital BCN were ill-founded. While such experimental units have been shown in Europe at private sessions of EBU technical groups, Zahn said there was no valid reason to have it at NAB.

Fernseh has also entered the color monitor market with a competitively priced line. Zahn explained that they have developed a common housing and modular units which permit them to assemble Class 1, 2 or 3 monitors from appropriate components, and this keeps the price reasonable. [335]

**Central Dynamics** switchers have always been among the leaders in the field of special effects, and interfacing with digital video devices. This year their line of production switchers offered an extended effects system and operation in conjunction with a Quantel DP 5000 DVE unit.

The CD-480 production switcher comes in a small configuration that starts at \$30,000, and larger systems that range from \$55,000 to \$90,000.

A new feature on the switcher which Bob Faulkner, vice president and general manager of CDL, was especially enthusiastic about, was the matrix wipe. It is a system whereby wipes can be preset to occur in a variety of steps, controllable by the operator.

For mobile, studio, and post-production operations needing a compact self-contained switcher, CDL had on display the VS-14 and the VS-10 which cover this area.

The most unusual part of the CDL exhibit was the new Videl Cel™, an electronic system for artistic creation of animation sequences using a computer to do the tedious repetitive work, from art work that is prepared in a special way.

Black and white drawings giving the beginning and end of a sequence are assigned colors from an electronic palette with more than 250,000

*continued on page 66*



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## Once over lightly

continued from page 64

shades. The system then creates all the frames in between for the time scale allocated. Designed and developed by Computer Creations Inc. of South Bend, Indiana, it is now part of the CDL product line, and Faulkner expects it to greatly cut animation sequence time at TV facilities where it will be used. [509]

It's hard to avoid Conrac at a TV convention; they always seem to have a limitless number of monitors to loan out to other exhibitors, and NAB '78 was no exception. The star of their show this year was a new model 6142 color monitor with a precision comb filter that has produced the best NTSC images in Conrac's long history.

According to Larry Ryan, v.p., this monitor is available on a 12-week cycle and costs \$5,950 with the precision comb filter in it. Conrac also had a new 5700 medium-priced color monitor on display that sells for \$3,850, and a range of other color and monochrome monitors that most broadcasters are already familiar with.

For those who need sharper pictures on a closed-circuit basis, the 5722 13V high-resolution monitor should be the one. Conrac also markets the Eidophor large-screen projectors. [554]

The Conrac Systems East Division, which handles the Eidophor projectors, had a separate booth adjacent to Fernseh where they were explaining the technical and economic aspects of this big screen projector. Ron Moore, marketing director from the Systems Group, felt both education and theater projection were prime markets. He revealed that the Eidophor can be driven by a computer and do 1029-line pictures on 50-field systems and 945-line pictures on 60. A new accessory is a remote-control unit that can go 50 meters from the projector and permit adjustments and inversion of both the horizontal and vertical. Conrac also rents these projectors for special events. [336]

3D video animation is the latest in services provided by Computer Image [339]. Using proprietary "Scanimate" and "Caesar" computer animation systems, they produce very unusual images which are used in commercials, educational tapes, and documentaries. Computer Image Corp. is a subsidiary of Dytek Industries [340], which also had a booth at NAB displaying a line of switchers and Vamco digital timers.

John Lowry, Digital Video's found-

er and president, has been pioneering digital video devices for many years. A long-time champion of 4fsc sampling at SMPTE meetings, he has applied his ideas to Digital Video's product line, which is designed and manufactured in Canada.

The new products this year included a field synchronizer expandable to a full frame, which is available with a comb filter option. Digital Video's normal product line starts with a DPS-1 time base corrector and builds up with options to the full synchronizer capabilities of the frame store and an interface for potential digital video effects. Lowry said that the budget-priced field store was attracting the most attention at this booth. He also pointed out that Digital Video's business was up over last year. [337]

### New wrinkles for TV monitors, too.

Dytek is the parent company for Computer Image and VAMCO. Their separate exhibit under Dytek Industries featured their line of production switchers and the Vamco LED timers. Their new products on display included the SL-5000 and SL-6000 production switchers that covered a \$32,000 to \$45,000 price range. These are available on a 90-120-day delivery. The DK-8000 routing switcher is an \$82,000 item made to order. Vamco timers, such as models 134, 115 and 149, were available on 30-day delivery.

According to Jim Morrison, their western regional director, the product drawing the most interest in their booth was the SL-3000-E production switcher, which sells for \$23,000 to \$28,000. He also said that business was up about 25% over 1977 and looked to a good year for Dytek. [510]

Electro Optical Systems, a Canadian-based company, has a line of proprietary products, and they represent some outside ones.

According to Maurice Evans, their vice president, the new products attracting attention were the portable time code generator and reader.

The Electro TCG MKIII is a small unit that can be worn on a waist belt or put on a desk. The battery-operated unit provides an entry keyboard for user bit entry. A

seven-segment LED display of high brightness gives the hours, minutes, seconds, and frames. The indications can be switched off to extend battery life to 10 hours. The unit sells for \$1,995 and there is a reader option at \$500. Delivery is five weeks.

Another new product was the ESZ editing system at \$15,000 with 12-weeks delivery. It is a program meter at \$180 and a line of monochrome picture monitors in the \$600 to \$700 category.

Their standard line of time code equipment, which had its debut at the Montreal Olympics, was also in evidence; they are also selling a line of spectrum and waveform analyzers.

Evans said business was substantially up this year and that they particularly liked the cooperative people and lack of union problems at the convention center. [512]

Electrohome is also a Canadian company that makes a line of monochrome and color monitors sold worldwide. Laird Weagant, their U.S. sales manager, said the newest product at NAB was the 2000 series color monitor in 19-inch and 25-inch screen sizes.

The price range is around \$3,000 and delivery was stock to eight weeks.

They also had a line of monochrome monitors on display and Weagant commented favorably on ease of setup and cooperation of convention center personnel.

He reported an upswing in business and thought the TK-47 was the most innovative product at NAB '78. [513]

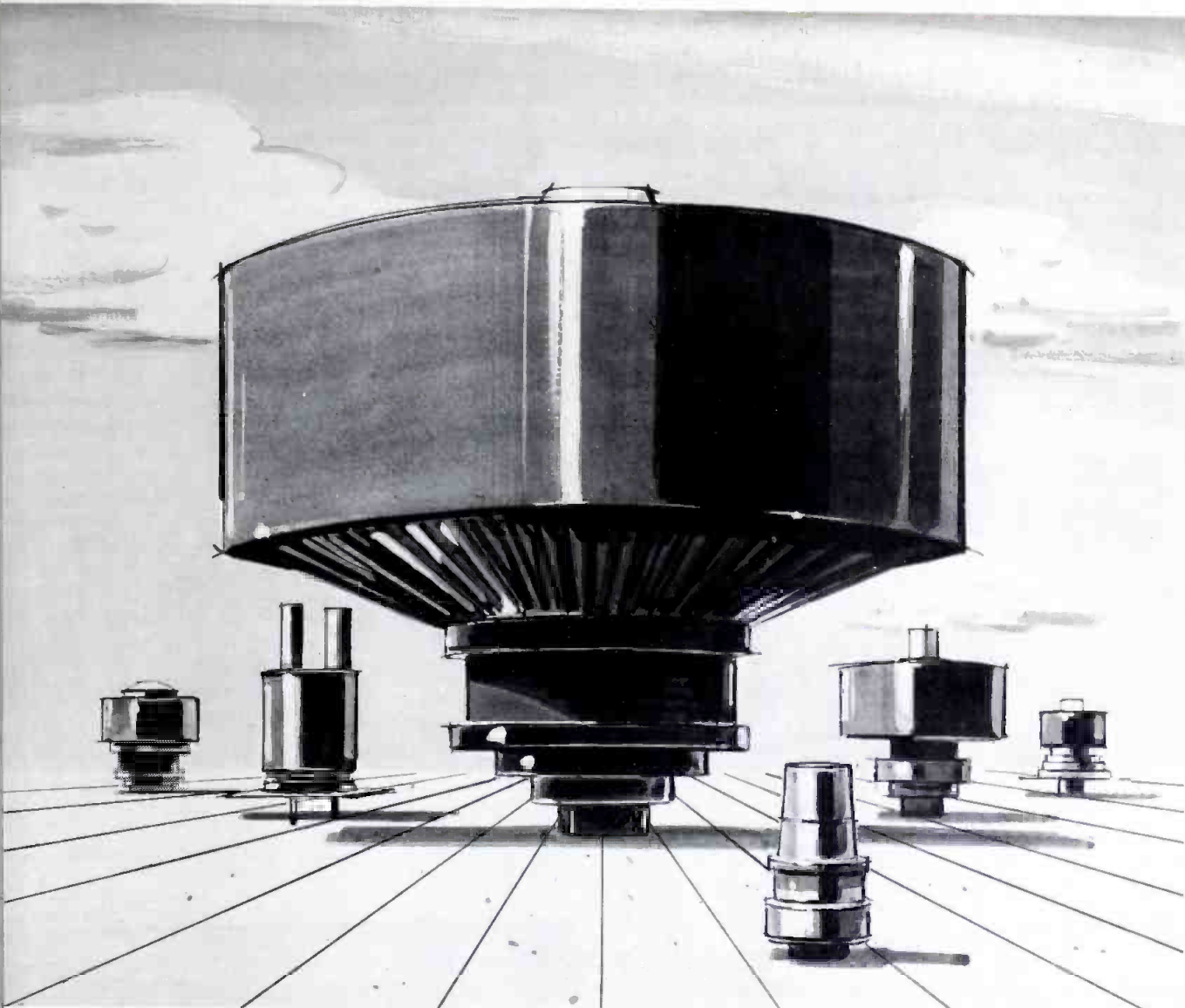
Ikegami considers themselves pioneers in the ENG camera field, with more than 800 HL-33 and HL-35's and an additional 550 HL-77's out in the field. They came to NAB with an HL-79, the first 3-tube color camera with the battery in the camera head.

All of the HL-77 characteristics have been bettered: 25% less power, 2 dB improved S/N ratio, and 20% more sensitivity. At f1.4 the HL-79 makes pictures in 3-foot candles.

Hermann Schkolnick, their vice president of broadcast products, was quick to point out the wide range of Ikegami cameras on display: the HL-52 for small vans which has auto beam optimization; the HK-357A studio/field camera with automatic computer-assisted setup; and the HK-312, a studio camera with computer control. Ikegami also has a film chain, the TKC-950B, which has an optional auto

continued on page 66





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**RCA** Electro Optics  
and Devices

## Once over lightly

continued from page 66

color-balance system available. This telecine achieves a dust-free image by focusing in space, 44mm in front of the field lens.

Camera accessories also included a new remote control for ENG cameras which works over radio links or triax cable. This unit, called the MA-78, uses digital techniques in both radio and triax modes. It works up to distances of 1500 meters (almost a mile).

In the color monitor line, Ikegami

has a range of 14- to 25-inch shadow mask monitors, including high-resolution models.

Another Ikegami innovation was an auto setup processor which can cycle six HK-312 cameras to automatically set up all functions in less than 60 seconds per camera. [514]

Kodak's exhibit encompassed their film products for TV and the Spin Physics Division in San Diego, which refurbishes video heads for quad recorders. In the film area, they were exhibiting a new process called RVNP which shortens the time between shooting and airing.

This new film processing will be available in the fall of 1978. Their regular 1250 news film for "available darkness," as they call it, was also being shown with sample program material.

Forrest Watson, manager of video products for Spin Physics, emphasized that their quad head refurbishing was done with ferrite materials, allowing them to give a 1,000-hour warranty on their Mark 10, 15, and other heads. The newest head they were handling was the Mark 15, and they also rebuild RCA high-band heads. [511]

The most eye-catching exhibit at the Microwave Associates booth was a shiny new Ford Galaxy fitted out as an ENG vehicle with bristling antennas and moveable carts in case the car is in a blind spot. The car is said to be one quarter the cost of similarly equipped ENG vans now used by broadcasters.

The new products on display were the 13-GHz frequency agile portable links that sell for \$15,000 and are deliverable in 120 days, according to Hal Scott, the company's sales manager.

The VR3/VR4 satellite receivers for single- or multi-channel operation are priced at \$5,000 and \$7,500 respectively, and take 90 days to deliver. A 2-GHz ENG system is listed at \$8,000 on the same delivery schedule.

Scott said their 2-GHz portables were attracting the most attention at the booth. [515]

The Philips booth continued with the approach they had last year of exhibiting their major product innovations with the use of visually articulate mimes. The sequence of scheduled performances were well attended and often with SRO audiences. Philips' most interesting product was the LDK14. A lightweight, one-piece ENG/EPF camera in the mid \$30,000 price range, it will be available in the third quarter of 1978.

The camera includes an exclusive new development called Dynamic Beam Control (DBC), a feedback look which includes the Plumbicon tube. Beam current increases above normal only in highlight areas giving better resolution overall and longer tube life. The LDK14 with DBC handles four f-stops of overexposure without serious picture deterioration.

The LDK14 comes in all standards, in many configurations, and with a variety of automatic features. It runs on batteries or AC and draws a modest 27 watts. According to Jim Wilson, vice presi-

continued on page 7

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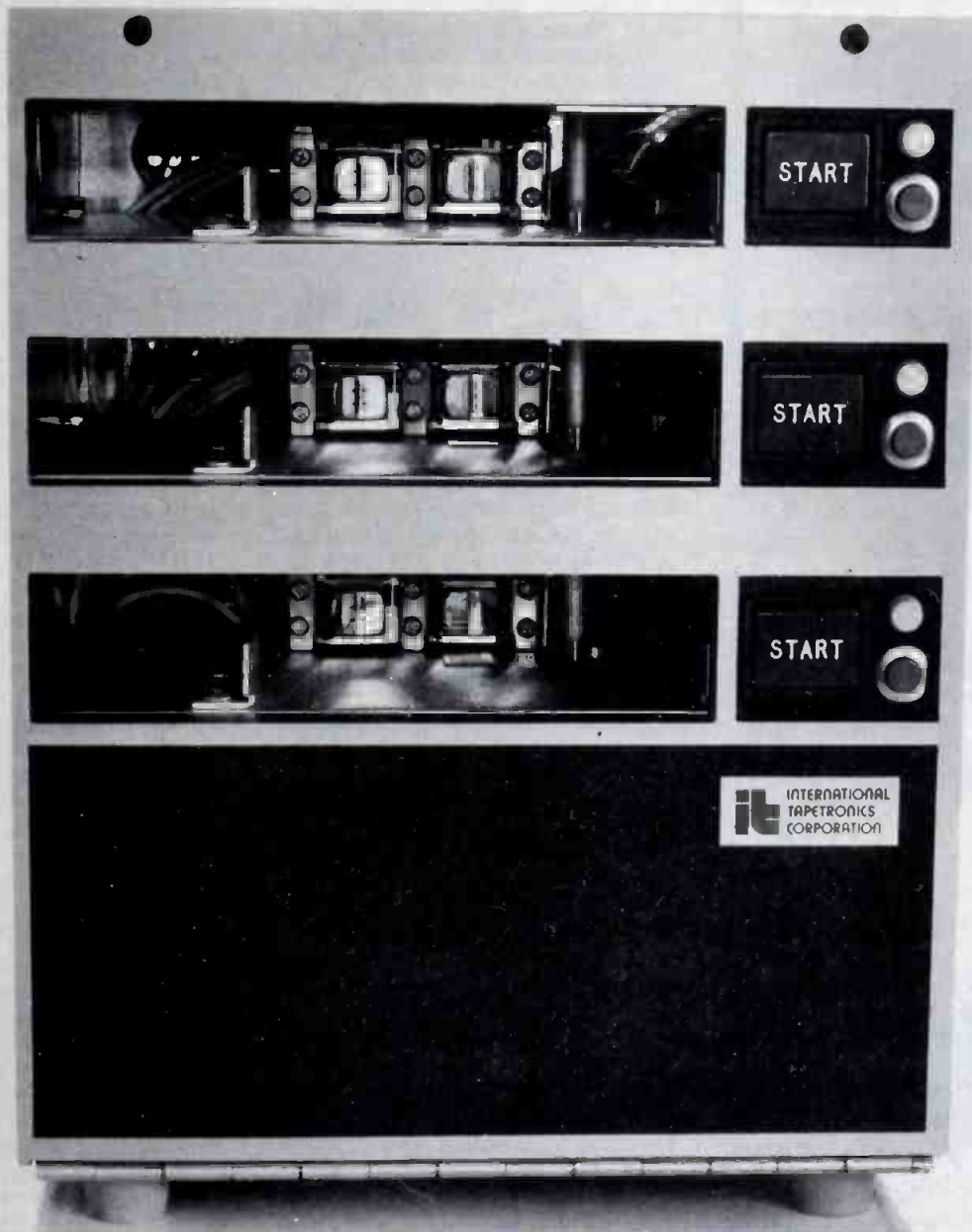
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## Once over lightly

continued from page 68

dent of product management, it drew the most attention of the broadcasters at their booth.

Wilson also said that the LDK25 with its diode-gun tubes and high resolution was a popular exhibit. They were showing the modular Video 80 camera as well.

The biggest surprise at Philips was the presence of Ampex VPR series recorders which Philips designates as PVR (Philips Video Recorder) series. Philips will market these video recorders on a non-exclusive, worldwide basis, thus joining Marconi in promoting the Ampex version of the Type C format.

Wilson also pointed out that they had on display a new sync generator at \$3,000; a new video/audio tape synchronizer at \$13,500; and some examples of their transmitter line, including a 55-kW UHF unit and a 22-kW VHF one.

The new Philips 73 x Q 1-inch Plumbicon offers up to 50% more resolution, increased dynamic range, and hot highlight suppression. While shown only on Philips cameras, it is obvious that some new camera design will allow other manufacturers to take advantage of the new tube developments. [516]

The Rank Precision Industries booth was a combination of the Rank Cintel Group and the Rank Taylor Hobson lens division.

Neil Kempt, their product manager, felt that the combination of the Mark 3 Flying Spot Scanner Telecine and a field store produced the ultimate in film scanning for broadcast television. The film store permitted smoothing out the scan of a film image in a manner that has heretofore been impossible, according to Kempt.

Available with this advanced telecine unit was a pre-programmed color correction system that made continuous color balance adjustments for the film being scanned. The Rank telecine is widely used in the UK and Europe, and is beginning to attract attention in the United States. [517]

Recortec's product line has continually expanded to cater to the needs of videotape and audiotape recording. Their product line of videotape evaluators, videotape cleaners, and videotape highspeed addressers was on display. They also make accessory kits for quad VTRs, the R-Mod for better tape handling, and timers for more accurate tape time monitoring.

At this NAB, Dr. Lester Lee, Recortec's founder and president,

revealed two new products which expand their line.

The Edimatic 200 is an on-line editor for use with quad VTRs. It is specially designed to work with R-Mod machines and uses pulses from the recorder tape timer as an accurate means of controlling the edit point. According to Lee, the control panel for the 200 is simple and easy to operate. It is possible to preview edits, and to trim frames in order to achieve precise editing. The Edimatic 200 is priced at \$4,500 to \$6,200 and is on a 30-day delivery cycle.

Recortec's booth also displayed a variety of R-Mod quad recorders and their line of timers for quad VTRs.

Dr. Lee felt that the R-Mod was still the hottest item at his booth and that sophisticated editors were the most interesting devices at the NAB, in general. [518]

RCA held a well-presented pre-conference to unveil the new products, and had a spacious, well-planned exhibit area to show them.

One of these new products was the TK-47, a fully automatic, total new design, color studio and field camera. This automated camera uses microprocessor-controlled functions. Set-up can be completely automatic at the touch of a button and the camera has its own diagnostic techniques for verifying proper operation. One of the internal characteristics of this camera is the very good geometry brought about by computer-designed and computer-controlled deflection yokes which are hard-mounted to the pickup tubes for absolute stability.

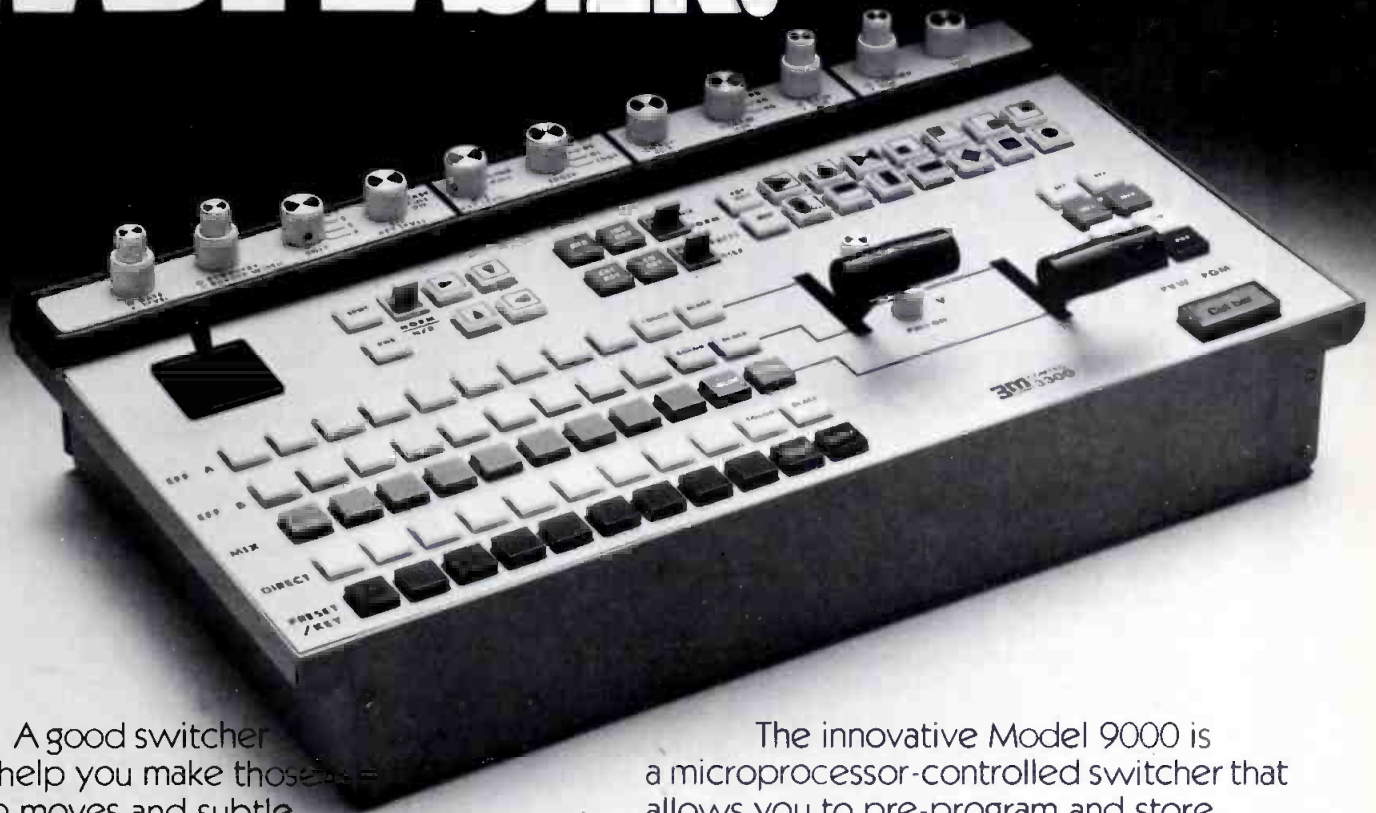
RCA also has entered the 1-inch Type C market by setting up a licensing agreement with Sony; RCA calls the VTRs the TH-100 and TH-50 (portable). The first machines are being made by Sony, but RCA has the option of manufacturing their own, according to RCA's Jerry Grever. RCA also confirmed that the Sony version of automatic tracking will be available in about a year, although a prototype could be seen in operation in a hospitality suite at the Hilton.

RCA's new editing system, the AE-6000, represents their first serious entry into the computer-assisted editing field. It interfaces with the TR-600 quad and external ARTS VTRs through a synchronizer optic. The AE-6000 has many of the familiar features of other sophisticated on-line/off-line systems, but also has a few new and attractive features. The most useful addition is an insert on the right-hand side of the edit decision list display, which

continued on page



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### Once over lightly

*continued from page 70*

gives machine status. An inverted polarity boxed display (decision list are white on black) shows the operator which machine is recording, cueing, or rewinding while tape editing is in progress.

RCA is also into digital video, and their TFS-121 frame store synchronizer has had a new option added which creates "frozen" slow motion as well as compression, quad freeze, and a hall-of-mirrors effect. [338]

RCA also had two other booths at NAB, which related to their American communications subsidiary, which provides satellite service, and the Electro Optics and Device division, which handles tubes of all types.

Their earth station map of the USA validated their claim that they have the largest satellite network in the world today. The only new product in these booths was a 50-kW power output tube, type 8984, which is used in FM and TV transmitters. RCA says it's the largest in that industry.

The growth of satellite use has moved Scientific Atlanta into rapidly expanding new industry.

Howard Crispin, their senior vice president, explained that satellite communication equipment, including the new series 8000 earth stations were the products attracting the most interest from visitors to their booth.

Their newest small dish product is an audio-only parabola that measures a scant six feet in diameter. It sells for \$7,000 and takes 15 days for delivery. Another new product was the Auto Antenna Positioner or the 8000 series. This unit is \$4,000 and is available in 9 days.

In addition to the new products, Crispin also pointed out that his company was showing video on audio earth station receivers, transmitters, modulators and demodulators; in fact, a full complement of products needed for satellite communications. As far as he was concerned, satellite earth stations were the "hot spot" of the show. [519]

Sony's posture in the broadcast business has been established further by their NAB exhibit. According to Irwin Ungerleider, ad director, Sony's booth was the largest and most elaborate ever, with small theater-style showroom beside the equipment setup. Sony's newest product, which has never been shown before, is the BVP-300 portable

*continued on page 71*



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## Once over lightly

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ble color camera which sells for about \$35,000. This camera, which will be available late this year, is the Sony version of the Thomson-CSF Labs Microcam. Sony obtained the rights to this camera when Thomson-CSF agreed to take on their VTR line in Europe. Sony's configuration is different in that they designed it as a single package unit.

Sony also had a less expensive 2-tube camera, the BVP-200, which sells for \$18,000 and employs a Saticon/Trinicon combination.

It was, however, the 1-inch helicals which attracted the greatest interest. The Sony BVH series, like its Ampex counterpart (the VPR), is a Type C machine which now conforms to the interchange requirements set up by SMPTE. While no official statement was made, it was reported from a reliable source that tapes had been exchanged at the show, and they played well. Sony had also recognized the value of the auto tracking system for the video head, and was privately showing a recorder equipped with this accessory in their suite. It even had one feature not found on the VPR-2: it made slow motion pictures in reverse that can be aired.

Sony had the BVH-1000 available in a variety of rack or console configurations and the BVH-500 in a compact, lightweight package for field acquisition. They have obviously geared up to build the BVH-1000, as they were offering 30-90-day delivery (the portable by November). Sony also had a variety of interesting accessories for their Type C machine. The BVG-1000 time code generator puts the time code in the vertical interval where it can be read out even when the tape is stopped. Remote control and editor interfaces are available; and, a computerized editing system with a keyboard console, display terminal, and hard copy printer, was also demonstrated in the booth.

The U-matic equipment and their newest version of the BVU-50 portable cassette recorder also attracted considerable attention.

Ungerleider stressed the fact that they were receiving hard orders at the show, which he felt showed a growing confidence in Sony by the broadcast industry. There were two other Sony products at the show which are not in themselves broadcast devices, but they were worth a look.

At their booth, there was a

30-inch direct-view Trinitron monitor which seems to dwarf other color TV sets. Sony does not presently plan to sell this unit outside of Japan.

In a remote corner away from the Sony booth, they had set up a video projector with a 6-foot diagonal screen. This is a one-piece unit with a built-in mirror which throws the image on the rear-mounted screen. While it has three projection tubes (R G B) it uses only two lenses since the red and blue images are optically multiplexed by a dichroic mirror before being sent through the lens. [523]

A relative newcomer in the field of television titling equipment, System Concepts has made an impact in this product area.

The Quantafont VI, their newest character generator for broadcast applications, is, according to Roy Romijn, the only microcomputer-based system. The model Q VI sells for \$8,000 to \$12,000, depending upon configuration. The 12 units they brought to NAB were all sold by the end of the show.

A more elaborate system called the Marchandiser I is also available from System Concepts. This unit is billed as a television production system involving graphics and alpha-numerics. Working from a program log, the operator can, with the aid of pre-programmed cassettes, set up a complete sequence which will be automatically displayed and repeated, if necessary.

Their business was up substantially according to Len Zaller, a vice president with System Concepts, and they were more than pleased with the space, ease of setup and good union help available at the convention center. [520]

At TeleCine, Inc., long focal lengths were the focus of attention by visitors to their display of optical equipment.

The need for these lenses on ENG cameras and 3/8-inch tube cameras was very evident to Craig Marcin, the technical representative who manned the TeleCine booth.

The new Schneider lenses he described included a 20:1 zoom (12 to 240mm) with an f1.4 aperture for low light-level shooting. This lens is designed for 3/8-inch tubes and sells for \$10,000.

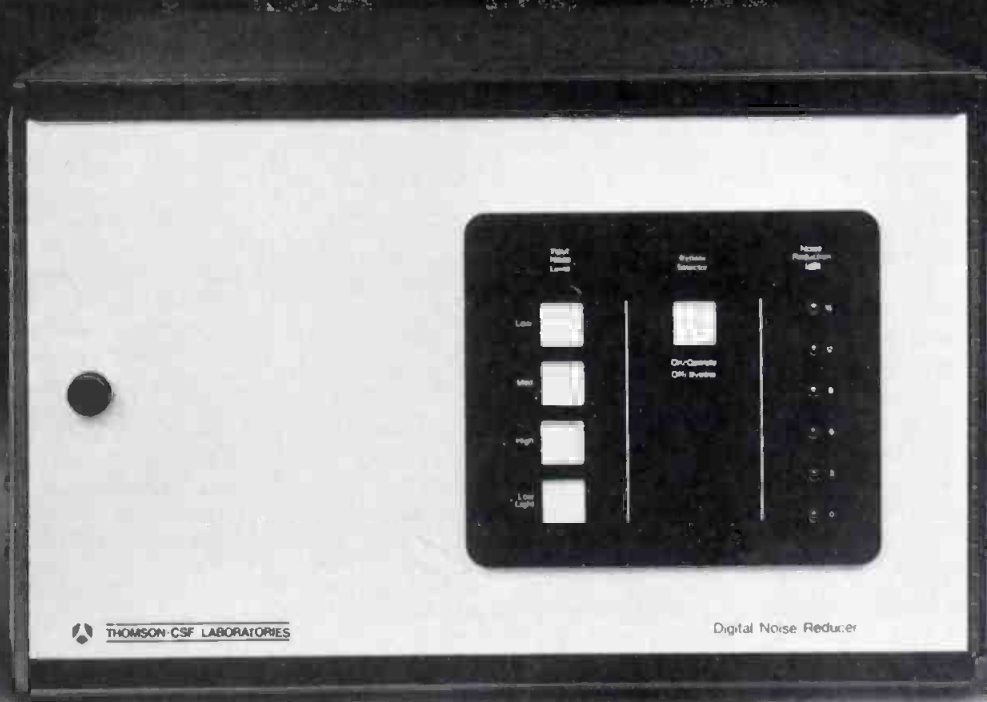
Another new series of lenses was available in three versions with 30:1 zoom range. These sell for \$22,000.

There were, of course, a whole variety of standard lenses including ENG-oriented 10:1 models and 15 or 20:1 versions for full-size tubes used on studio cameras. [521]

continued on page 76



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continued from page 74



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Robert H. Boulio, the national sales manager of Terracom, was more than pleased with NAB '78. Coming on the heels of their success with their ENG equipment that was used at the Academy Awards, and with a business upturn of 100% in 1978, he could hardly complain.

Boulio explained that their two newest products at NAB were the THP-2T-20 digital program channel multiplexer and their ENG mini-wave gear. The THP-2T-20 sells for \$3,000 to \$3,500 and is available in 120 days. The ENG mini-wave equipment is in the \$12,000 range on the same delivery. In addition to the new products, Terracom was also showing their STL and TS links, and the antennas they market for ENG applications.

Boulio also endorsed the general view that NAB '78 was well organized and convenient, and that the ENG equipment coupled with digital stereo were the hot spots. [522]

Very few companies have all the answers to a broadcaster's needs, but Tektronix claims that they have at least one in the signal measurement and monitoring field. In fact it's called ANSWER.

The ANSWER system will automatically measure 37 parameters of a video signal, and will print out a hard copy which can be kept as a permanent record. ANSWER will measure with worst case accuracies of 0.5% and 0.5° where applicable and will check timing of blanking, sync and burst. Test limits can be pre-programmed into ANSWER so that if they are exceeded, the user will be warned that something is out of spec.

ANSWER works over low-grade phone lines, and uses modems that interface with ANSWER and employ digital circuitry for low-maintenance operation.

As more transmitters go to automatic operation and as more satellite and terrestrial common carrier systems go into service, ANSWER becomes an attractive method for rapid evaluation of a television transmission system, even while a regular service is being carried on.

Tektronix also had another new product in their booth: a high-resolution color monitor dubbed the 650-HR. This picture monitor uses a special Trinitron and has extended bandwidth in the luminance and chrominance channels. It comes in NTSC, PAL, SECAM, and dual-standard models and has an RGB option. The 650-HR has 50% more resolution.

continued on page 76

BROADCAST ENGINEERING



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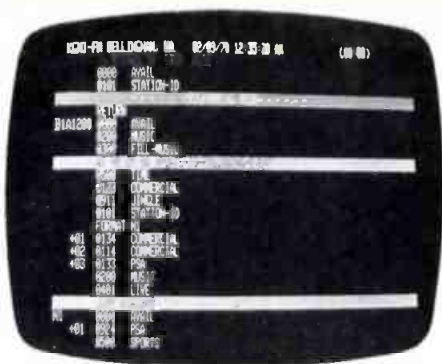
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facilities, upgrading your current studio or  
looking toward AM stereo let us show you how  
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# IGM

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## Once over lightly

continued from page 76

tion than a standard Trinitron.

Other new products included an NTSC TV demodulator (1450) and a high-speed A/D and D/A converter. This converter in OEM quantities can be purchased for under \$500, and should have a positive effect on future digital TV products. [524]

The Thomson-CSF Labs exhibit concentrated on the three major products this company offers: the Microcam, the Vidifont IV-A, and the digital noise reducer. Bob Estony, director of information services, felt that the Vidifont with its improved capabilities was drawing major customer interest. Changeable fonts and flexible disc storage have always been attractive features of Vidifont. The IV-A now includes color previewing on a second channel, interface to data processing gear, and auto sequencing of prerecorded messages. The IV-A has a price range of \$20,000 to \$35,000 and is available in 30-60 days.

The Microcam comes in a Mark I and Mark II configuration. The first is a single-body package, the second a two-section camera which can also be piggy-backed together for on-shoulder use. According to Estony, several hundred are now in use; the price is around \$30,000 and delivery is off-shelf.

The model 9000 digital noise reducer has had a frame synchronizer feature added to it. The basic unit is \$24,000 and the synchronizer option raises it to \$33,000.

Another new product at the booth was a miniaturized 2-GHz video link. It was so new, no one at Thomson-CSF Labs would quote me a price or delivery date. [526]

Lyle Keys was holding forth in the Utah Scientific booth. Long associated with Telemation, Keys' booth displayed the new company's routing switcher modules that were assembled into multiple matrices that exhibited the switcher's modularity and performance.

The switchers start at \$16,000 for a 20 by 20 audio/video system. Larger configurations or custom switchers can be ordered. According to Keys, special care was taken in the card design to minimize crosstalk.

Special features in the Utah Scientific switchers include a control panel that permits selection of source and destination by name rather than number, automatic preview and auto status request, and a refresh memory. A 24-hour battery is included. [528]

Vitality is the obvious hallmark of Nubar Donoyan, the president of Vital Industries, who considers Vital's contribution to the television industry a revolutionary one.

Vital's booth was set up to show the combination of their production switchers and digital video effects, which they label as Squeezoom and PSAS. The live presentation using a Vital frame store is so complex that even experienced observers think it is a pre-taped show.

Actually, Vital is able to handle four non-synchronous inputs with a single digital memory and produce a quad split, or other effects, because of a unique video signal priority system in the frame store. The result is much greater flexibility in using digital effects with visually attractive results. Donoyan made some hard points that broadcasters should consider before investing in switchers or DVE devices.

The purchase of a frame store that has only a synchronizer function limits the potential capacity of the TV studio to adopt more modern effects systems. Vital, he pointed out, is the only American company that makes both the switchers and the digital equipment, thus guaranteeing good integration and sole source responsibility.

Since Donoyan believes that every broadcaster will eventually have frame-store synchronizers and DVE accessories, they might as well get them all together. Vital also has microprocessor controls that provide interface with the station's business computer. They can put the computer program on a cassette and verify on-air use, with the cassette remaining as a check system. Squeezoom with an integrated switcher costs between \$95,000 and \$170,000 and has a six-month delivery cycle. The new PSAS system is \$48,000 and takes 90 days to get.

Vital now has more than two dozen working systems with such TV networks as Storer, Taft, Scripps, and with production companies like Teletronics and Mobile Video. Business must be booming as Donoyan rated 1978 at 300% over 1977. While not directly related to Vital only, Donoyan did make a point that is worth expanding on. Digital video effects have become so complex operationally that it is hard to paint accurate word pictures of what they do and how it is accomplished. Anyone contemplating the purchase of any of the DVE systems being offered needs to spend some "hands on" time with the equipment in order to comprehend its intricate capabilities. [525]



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One of the nicest reactions to the LX comes from Norm Woodruff, News Planning Consultant, in his radio newsletter "Keeping Current":

"To me, the *still* newest and best gadget going is a frequency expander for use on dial-up telephone lines. It was introduced a few months ago, and now has been placed in some new configurations that make it even more attractive. It can be used on two-way systems to improve quality. I mentioned this when it was first out, and mention it again because it is still the newest piece of equipment that can do miraculous things to help out remote quality. As the networks start bringing full-fidelity broadcasts to your studio from the other side of the country, the audience is going to find it unpleasant to hear a local news event or ball game with the poor quality we have been allowing. This gadget solves the problem."



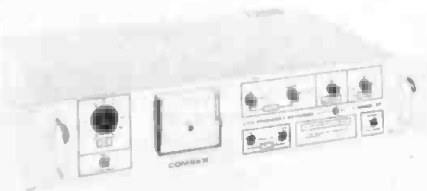
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(Photo by Donna Foster Roizen.)

# No brass bands in the hit parade

By Ron Whittaker

It's too bad social progress isn't as rapid as technical! This year's NAB convention is a good example. While numerous hours were spent debating some of the age-old social issues—sex, violence (and now children's programs and advertising)—another wave of technological progress was evident on the equipment side of the broadcasting business.

This is not meant to take anything away from the importance of the issues debated. They will affect us all. But technical progress was evident again at the NAB. As we go through the booths, you'll notice we end each coverage with a number. If you're interested in the products covered, circle these numbers on our Reader Service Card. Ready?

At the **Angenieux** booth, the

highlight was their newest lens, a 15X model designed especially for EFP and ENG cameras (F1.8 at 9.5 to 142mm). The new lens has a servo iris and a servo zoom, and features a detachable pistol grip. It weighs in at 5.5 pounds. According to Angenieux, a retrozoom can be added.

They also were showing a wide-angle attachment that's front mounted, and they have a 1.6 range extender and remote control kit.

Another top-line lens on display was their 42X zoom lens for studio cameras. [344]

The **Asaca Corporation** booth featured video test equipment, including an envelope-delay measuring set and a distortion meter/oscillator. And as you'd expect, Asaca exhibited an interesting ENG camera, the ACC-2000.

The envelope-delay set features compact design that Asaca feels will deliver an easier way to test transmitters. Some of these units already have been delivered to the networks.

The ACC-2000 ENG camera has a large viewfinder, checking in at 5 inches. When this viewfinder is added, along with focus and zoom handles, the camera is ready for studio use. It's listed at just under \$30,000.

Asaca's color video noise meter was displayed. Designed to handle chroma and B&W noise, it adds another dimension to their test equipment line, where they obviously are placing considerable emphasis this year. [345]

**Amtron** made some big jumps in their monitor line that now runs from 5- through 19-inch models.

The newest additions include 8-, 13-, and 19-inch versions. All are color monitors.

Also exhibited in the Amtron booth were 5-, 12-, and 17-inch color monitors. While there were not too many comments on the subject, monitors had to be among the products showing the most new versions in both sizes and built-in features. The crowds at the monitor booths, including Amtron, indicated that monitors were getting plenty of attention. [346]

**Berkey Colortran's** attractive exhibit had some surprises. They spotlighted Channel Track, a computerized memory lighting control system, and Pantograph.

Their computer control system can program up to 1,000 setups for each dimmer. How's it done? The key is a floppy disc system. In fact, the memory permits a preview modification and "blind recording" of selected channels. According to Berkey, it's available now.

Pantograph is designed to trolley along the grid. It comes in two weight ranges. It uses counterbalanced springs, and has extra safety features.

Berkey also showed their 1, 2, and 5-K Fresnels, with a new packing design that reduces the cost yet offers the same optical quality. Returning to their lighting controls before we left the booth, Berkey was getting good reaction to their manual lighting control pack offered in several sizes. The Master Control Pack can drive 120 channels of control. [347]

**Bogner** was one of the first companies ready to offer a circular—  
*continued on page 82*



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## No brass bands

*continued from page 80*

ly polarized television antenna. As you may recall from previous **Broadcast Engineering** articles, Bogner's standard horizontally polarized antenna can be converted to circular polarization. According to Leonard King, this antenna is available at "a reasonable cost."

While Bogner makes more than we have room to cover here, they were scoring in the ENG market with a microwave antenna that features a slot configuration. This one should exhibit low windloading.

Once again, all ENG systems equipment was running at a high interest level at the convention. [348]

At the **Canon** booth, the ENG interest continued. They were showing a wide lineup of lenses, but the models that caught our attention included the 25X and 13X zoom lenses.

The 25X zoom is designed to adapt ENG lenses to studio use.

Another ENG lens at the Canon booth was their new 13X zoom (J13X 9B). Its specs include a range from 9 to 118mm at F1.6. Broadcasters should be pleased to see the emphasis being placed on ENG by the lens manufacturers. The variety now

available should make existing cameras even more flexible. [349]

Fred Benjamin of **Christie Electric** introduced us to the new Reflex 20 Sequencer. It automatically charges up to eight different batteries in four hours. And this includes nickel-cadmium batteries for ENG cameras, VTRs, and related portable equipment. The Reflex 20 will be available for delivery in July.

For those on the run, the Reflex 20 will fully recharge batteries in 12 to 20 minutes, using a patented new charging concept: continuous injection of negative/discharge pulses during the charging process. [350]

*continued on page 84*

## Technology steals the show

Compared to the two previous NABs, Las Vegas was a joy. It was one of the best organized and smoothest run of any NAB on record. For the exhibitors—a record 293 in all—it will probably turn out to be the most financially rewarding of them all. Potential buyers often had to stand in line to talk to salespeople. Not since the late 1960s when there was the rush to "go color" have there been more buyers and fewer "window shoppers."

From the many people I talked to there were only two real complaints. Although there was almost unanimous praise of Las Vegas as a convention site (many said they would be quite happy if the convention were held there every year) there were some minor symptoms of encroaching union problems.

There was also a complaint of another type: many people I talked to said the convention was too short. To give the sessions and the exhibits the full attention they deserved, it should have lasted through Thursday.

### The technical highlights

As for the technical highlights, if I had to list three, I would put the new Type C 1-inch helical machines at the top of the list. I would follow this with something which might well end up representing some direct competition for 1-inch: TRI's Trichroma-U process (more on that in a second). The third highlight would have to be the microprocessor-controlled camera setup systems (although the concept was actually introduced some time ago by Ikegami).

The Type C format has gotten a lot of press in the past few months, so we'll skip that. And the microprocessor auto-align concept was not unveiled this year, so I'll skip to something that many people may have missed in the crunch of time: Trichroma-U.

The ¾-inch cassette process, which was lifted from the level of industrial and home quality by TBCs and various other signal-laundrying devices, has been given yet another push up the quality scale by a new video signal "language." Low-band, high-band and color signals all suffer from problems inherent in the

NTSC signal process when transferred to videotape.

Trichroma-U gets around many of these shortcomings and offers a significant (12 dB or more) increase in chroma signal-to-noise; the elimination of velocity error; a substantial reduction in gain and phase errors; and the elimination of multiple-pass chroma erasure problems. By offering a direct FM dubbing capability, the problems surrounding multiple-generation dubbing are reduced to the point that they are no longer a problem in most editing and duplication applications.

The FM dub mode requires the use of three RG-59 cables: one for FM luminance, one for FM chrominance, and one for servo sync. This eliminates the modulation-demodulation process which is normally required for dubbing video. Therefore, the multi-generation bandwidth integrity of both luminance and chrominance is held within the parameters established by the first generation recorder.

With the help of a new bottom enclosure for your ¾-inch machine, the Trichroma-U boards will fit snugly into the bottom of your present record-playback units. A selector switch will allow you to go with either the standard NTSC or Trichroma-U signal format.

Cost of the unit is about \$4,000. And even though the most popular application will probably be in ¾-inch recording, Trichroma-U can be applied to any VTR format. Who knows, this concept may do for video recording what Dolby has done for audio recording.

Before moving on, let me briefly mention one other thing, something which we may find (when we look back on this convention five years from now) actually represented the most important single device introduced at the convention. There is now an IC which will handle the analog-to-digital and digital-to-analog video translation.

This single IC may well find itself in most of the new generation of digital equipment—the same equipment which this year fascinated everyone with a whole new dimension of electronic effects, signal processing, and computer-controlled editing. Thanks to this IC, all of this will soon be even easier (and better).

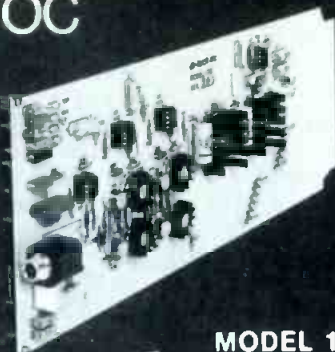


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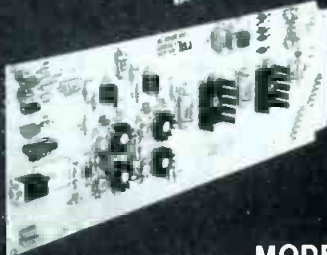
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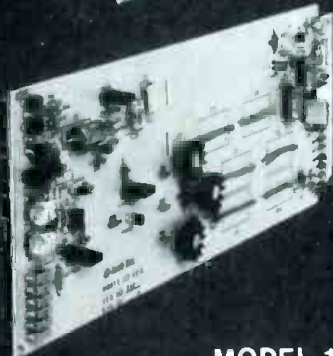
**MODEL 171 A.D.A.**

- 0 TO 40 dB GAIN
  - ADJ. 2 RANGES
  - DIST.  $< 0.1\%$  @ +18 dBm
  - DIST.  $< 0.3\%$  @ +22 dBm
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**MODEL 110 V.D.A.**

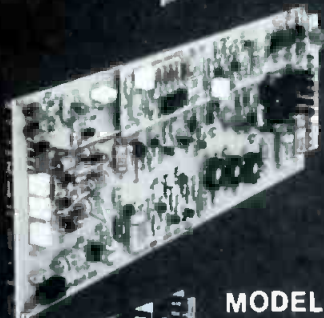
- A.C. or D.C. OUTPUTS
  - 9 dB GAIN
  - DIFF-PHASE  $< 0.1^\circ$
  - DIFF-GAIN  $< 0.1\%$
- PRICE: \$235



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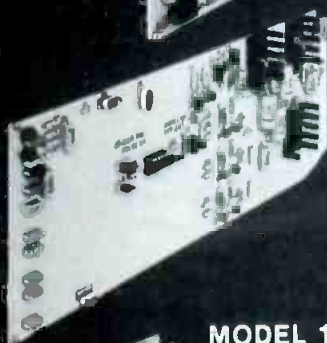
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- PRICE: \$340 w/Opt.



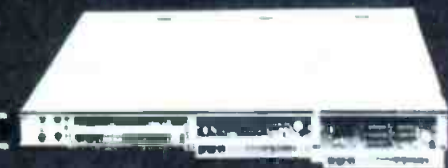
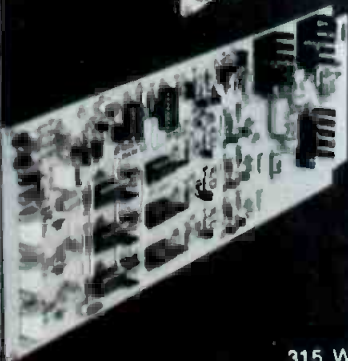
**MODEL 150 P.D.A.**

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## No brass bands

continued from page 82

At the **Chyron** booth, Joseph Scheuer described their new Chyron IV as a graphic unit, since it does more than you'd expect of a character generator.

Chyron IV has 27 nano-second resolution, and it stores six full fonts simultaneously. Here again, the floppy disc is the workhorse. According to Scheuer, you can use 64 colors simultaneously in the background and up to seven colors in the foreground...at the same time. Characters can be moved, overlapped, and adjusted to any position on the screen. Other interesting possibilities include a variable mask, variable positioning on roll, and "slow reveal." It should be available this month.

Another high-interest item in the booth was their cassette cleaner evaluator. It optically looks for edge damage, and photo-optically looks for scratches and oxide while it cleans the surface. The unit cleans at 10 times the normal playing speed of the cassette. [351]

**Cinema Products**, still elated over their Steady-Cam Oscar Award,

made the ingenious camera-carrying device available for hands-on demonstrations.

Crowding in, we saw their new MNC-71CP ENG/EFP camera. And according to Charles Lipow, Cinema Products will offer to incorporate design improvements (if they are needed) throughout the MNC-71CP's one-year warranty period. Overnight servicing of parts anywhere in the U.S. also is part of the deal.

The MNC-71CP is priced at about \$32,000.

Of course the Steady-Cam was the focal point. It includes the body attachments and platform. The equipment can be adjusted to camera and body for maximum ease of operation and minimum operator fatigue. A special 3-inch monitor is used that has a special kinescope tube of such brilliance that it produces over 4,000 footcandles on the screen before passing through a special filter designed to eliminate reflections on the face of the tube.

Since their beginning, **Convergence Corporation** has been drawing crowds at the NAB conventions. This time they did it with the ECS 100 Superstick series editing systems. They're totally modular. Just by changing panels,

you can convert from a 101 Basic Editing setup (at \$5,000) to a much more sophisticated editing system (up to \$11,000). It takes only about two minutes to install the panels. This series is targeted at ENG on the low end, while the full system hits the post-production user. It's available now.

Before moving on, it should be noted that the Superstick interfaces with any format.

On the industrial and closed circuit side, Convergence was offering the ECS-10B. It will go for about \$3,600. [352]

Moving right along the editing line, **Datatron** displayed their model 2000 computer automated editing system. It utilizes SMPTE code user bits, enabling the user to edit film footage since the user bits carry the film edge numbers. Another model 2000 feature is its multi-source editing capabilities (8 VTRs and one switcher in any format).

Floppy disc storage is used for the edit list, with hard copy printout and a color-coded CRT display.

Datatron also showed their **Drecision Lister**. It provides edit listing capability to any compatible SMPTE control track or manual, off-line

continued on page 88

## Digital Time is at the heart of the Cenchron master control system. It offers the greatest flexibility on the market, at an exceptionally low price!

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The system has been operationally field-tested with over two years of trouble-free performance on the CN Tower in Toronto.

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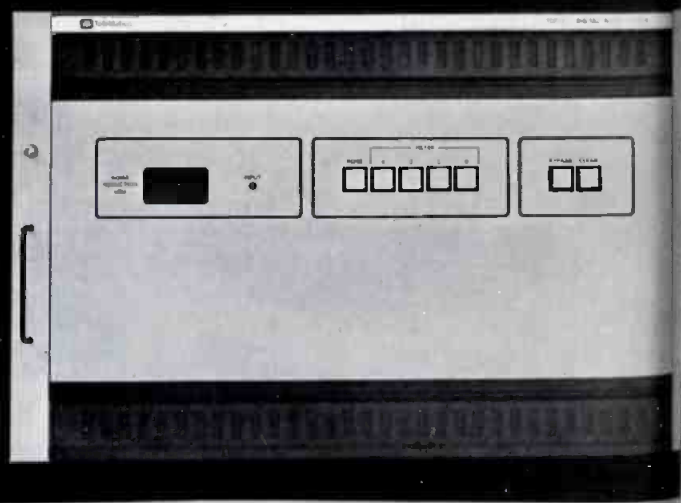
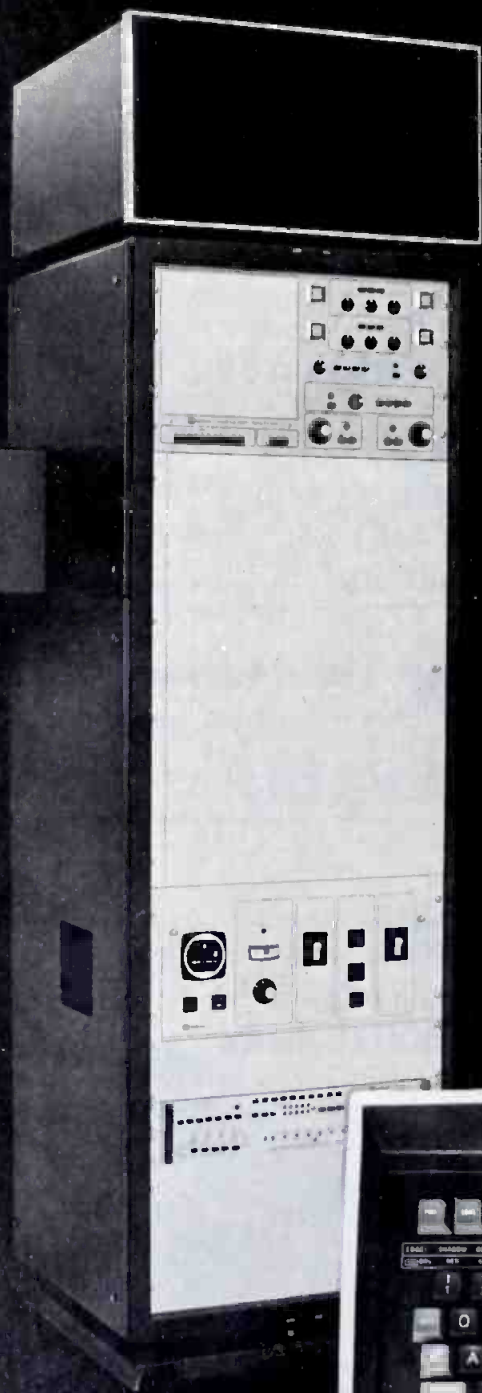


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# New from TeleMation





## **Introducing a state-of-the-art digital noise filter that costs less.**

From input to output, the 8-bit TDF-1 represents an entirely new approach to digital noise reduction. At the input, we've included a full, broadcast-quality processing amplifier that completely regenerates incoming sync pulses. The TDF-1's charge-coupled device (CCD) memory offers the same high performance as RAM systems at a significantly lower cost. We've also increased the video sampling rate from three-times-subcarrier to four-times-subcarrier for greater bandwidth and resolution. And maintenance of the TDF-1 is made simple by a built-in diagnostic system.

## **A graphics system with off-line archival storage.**

Everyone who uses an electronic graphics system has their own artistic requirements. With the new Compositor I™ memory system, each of your clients (or departments) can use the fonts they like and logos they need to create up to 999 graphics on a low-cost, removable cartridge disk. At the end of their taping session, they simply take out the cartridge and put it on the shelf. The next user (such as your news department) can then load another cartridge containing different fonts, logos, and pages and be on line in seconds. And, with the new dual disk system, you can copy directly from one cartridge to another.

What else is new with Compositor I? Fonts! More than 40 fonts are now available, including weather symbols, graph characters, and foreign fonts. And Compositor I's are now in use in PAL countries.

## **A microprocessor-controlled distribution switcher.**

The new TVS/TAS-1000 Distribution Switcher microprocessor option can be programmed to perform salvo switches of multiple crosspoints simultaneously. Eight (or more) different salvos can be loaded into the system's memory and previewed by the operator before the live switch is executed, virtually eliminating the possibility of error. Other new control options include X-Y panels, where the source is selected with one button and the destination with another, and category-number selectors, where the input is selected by a name key (such as "VTR," "Camera," "Studio," etc.) and a number key.

## **A telecine camera that replaces GE units quickly and easily.**

A new optics kit allows the TCF-3000 Broadcast Color Film Camera to replace GE 240 and 240-format cameras without so much as moving a projector or changing a lens. The TCF-3000 also gives you true hands-off color balance and color correction, automatically correcting poor-quality film without disturbing balance or gamma tracking of good film. This long term operational stability is made possible by unique, temperature-compensated sampling and control techniques. The TCF-3000 has several other advantages over competitive units, such as lower noise, more detail in black, and superior color separation. And a fully-remotable six-vector color corrector is available as an option.

For more information about these TeleMation products, circle one of the numbers below or contact:  
TeleMation, Inc., P.O. Box 15068, Salt Lake City, Utah 84115. Phone: (801) 972-8000.

For More Details On TDF-1 Circle (55) On Reply Card  
For More Details On Compositor 1 Circle (56) On Reply Card  
For More Details On TVS TAS-1000 Circle (57) On Reply Card  
For More Details On TCF-3000 Circle (58) On Reply Card



## No brass bands

continued from page 84

editing system. It generates hard copy or tape of the edit commands.

SMPTÉ generators and readers also were exhibited. [353]

Di-Tech showed a new entry for routing switcher shoppers with a 20 by 15 audio-follow-video model that is expandable up to 100 by 100. The audio side is three-level.

Also new was a 28 by 2 A/V switcher, additions to their audio DA line, an audio monitor amplifier, and a telephone access control system for remote equipment.

Di-Tech also showed their standard lineup of audio and video switching and distribution equipment.

According to Tony Bolletino, the 20 by 15 expandable routing switcher is available now. Depending upon how far you expand, the price will run between \$15,000 and \$20,000. [355]

Electro Controls was on the exhibit floor for the first time, and they got off to a good start with their Parellisphere variable spotlight. It's based on a new approach with the light variable for a wide

range of applications. Wattage is from 500 to 1,000.

The company also showed an ILS lighting control system that controls up to 400 channels with 400 cues, and it includes a CRT display. Their exhibit included lights, dimmer boards, patch panels, and control systems. [356]

Rick LeForge was on hand in the Farinon booth to explain their continuing thrust in the ENG market. Farinon has portable microwave links that hit 2 GHz and 13 GHz.

Looking beyond ENG, Farinon has a new audio earth terminal and a video earth station.

Their hottest product at the show was the FV43-02, an FM transmission unit that integrates the video and audio (on the subcarrier) on the same signal. The audio capabilities in this design run up to 15 kHz. [357]

Fujinon Optical demonstrated a telephoto converter for zoom lenses. Introduced at the convention for the first time, the telephoto converter increases the focal length of your lens 1.8 times. This is accomplished without affecting the F-stop setting. They should be ready for summer deliveries.

Here again, ENG continued its

domination. Fujinon showed a new 14X ENG lens with a built-in 2X extender. Other new models included a 22X studio zoom lens (F 1.6, 12.5 to 275mm), and a servo focus module to adapt an ENG camera to studio use. It's suitable for any camera, but only with Fujinon lenses. [358]

Fuji Photo introduced their H-621, a new entry into the 1-inch videotape field. According to Al Bedross, this new tape exhibits low dropouts, excellent signal-to-noise, and it should reduce head wear. Priced competitively, H-621 tape is compatible with both B and C formats.

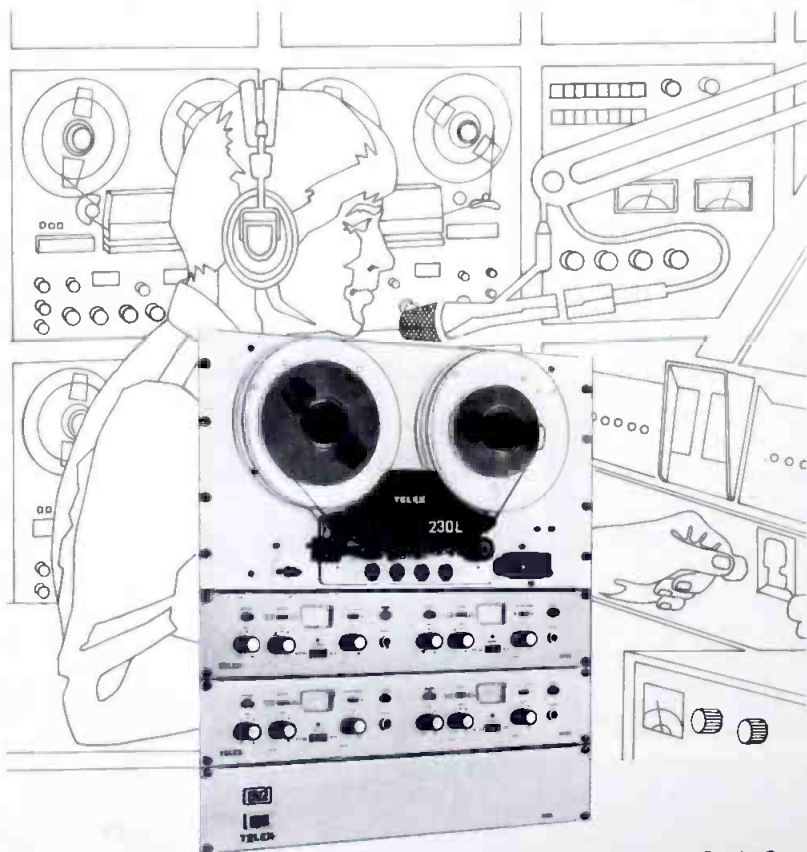
Fuji also has a VHS ½-inch cassette for consumer and business uses. On the 2-inch end, H701-E tape replaces their 701 stock. [359]

The Great American Market president, Joe Tawil, was on hand to show us their Scene Machine. It's a special-effects background projector that can produce patterns that range from simulating snow to disco dancing to stained glass church windows.

Also new at Great American Market was Scanamural, a computer approach to reproducing large studio backgrounds in full color

continued on page 90

# Our Logger is a Turtle!



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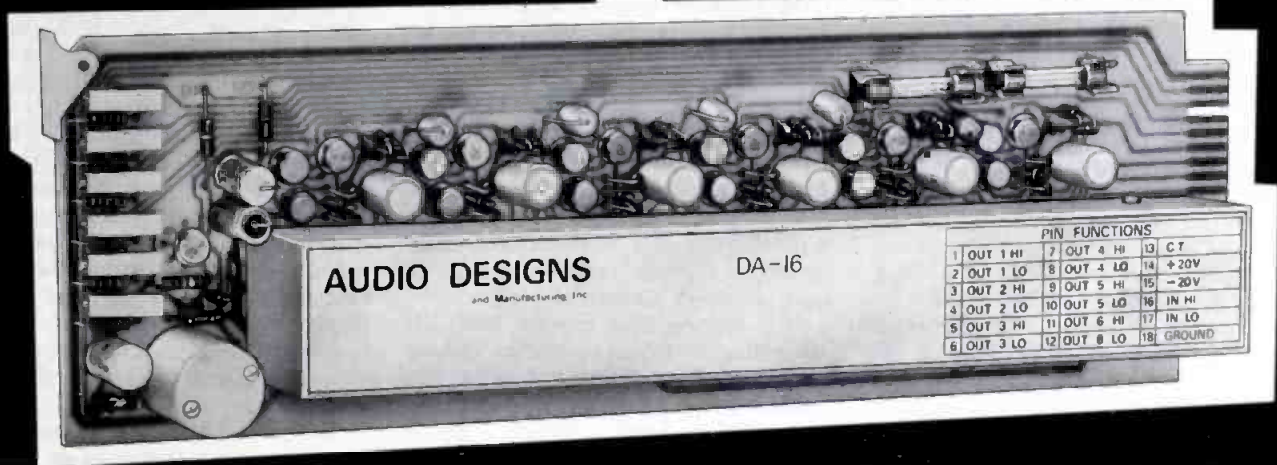
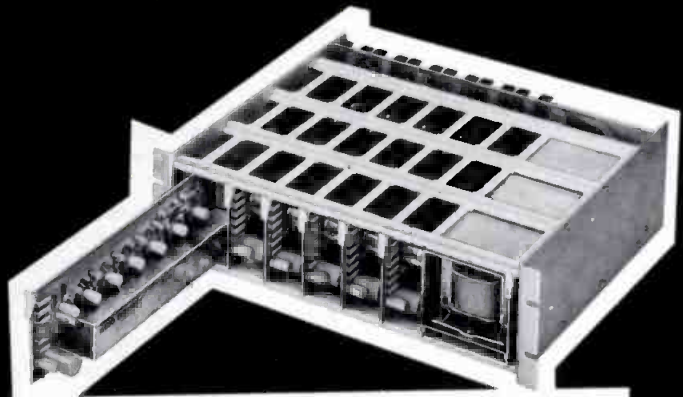
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## No brass bands

continued from page 88

from transparencies, large drawings, etc. Another addition was a Fresnel with features such as two tabs, asbestos ring for the lens, a better bi-post socket, and a protective shield on the switch.

In case you're not familiar with Great American Market, they're known for their pattern projectors, which have been used by John Denver and the Captain and Tennille. [600]

Over at the Hitachi Denshi booth, Bob Blair showed us the SK-96, a camera designed to fill the need of those looking for a camera that can be converted for use as an electronic field production camera or as a studio camera. Using 2/3-inch Saticon tubes, it weighs 13 pounds when converted. And it features automatic beam optimization.

At the top of their ENG line, Hitachi was showing the SK-90. It's in the \$35,000 range. On the other end (\$9,500), they introduced the FP-3060, a single tube 2/3-inch camera. Checking in at 7.5 pounds was their FP-3030. It's a low-light level designed camera. It's another

field production camera that can be converted for studio use. [360]

Along with a full line of their equipment at the booth JVC had a new 3/4-inch recording and editing system called the CR 8500 LU. It offers bi-directional fast and slow search from approximately 10 times to 1/20th time. According to JVC, the accuracy is  $\pm 2$  frames. The package includes two VTRs and a remote controller (RM 85U).

Other new equipment at the JVC booth included a camera that can be converted from ENG/EFP use to studio configuration. Dubbed the CY8800, in its basic ENG configuration, no CCU is required. The studio layout version includes a top-mounted viewfinder.

JVC also showed the CR 4400 LU, a portable videocassette recorder with automatic editing capabilities. It weighs 27 pounds and features low power consumption. It's compatible with any high-quality color camera. It has built-in recording and playback circuitry.

JVC reports that the CR 8500 LU recording and editing system should be ready for deliveries this month. [361]

A Performance Memory Console was the highlight of the Kliegl Bros.

booth. It remembers and reproduces 200 lighting settings on up to 200 different lights. Kliegl reports that this same system already is in use in Las Vegas theaters.

The Kliegpac 9 remotely controls nine dimmers through a console. It should find its way into remote location assignments. And according to Kliegl, their solid-state dimmer has been improved and refined so that if an overload occurs, the lights will dim but not go out completely. [362]

At Lenco, their black and white monitors were the hottest items on display, according to Dick Lawrence. Ranging from 9 to 23 inches, they feature 900 lines, higher resolution, and they have interchangeable electronics modules for every monitor, regardless of size. They're priced from \$625 to \$800.

If you haven't seen the Lenco 300 system yet, it's a "you name it and you've got it" flexible modular approach to video testing. Advanced test modules allow 29 test signals designed to meet the user's system test specifications. The modules are easy in-and-out units that slide into a mainframe rack.

At the show, Lenco had some

continued on page 92

# The Reverb Price/Performance Leader

The Orban dual-channel 111B combines solid, industrial-quality construction with unique signal processing and an unmatched pedigree. Since the first Orban Reverb was introduced in 1970, the line has been acclaimed for its outstanding cost/performance ratio.

Standard are built-in bass and "quasi-parametric" mid-range equalizers, our exclusive "floating threshold limiter" that minimizes spring twang and eliminates overload distortion, dual outputs (use the 111B regardless of whether your mixer has echo send/return facilities), and 115/230 volt AC power supply. Standard also are the sophisticated electronics that provide bright, super-clean sound with extraordinarily low noise. We reduce "flutter" to the vanishing point by using four (not just two) springs per channel. Special mu-metal shields eliminate the hum that usually plagues a low-cost spring reverb.

As always, you can count on Orban's reliability and prompt service.

Although the 111B interfaces perfectly with "home-studio mixers," its quality makes it equally at home in professional studios, radio stations, and travelling shows. Its rugged construction stands up to the rigors of the road, and many top acts carry the Orban Reverberation with them on tour.

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## No brass bands

continued from page 90

interesting additions for the 300 System. They include a VIR generator, and a color bar generator using alignment test signals (a la SMPTE). While industry optimism was generally apparent (and the real key to the convention), Lenco was an excellent example with sales reportedly moving dramatically in 1978. [363]

Leitch was proudly displaying

their 160 Video Source Synchronizer. It was developed for the Canadian Broadcasting Corporation for use at the Montreal Olympics. The device brings diverse video sources into one common house sync. Obviously, it's a workhorse in situations (such as large remotes) where there are multi-camera and videotape machine inputs.

Handling crowds even in the morning shifts, Leitch was also showing the CSD 510 clock driver, the SPG 102 master sync generator, and the SPG 130N slave generator.

These units are packaged for high flexibility. The slave generator, for example, uses only one rack, thus saves space. And they are priced on the low side.

While there usually are a lot of mixed emotions about NAB conventions, Leitch reports that after the last NAB their sales increased dramatically. With size of the show jumping each year, it wasn't too surprising that some manufacturers were suggesting that the show be extended an extra day. [364]

**Micro Communications** was emphasizing their circularly polarized antennas for VHF-TV and FM, featuring low wind loading and low SWR.

The Micro Communications CP FM antenna can handle (diplexed) up to six stations. Interesting features include the fact that the radiation pattern is not affected by the tower structure. Its computer designed shape allows omni-directional patterns.

Their series 42000 notch filters, series 44000 harmonic filters, series 43000 absorption filters, and their series 51000 loop couplers were also displayed in the booth. [365]

Digital video effects have certainly caught the fancy of the broadcast industry, partly accounting for the visitors at the **Micro Consultants** booth who showed up to see the DPE 5000 (Digital Production Effects) device do its thing.

Interfacing with any switcher, the DPE 5000 can massage a video signal until the viewer thinks he's looking at optical effects. The device will freeze, squeeze, flip, wrap around, position, wipe, pan and tilt, and then zoom in and out. It can track a chroma key area and fit a compressed picture into a slot, automatically maintaining aspect ratio and perspective.

Micro Consultants also displayed their Digital Standards Converter (DSC 4000) that was shown earlier at Montreux. It can be purchased in one-way conversion or bi-directional versions.

Noise reduction was also a factor that interested buyers. Their DIC 350 digital frame corrector reduces noise up to 15 dB, while offering digital image enhancement, full frame storage, and delay correction.

The company also showed their DFS 3100 frame storer, and a low-cost digital field store synchronizer, the DFS 1500. [366]

Keeping up with the technology is a never ending job. Take the **Micro-time** booth, for example, where CCDs were being used in their

continued on page 94

# NEW! Beaucart Audio Console.



Here's a console that will, literally, win a place in your heart: The new Beaucart® audio console from UMC/Beaucart. Our eight-channel stereo console incorporates every feature a broadcaster could ask for. Expandable to sixteen-channel stereo with the addition of standard top plug-in channel modules. Three fully metered matching stereo busses out plus a standard mono feed buss. Three selectable inputs on each channel module for a maximum of 48 hard wired console inputs. A momentary, cue buss access, select button on each channel for auditioning without disturbing pre-set volume levels. On/off buttons are noiseless and weather station. And on top of all that, the Beaucart console has been beautifully human engineered to make it a real pleasure to program with.

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## No brass bands

continued from page 92

appropriately named 1600 CCD Time Base Corrector.

Using CCD technology, this corrector promises an instantaneous correction window of 4 H lines and a signal-to-noise ratio of 50 dB. An interesting option is the Image-Ex. For an additional \$2,000 it crispens the picture, reduces noise 3 dB, and it has chrominance/luminance delay compensation built-in.

Microtime was also showing their

2020 Total System Corrector, Image Plus standalone correction system, the 2020 Plus signal corrector, the 2020 video signal processor, and the 1020 time base corrector. Reflecting the increasing interest in ENG and EFP, a Microtime spokesman at the booth said sales so far in 1978 were up about 40% over the same period last year. [367]

Shintron president Shintaro Asano was on hand to help introduce the company's 373 BP Switcher Effects Generator Control. It's an integrated production unit that includes sync, color bar and color/black genera-

tors. Intended for ENG use, the company feels it is ideal for non-technical people.

Other Shintron introductions included a portable SMPTE code generator, a SMPTE code reader, and a medium size ENG van switcher (model 375), a downstream matte keyer, and an encoded chroma keyer. [555]

Returning to the lighting side, we visited the Strand Century booth where Micro-Q was being demonstrated. This is a memory control system designed for the needs of the medium and smaller TV studios as well as theaters.

With a floppy disc and CRT, you can program 200 lighting scenes on 96 dimmers. In keeping with the surge of products at NAB, it is modular, so it can be expanded into a very complex system.

A new feature of their HMI system is the inclusion of ballast. Strand says it would take four regular instruments to achieve the same power of one HMI. [368]

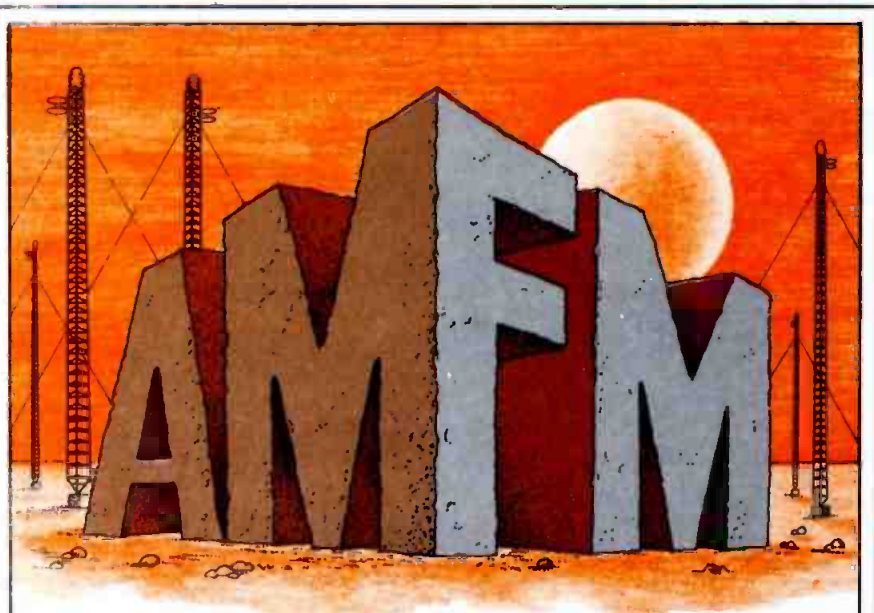
In the Telemation booth they were showing off their TDF-1 Digital Filter. Using CCD technology for memory, the TDF-1 features a 4fsc sampling rate. You can pass moving pictures through it without blurring or streaking. It meets the new SMPTE standards, and offers a maximum of 18 dB of noise reduction.

Telemation also demonstrated their Composer 1 again. They've been revising and updating it and have added arabic characters and animation features. The TVS/TAS 1000 Routing Switcher was also on display. A company spokesman at the booth reported that the company was having its best convention ever. [369]

If you haven't read my overview of the convention, turn to it now. Television Research International drew our raves there, and rather than repeat all those features, I'll keep it short so you can flip back to my wrap-up.

What you'd expect to see in the TRI booth was time code and editing equipment. The display included a Triangle Package that has the EA-3 editor, the DDT-1 digital timer, and the EIT-1 insert timer.

The hot spot at TRI was the Tri Chroma-U Signal System. If you're familiar with ¼-inch VTRs and their cassettes and the mess you get into with multi-generation program material, this system should interest you. Now you'll want to refer to my write-up to see just how TRI upgrades the ¼-inch machine signal and makes multi-generation possible. [370]



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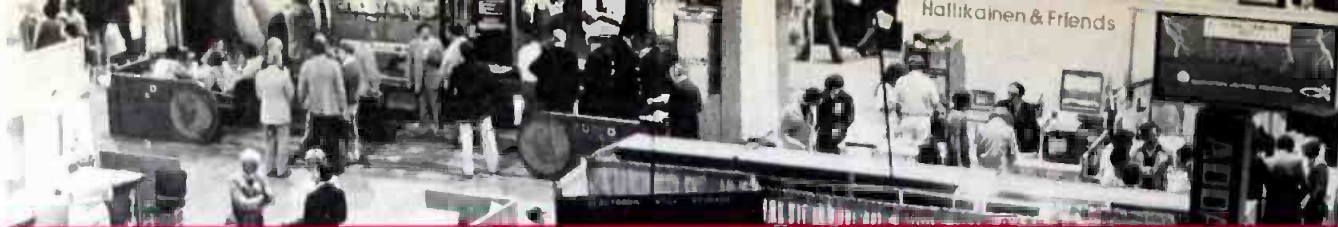
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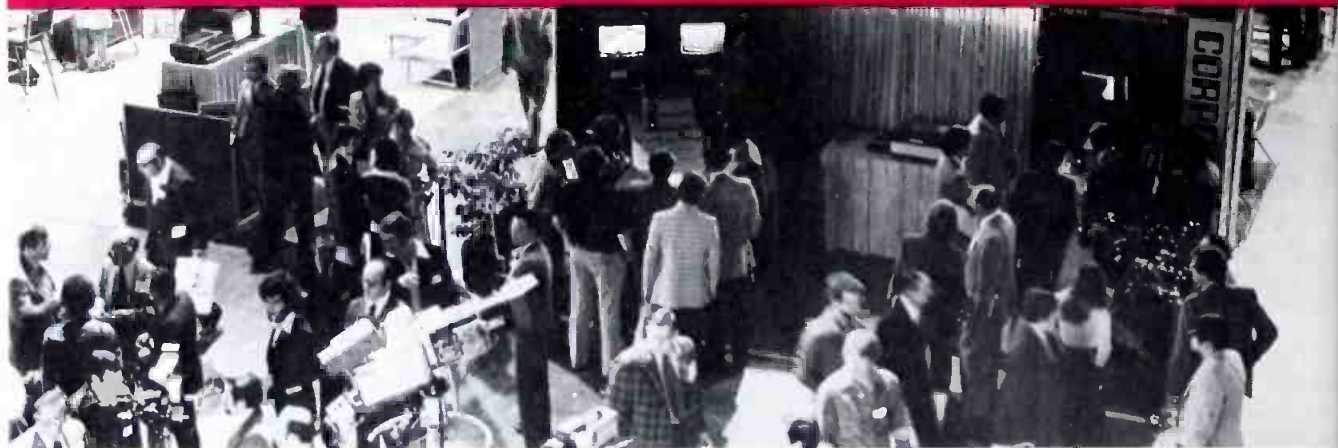
# NAB AUDIO ROUNDUP

*Broadcast Engineering's  
audio editors bring us in  
for a close look at  
convention exhibitors—their  
products and their views.*





## ATS and automation continue to draw crowds



By Peter Burk

Broadcast manufacturers must have stayed awake nights dreaming up new equipment to bring to Vegas. Radio broadcasters could see, hear, and touch products designed to solve every conceivable problem. (Some even solved problems we didn't know we had!)

The convention also provided a chance to meet the faces that belong to those voices on the telephone, as nearly every exhibitor manned their booth with knowledgeable sales people and engineers ready to answer everyone's questions.

If you missed picking up literature at the booths, or if you missed the show, circle the numbers following each manufacturer of interest on the Reader Service Card.

ATS continues to draw attention. At the **QEI** booth a self-contained system was exhibited. It includes a built-in modulation monitor. QEI also showed their AM, FM, and TV monitors, along with stereo and SCA generators, and AM and FM peak limiters. [529]

**Micro Control Associates** displayed a ready-to-wear ATS that includes a built-in modulation monitor. A unique feature of this package is that pressing any button

on the companion remote control unit drops the system out of the ATS mode. [530]

**Delta** demonstrated an ATS-compatible modulation controller along with their line of RF Ammeters, antenna monitors, and remote control units. [531]

**Eric Small and Associates** was on hand, ready to explain how "Telesis" (the "ultimate" remote control unit) could handle any transmitter plant, no matter how complex. [532]

**IGM** demonstrated how easy it is to operate in BASIC A. Their automation system avoids complex codes and talks in English. It's an interesting automation approach, because if you want to make program insertions or deletions, you ask the system, in English, and it responds. It stores 4,000 in a RAM memory, and it's expandable in increments of 2,000 events.

The **CRT** readout gives event information in attractive but sensible multi-colors. [533]

The **Cuerac** automation system of **Consolidated Electronic Industries** was demonstrated by Jack Neff. It's described as an automation library, and that's just what it looks like. Its expandable rows of carts could house your entire cart library. Instead of sucking carts in or rotating them around, the Cuerac system pulls them out of their racks and puts each cart into a repro-

ducer at the bottom of the rack. There is a reproducer at the bottom of each vertical rack.

The system includes a CRT event readout. [534]

Bumping the automation market, **International Tapetronics** demonstrated their new "1K" system. The mass cartridge storage/retrieval system drew crowds throughout the convention.

They also showed a complete lineup of cartridge equipment, including the RPD cart delay system, eraser/splice locator, and single and multiple deck cart machines. [535]

**RENG** is alive and well! **Comrex**, in addition to their portable VHF and UHF equipment, demonstrated a unique device aimed at improving telephone line quality. The "Low Frequency Extender" shifts the remote audio up 250 Hz before transmission over voice grade lines, then shifts it back down at the receive end, restoring the bottom two and a half octaves. [536]

**Marti Electronics** demonstrated a new automatic repeater, using transmitters type-accepted for 10 frequency groups. Marti also introduced a new transmitter-studio link which has been type-accepted. [537]

For studio equipment, broadcasters could look at audio consoles from a number of manufacturers.

*continued on page 98*

(Photo by Donna Foster Roizen.)



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Tracking Indicator  
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## Top attraction was AM Stereo

On the radio side, AM stereo was the key word at NAB '78. General managers were asking how much and how soon; program directors asked how loud and how far; and chief engineers were asking how.

Two manufacturers demonstrated their proposed systems on the floor so all could hear. Several sessions brought experts together to discuss some of the considerations facing stations planning to jump on the stereo bandwagon. One manufacturer was even taking down payments for AM stereo excitors, contingent, of course, on FCC approval. Stereo on the lay-away plan.

ATS, the hot item last year, seemed to have cooled a bit. Although several manufacturers displayed operating systems and more yet offered "ATS-compatible" equipment, there has not been a stampede at the commission's door

by stations wanting to put in the black box. Some broadcasters expressed the feeling that the rules for ATS left something to be desired; the advantages might not outweigh the possibility of lost air time due to an ATS failure.

After looking at row upon row of hardware, it became obvious that the technology is available to accomplish just about anything broadcasters want.

Microprocessors were being used everywhere...for elaborate remote controls (Eric Small's "Telesis," based on DEC's LSI-11)...for automation systems (many using the popular 8080)...even for a "smart" cartridge timer (from ITC using the one-chip 8048).

It's in our best interest to learn all we can about the new technology. The manufacturers need our input if they're to produce hardware that we really want, and we can't provide that input without at least a superficial understanding of what the technology can provide.

## ATS and automation

*continued from page 96*

McCurdy Radio Industries drew attention with the new "7900" series radio and TV production consoles. McCurdy also offered

many useful packages of peripheral studio equipment. [538]

ORK, in addition to their turntable line, also introduced a new console...this one a small DC-controlled unit for smaller production applications. [539]

Fidelipac exhibited their cartridge

line, including alignment tapes for wow and flutter. They also have insertion, height, and right-angle zenith gauges.

Fidelipac had two products that will help you organize your carts. Their Cart-A-Round storage rack

*continued on page 100*

# IMAGE ENHANCERS.



The Model 6220 In-Line Image Enhancer provides overall signal enhancement and detail gain, as well as level dependent aperture equalization. It also features a built-in RGB decoder for chroma key applications.

The Model 6210 RGB Image Enhancer allows the operator to adjust

black region noise and background activity which can particularly improve tape quality in film transfer work.

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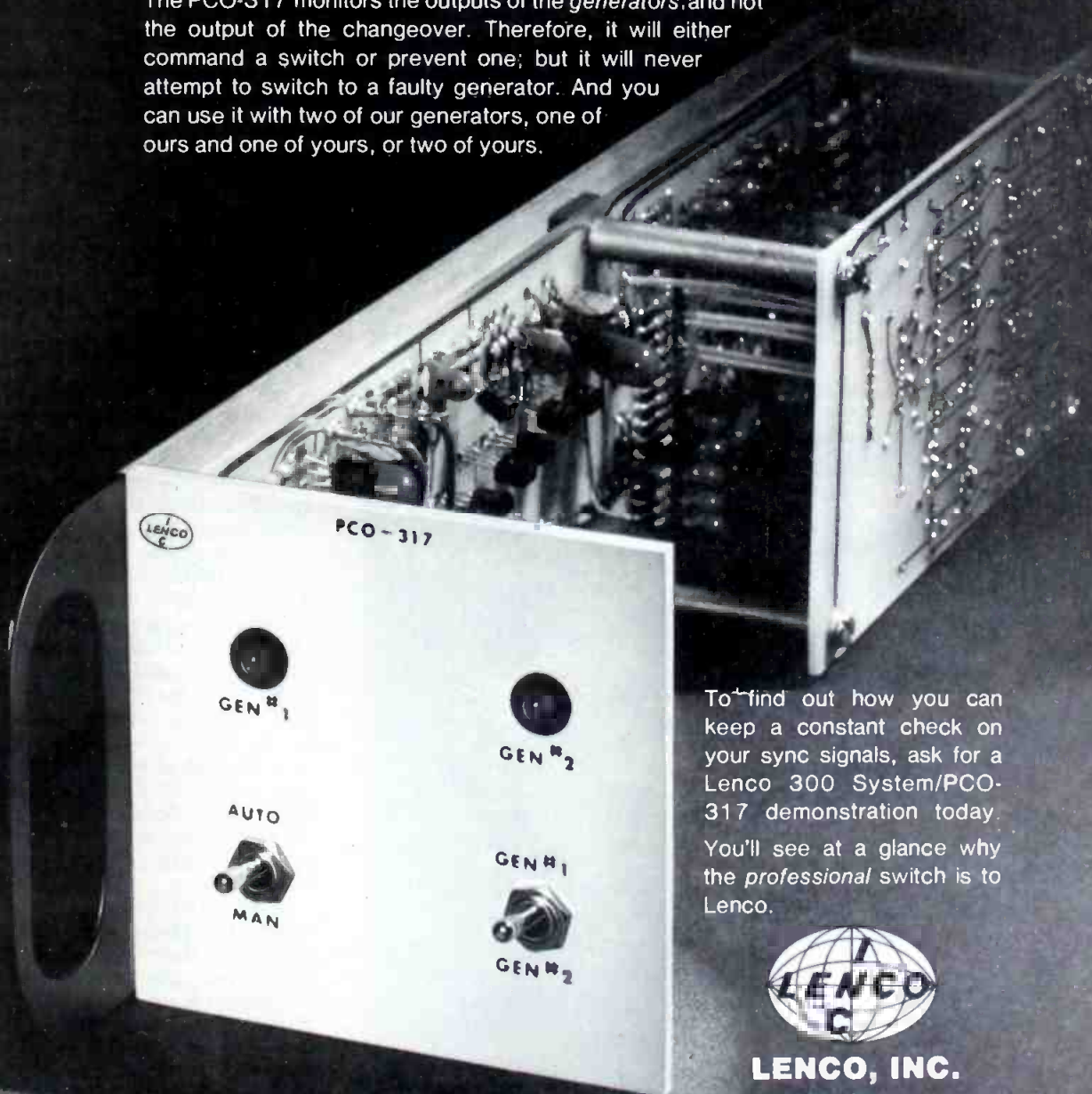
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# Super Sleuth

The Lenco 300 System/PCO-317 Automatic Sync Changeover Switch instantly detects the failure of any synchronizing signal and immediately switches to an alternate source. Each input is monitored for the level and timing of the sync, blanking, horizontal drive, vertical drive, burst flag and subcarrier signals.

The PCO-317 monitors the outputs of the *generators*, and not the output of the changeover. Therefore, it will either command a switch or prevent one; but it will never attempt to switch to a faulty generator. And you can use it with two of our generators, one of ours and one of yours, or two of yours.



To find out how you can keep a constant check on your sync signals, ask for a Lenco 300 System/PCO-317 demonstration today. You'll see at a glance why the *professional* switch is to Lenco.

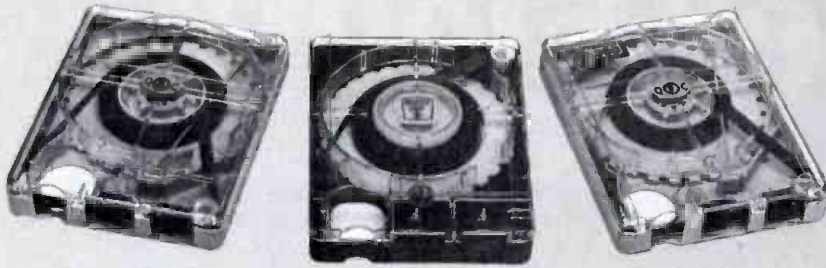


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**ATS and automation**

*continued from page 98*

(it's on wheels) has eight racks that hold 25 carts each. And, they have a table-top version that holds 96 carts. [540]

**Electro-Voice** was showing off their new professional condenser microphone system and a miniature condenser tie-clasp microphone.

Along with their standard line of broadcast microphones, Electro-Voice also showed their studio monitor loudspeakers. [541]

**ESE** displayed their digital emphasis in digital clocks, digital timers, master clock systems, and time programmers. New at the booth was a timer with display freeze, a station thermometer that reads out in centigrade and Fahrenheit, and a six-digit clock/timer with memory. [542]

**Telex** came up with a new one in a reel-to-reel tape logger, and they showed their latest in headsets, a model called the Hear Defender.

The crowds around Telex also had a chance to see their reel-to-reel tape recorders, tape transports, and cartridge tape recorders. [543]

**Stanton** displayed their line of high quality cartridges and headphones. [544]

**Russco** expanded their turntable/preamp line with a new electronic speed control to vary turntable speed by  $\pm 12$  RPM. [545]

**Duracore™** was the key word in the Nortronics booth. These heads directly replace conventional heads without requiring electrical or mechanical changes. According to Nortronics, these heads use a mu-metal type material that offers 10 times the life span of conventional heads. [546]

In the Taber booth, the emphasis was on reconditioned audio heads. Their line display included heads for reel-to-reel machines as well as audio heads for Ampex and RCA VTRs. [547]

If larger hardware is your thing, **Continental Electronics** could talk to you about their 5, 20, and 50 kW transmitter line [548], while **CSI** introduced a newly packaged series of FM transmitters [549]. **McMartin** displayed a wide range of equipment, including a new 10-kW AM rig, and an expanded line of RENG equipment. [550]

For the antenna farm, **Phelps Dodge** harvested a new high-power FM antenna [551] and **Flash Technology** introduced a lightweight version of their strobe light for tall towers. [552]

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### In a new RCA transmitter, less is really more value.

RCA transmitters have fewer of the traditional troublemakers: fewer tubes, fewer blowers, fewer linear amplifiers.

But more of the features that eliminate trouble, increase reliability, and decrease the need for adjustments. Features such as built-in filament voltage regulators, and a complete system of status indicators to assist in troubleshooting.

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With more in operation than  
anybody else. Now, you know  
some of the reasons why.**



# RCA

# Convenience features dominate latest product developments

By Dennis Ciapura



(Photo by Donna Foster Roizen.)

There probably has never been an NAB convention where so many new products were on display. But for all the new products, few were what you'd call revolutionary. Two new buzz words were added, prompting attendees to ask, "Is it digital?" and "Does it use a micro-processor?"

Sooner or later at every NAB convention, the big question is "What's the hit of the show?" Of course that answer depends upon what you were looking for and what

kind of station you represented. There had to be a number of hits.

It's interesting to ask exhibitors what equipment would be a hit. After they mention their own gear, they usually are pretty objective in their selections. The exhibitors I talked with said the hit categories were AM stereo, satellite communications, ENG and RENG gear, and CP antennas.

While digital audio wasn't a factor at this convention, in the years to come it probably will be. In

the meantime, radio equipment manufacturers have been responding to basic demands through human-engineered features...geared to make your day more challenging yet easier, your signal better sounding, and control and measurement more accurate.

But let's start down the aisles and I'll introduce you to the booths I visited. At the end of each writeup you'll see a number. You can use your Reader Service Card and these numbers to get more information on the equipment that interests you. So, let's get started.

**Accurate Sound** showed their 16:1 high-speed duplicator at this year's NAB, as well as the rest of their product line, including Ampex deck rebuilding. The state-of-the-art duplication equipment features 12 kHz bandwidth.

The 2400 duplicator uses plug-in assemblies for rapid format changes. All tape formats are available, and an autocue/counter module is available for programmed production runs. [560]

At the **Ampro** exhibit, the Time Machine digital audio delay unit was the star of the show. Ampro's console and cart machine line was also on display, as was the famous Ampro Monomax.

The Ampro audio digital delay system (ADDS) delivers a 6½ second audio delay with full digital storage capacity. ADDS converts wideband signals into digital impulses, while utilizing a digital memory system that provides good audio reproduction. It operates on a 15 kHz bandwidth, at a frequency response flat within ±.25 dB and

*continued on page 10*



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

## Convenience features

continued from page 102

total harmonic distortion of less than .5%. [561]

**Andrew Corporation** reports that their UHF TV and earth station antennas garnered most of the attention at their booth. Andrew also displayed heliax coaxial cable and pressurization equipment. Their new LDF series Heliac<sup>®</sup> cable was on display. They're using a new low-density foam dielectric that reduces attenuation almost to that of air dielectric cables. This new

low-loss cable comes in 1/2-inch and 7/8-inch sizes. [562]

**Auditronics Inc.** showed their line of improved consoles featuring better performance and new cosmetics. On display was one of the company's well-equipped mixing and control centers. The attraction at the Auditronics booth was their latest console. It's an 18 in/4 out model with VU and peak level indicators. [563]

**Audio Designs and Manufacturing Company** introduced their 1600 and 3200 series consoles for the first time at this year's NAB. These new

units offer high reliability, preamplifiers, and engraved lettering.

They also showed a new intercom system. Among their other products on display were distribution amplifiers, speakers, patch bays, audio processing equipment, and spectrum analyzers. Their DA16/CH20 audio distribution system uses an advanced design approach. Each amplifier is a 1 in/6 out plug-in card with +24 dBm input and output capability. At that level, distortion is less than .1%. Up to six DA16 amplifiers can be housed in the CH20 rack.

Their console designs feature contours that make sophisticated configuration easy to operate. Strictly state-of-the-art. [564]

High-quality modulation monitors featuring auto-ranging were the star attractions at the Belar exhibit. AM stereo and tuneable AM monitors also drew lots of interest from broadcasters.

Actually, Belar had a full lineup of new monitors for AM and FM, as well as a new digital clock and Status Alarm System that starts with two statuses and can be expanded to more than 900 statuses. Their new stereo monitor features two sensitive auto-ranging voltmeters for simplified automatic measurement of stereo separation and crosstalk. The new Belar Automatic Power Controller provides power correction and alarms for ATSC. [565]

An all-in-one low-cost tape synchronization unit was introduced by **BTX Corporation** for the first time at this year's exhibit. With the price tag under \$5,000, this new device is destined for a long and happy future among broadcasters. [566]

**Cablewave Systems** showed their new 4 1/2-inch Flexwell cable for the first time, as well as their new SBD-10 dehydrator. Fiber-optic connectors featuring minimal misalignment probability were also displayed. With fiber optics now moving into the broadcast scene, anyone coming up with easily installed connectors is sure to have a hit. (See cover article of *May Broadcast Engineering*.) [567]

New products abounded at the CCA exhibit, including IF modulated VHF TV transmitters, new VHF TV exciters, and a 2.5 kW AM featuring solid-state frequency synthesized design. A new audio console line also was shown for the first time. With AM stereo on the horizon, consoles were a big drawing card at this NAB convention. [568]

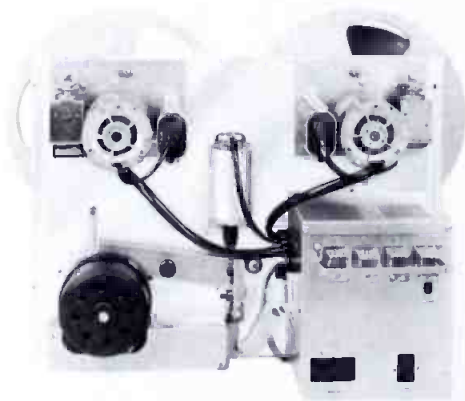
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continued on page 103

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five years ago, I've done all of Shaun Cassidy and Leif Garrett on it, most of  
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and others.”

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## Convenience features

*continued from page 104*

console line, Cetec also exhibited their new 7000 series automation system (introduced at the show). The 7000 system employs micro-processor technology and allows central control programming. Cetec also has a new 30 kW FM transmitter. Of course, their Jampro circularly polarized FM antennas were displayed, too. [569]

**Data Communications Corporation** introduced their new Micro-Bias system for the first time this year. Intended for smaller market stations, this smaller version of the now famous Bias computer system attracted lots of broadcaster inquiries. Data Communications was also detailing their accounting system and automated switching. [570]

**Datatek** showed their D-480 low-cost audio switchers and a 481 SMPTE time code switcher. Routing switchers seemed to be the hottest product at the booth.

Along with their routing switchers, for which they are well known, Datatek has a full line of video and audio distribution amplifiers in rack housings.

Two new products were the D-605 DA and the D-518 SMPTE DA. The D-605 features an individual power supply, and has three outputs from each of two independently adjustable channels. The D-518 is a SMPTE time-code signal distribution amplifier with six balanced outputs. [571]

The model 334 FM noise reduction system dominated the **Dolby Laboratories** exhibit. As always, lots of broadcasters were on hand to inquire about the future of Dolby FM and inspect the equipment. [572]

**Harris Corporation** had an exhibit featuring enough new products to keep a broadcaster busy for half a day. AM stereo, the MSP100/MS-15 FM processing/exciter system, and Criterion 90 cart machines were among the product lines sharing the spotlight with Harris' new Cyclotran lightweight CP antenna/transmitter system.

Since Harris is offering a stereo AM exciter, their demonstrations drew crowds throughout the convention. Harris also introduced a triple-deck cart machine. This kind of machine has been selling well for cart manufacturers to both AM and FM stations. Their all-solid-state kW rig was still an attention getter. [573]

Low-wind-load circularly polarized UHF TV antennas were the

*continued on page 106*



# SATICON<sup>®</sup>

## knocks the lead out of ENG cameras.

SATICON broadcast vidicons give you everything lead-oxide types deliver—and more. They have the sensitivity and low lag you need in ENG. Plus superior resolution. And the promise of much longer life.

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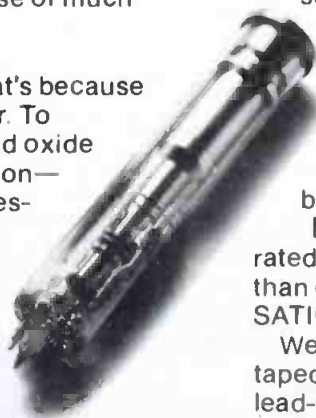
**Consistently high sensitivity.** The SATICON has a very narrow range in sensitivity from tube to

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## Convenience features

continued from page 106

stars of the Jampro Antenna Company booth. VHF CP antennas were also on display. [574]

The BCS data system once again attracted lots of broadcasters to the Kaman Sciences exhibit. The flexibility of the system appears to have been the feature that was most important to the broadcasters who visited the booth. [575]

The Omega line of audio consoles made a hit at the LPB Inc. booth. The company's line of turntables, preamps, limiters, and distribution amplifiers was also on display.

Strong in studio furniture and studio systems, LPB's audio console hit is a new "Producer" series. But also new at the booth was a 10-watt educational FM transmitter and a turntable preamp. LPB was already offering educational FM equipment as well as an AM carrier current rig. [576]

O'Connor Engineering featured their model 150 fluid head TV camera pedestal. The company reports that the well-received model 30 is now in full production. O'Connor also supplies conventional tripods, a hydraulic tripod, fluid pan and tilt camera heads, and a fluid zoom control. [577]

An impressive bin-loop high-speed duplicator system stole the spotlight at the Otari exhibit. The high reliability of the Otari duplication system was an important selling point for the system. Visitors had a chance to view first-hand the professional and broadcast line of recorders, including the MX5050-FL, 2SL, 2SH, DP4050, DP1010, and the MK II. [578]

Pacific Recorders showed their new BMX12 high-quality audio console for the first time. The BMX12 boasts superb performance for a console in the \$10,000 price range and actually exceeds the capability of many consoles selling for twice the price.

If you missed this booth, you also missed seeing the PT-1 digital production timer. You can add their PT-1C circular display slave and have a complete production timing system. [579]

Rohde & Schwarz displayed many of the products in their Barco line of TV monitoring equipment. Among the most interesting were the CM33 monitor for ENG application and the EFK-2 TV monitor.

New at the Rohde & Schwarz booth were a color TV bridge

continued on page 110

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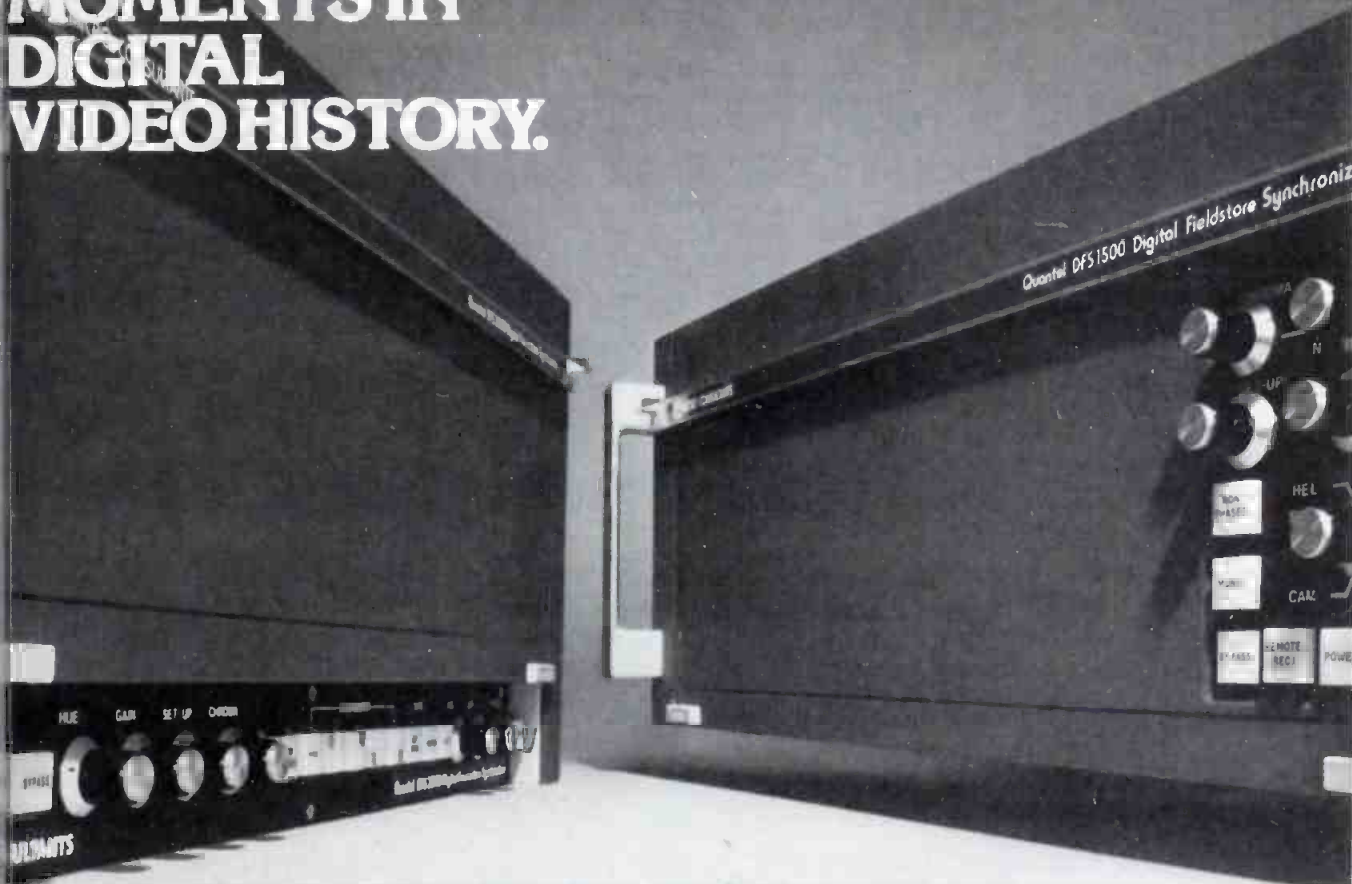
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But if you need less, the new DFS 1500 gives you basic fieldstore synchronization and truly outstanding time base correction. It's ideal for broadcasters who don't need all the power of the 3100, as well as those who have a need to use it in addition to a 3100.

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So whether you need more synchronizer—or less synchronizer—get in touch with Micro Consultants, Inc., P.O. Box 10057, Palo Alto, California 94303, (415) 321-0832.

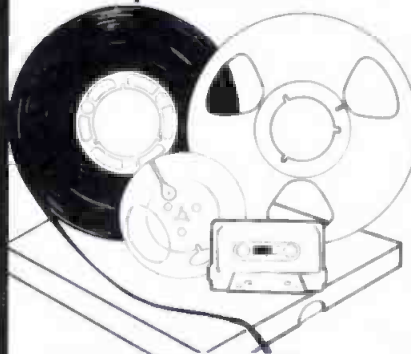


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## Convenience features

*continued from page 108*

monitor, precision TV demodulators, and a remotely controllable AM/FM tuner amplifier. [580]

The new model 250 and model 255 broadcast tape decks which feature built-in 25 Hz sensors were a hit at the **Scully Recording** exhibit. These high-performance decks will be in the \$12,000 price range and should be available in about 60 days. [581]

**Sintronic** showed their new SI-10-E high-performance FM excitor along with the SI-F-3 3 kW FM transmitter. The company's new SI-A-1S 1 kW AM transmitter also was on display. [582]

**Sound Technology** demonstrated the new 1410A portable audio generator which, when compared with their 1710A audio test set, offers the broadcaster a complete high-resolution audio testing capability. A 1200A stereo test panel was also demonstrated. [648]

The ESP-1 4,000-event automation programmer attracted most of the attention at **Sono-Mag's** exhibit. This microprocessor control system features under-programming protection for reduced on-air error rates. [583]

**Studer/Revox** demonstrated their new B77 deck for broadcast auto-

mation systems, which now features better headroom. The Studor A800 24-track system was also on hand for interested audio engineers. [584]

A demonstration of the excellent audio performance of the Generation 4 FM system attracted lots of attention at the **Rockwell** exhibit. An operation satellite earth station also dazzled the throngs of broadcasters who visited the Rockwell extravaganza. [585]

**Technics** showed their new model RS1520 professional recorder. This unit features quartz-locked isolator loop tape handling which captured the attention of many broadcasters. [586]

The new R2000 console for radio broadcast was demonstrated by **Ward-Beck Systems**. The company's 2042 standard series of TV consoles was also on display and, as always, the company's reputation for a quality product attracted many console shoppers.

Their latest attraction is a line of modular AM stereo consoles that allows you to start with a minimal system and add to it as demands pile up and money becomes available. Ward-Beck also attracted TV engineers with their video consoles, monitor amplifiers, and a portable extended range VU meter. [587] □

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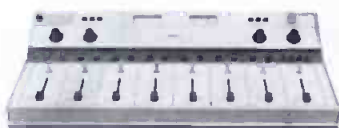
**MX-5**  
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**B-1000** For demanding studio broadcast and production applications. Newest design on the market—Vertical or rotary attenuators—5 or 8 channels—Mono or stereo—Cassette input jack (8 ch. models)—Gold plated PCB contacts—Tantalum capacitors—State-of-the-art ICs—15 watt monitor amplifier

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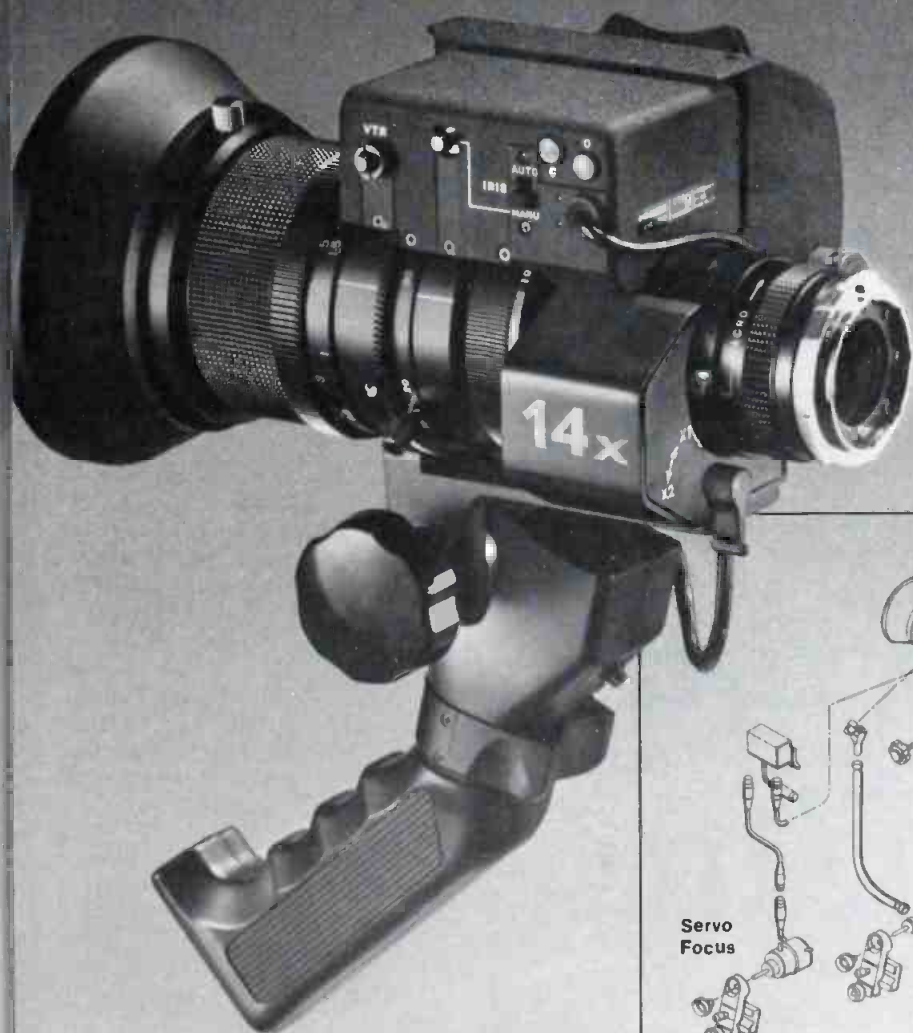
**MX-5** For high quality sound reinforcement and low budget broadcast applications. One program and four mic channels—Two mic channels convertible to RIAA magnetic phono—built-in tone generator—AC or external battery operation

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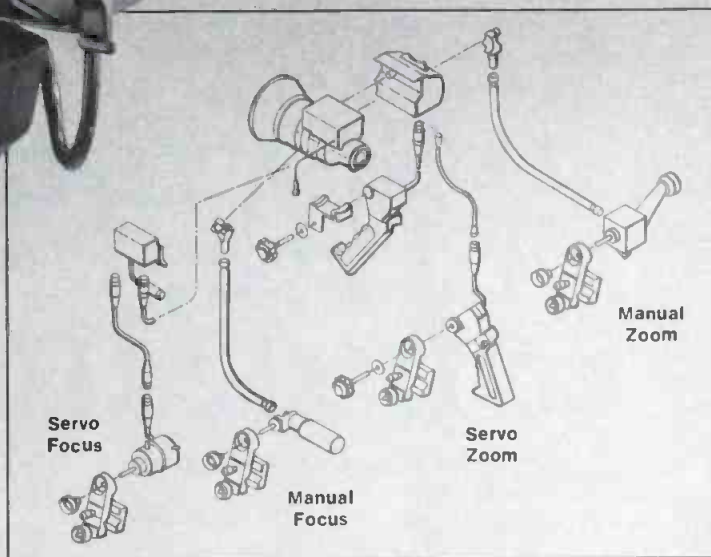
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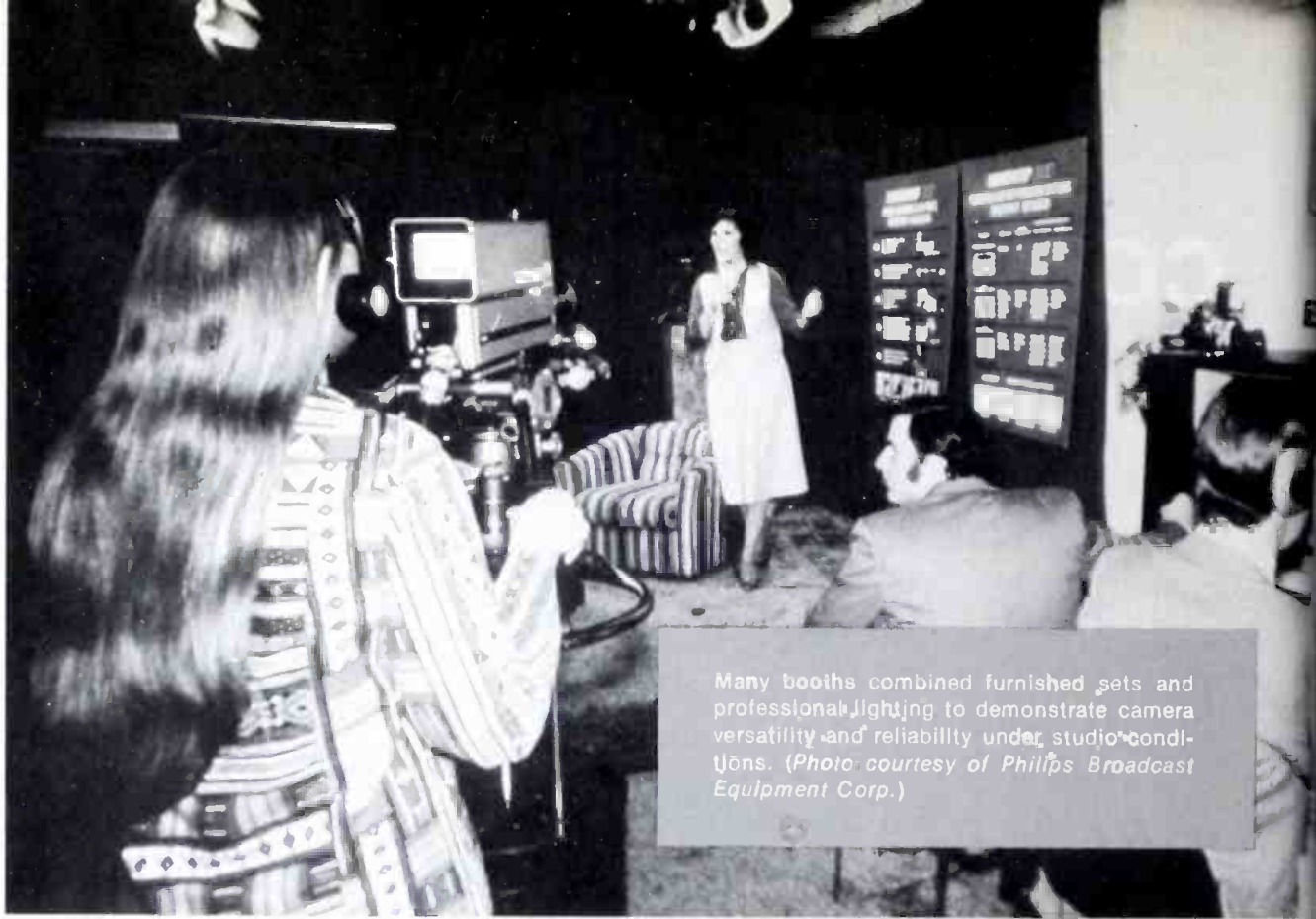
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Many booths combined furnished sets and professional lighting to demonstrate camera versatility and reliability under studio conditions. (Photo courtesy of Philips Broadcast Equipment Corp.)

# NAB '78: So much to see, so little time

By Michael Scheibach

A first trip to Las Vegas (or is it Lost Wages?) makes you wonder about the energy crunch and where all that money goes when the dealer pushes another \$20 bill down the slot. It's a chance to see top entertainment and be amazed by the endless parade of beautiful show girls.

But the real show, and the purpose of the trip to Las Vegas (right?), was the convention. Housed under one roof with ample refreshment areas and restrooms (for 22,000 people), this year's convention was a big success. Attendees were happy with the location (and less wear-and-tear on the shoes);

and, overall, manufacturers reported good traffic and high order volume.

There were some problems, however; but they were few. Among those with complaints, many agreed with Carole Dean, president of Studio Film & Tape, who said, "The layout of the convention was very unfair. As we were in (booth) 1212, we lost sales because of traffic patterns. Large booths should have been scattered throughout the hall to create more traffic patterns for the small displays."

With more than 250 exhibitors, problems such as these are inevita-

ble, or so it seems. And, although this criticism must be reckoned with before plans are made for next year, the 1978 convention was, indeed, a success—and vast improvement over past shows in Chicago and Washington.

For those who missed compressing two-weeks viewing into a four-day encounter, this roundup is for you. It's also a second chance for those who want to take another, and more leisurely, look at the exhibits.

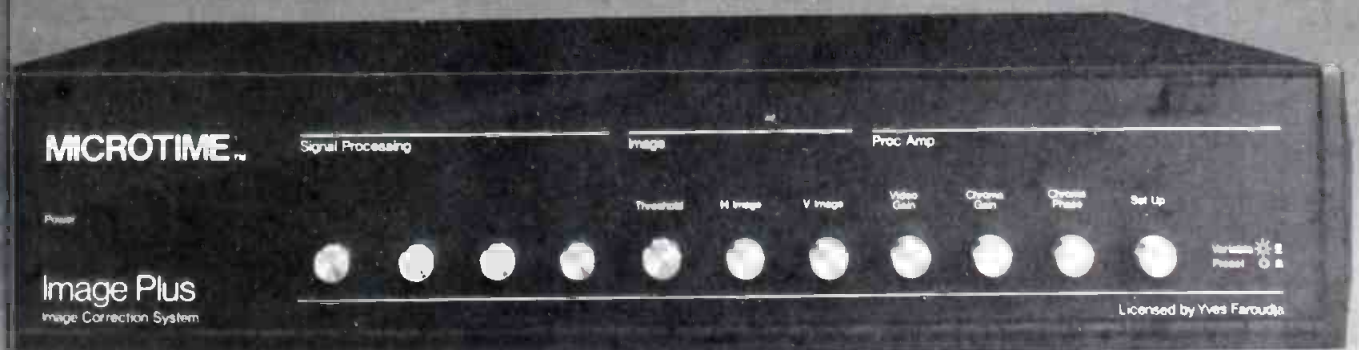
As you read through the exhibitors, keep our reader reply card handy. For more information from any company discussed here, merely circle the appropriate number on the card and drop it in the mail. Now, for a closer look at the 1978 NAB....

**VIF International's** new model S6/2 production mixer received many favorable comments at the convention. The S6/2 offers the advantage of auto-start and auto-fade capabilities plus linear faders. The unit is equipped with four stereo input channels (two phono and two line), two mono microphone channels, stereo main out, stereo headphone monitors, and remote switches for complete control over auxiliary equipment. [374]

The **Orange County Electronics**  
*continued on page 114*



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## MICROTIME

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## So much to see

continued from page 112

Corp. Ltd. of Canada came to the NAB with a host of audio products, including a stereo FM audio processor and AM audio processor with equalizer. One of the new products of interest was Orange County's model VS-1P pre-emphasizer with parametric equalization, which costs about \$2,300. [375]

Inovonic's model 500 acoustic analyzer, new at the NAB, has multiple uses, ranging from noise surveys to music analysis. Its 13 x 31 LEC matrix displays both real-time and reverberation decay plots; the rear-panel connector provides

an external scope output and trigger; and analyzer sensitivity is manually programmable up and down. Inovonics also featured their multiband audio processor, audio level optimizer, peak limiter, noise suppressor, and replacement tape recorder electronics. [376]

Eddcor's main attraction was the Calrec sound field microphone (model CM4050), designed primarily for the Ambisonics Surround Sound System. According to Larry Weston, Eddcor president, a few of the CM4050's many features are a separate sound field signal control

unit which provides controls and circuitry to allow any first-order mike characteristics to be synthesized; the ability for these controls to be exercised either live or in post-session processing of the B-format tape; remote-control gain adjustment of the mike sensitivity at the mike equalization unit; and further connectors to allow for a four-track recorder (or two-track for stereo/mono) with facilities for simultaneous replay and tape check. [377]

Broadcasters looking for custom designed audio consoles were able to get a good idea of what is available at the Helios Electronics Ltd booth. Helios, headquartered in England, featured their newest "Nordic" console with 10 to 40 inputs using the same module family. They also build custom recording consoles in 24-track configurations and others. [378]

Convention attendees got their first public look at the Discriminate Audio Processor II by Track Audio. This multiband processor has variable gain, compression, attack time, release time, output and crossover points; and was designed without a peak limiter. [379]

The new product at the MICMD Audio Products booth was their Dynaflanger, an audio effects unit which provides improvements in the comb filter effect known as flanging. The unit dynamically controls its effects in response to the program material. Dynamic flanging is possible in three basic modes, with the dynamic tracking reversal capability expanding this to a total of six distinct effects. The Dynaflanger can be used for standard or non-dynamic type flanging; flange phasing/depth is fully variable in all operating modes. [380]

The complete line of sync recorders was displayed by Nagra Magnetic Recorders: 4.2L standard sync recorder for cinema, television and radio; Mini SNN recorder for high-quality recordings; single track, synchronous, lightweight IS-L recorder; and IV-S professional stereophonic tape recorder for very high-quality musical recordings. [381]

Lutz Meyer, vice president of marketing at MCI Inc., said company sales were up 20%, with much of the attention going to their JH-110A tape recorders/reproducers and JH-500 mixing consoles. Introduced was

continued on page 116

## Good times continue in broadcasting industry

"Increased sales in '78" was the overwhelming response among exhibitors surveyed by **Broadcast Engineering** at this year's NAB—a clear indication of the continued "good times" being experienced by the broadcasting industry during the past few years.

Exhibitors were asked the question, "How do your 1978 equipment orders compare with last year?" With more than half of those surveyed responding, 83% said sales were definitely up over 1977.

Of those companies showing an increase, this is how they ranked their sales over 1977:

% of increase	companies responding
0-30	68%
31-60	13%
61-100	13%
above 100	6%

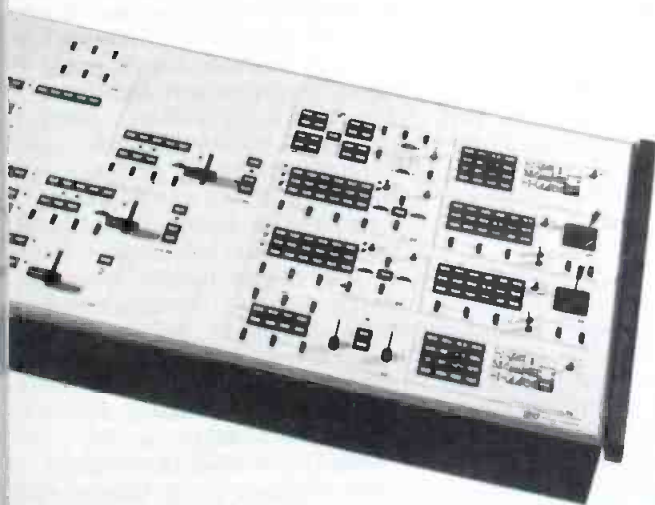
The most optimistic company at the convention was Tayburn Electronics, which reported sales up 1,000% over 1977. Other companies showing increases of up to 300% were Vital Industries, Channelmatic, Automated Processes, A. F. Associates, and Mach One Digital Systems.

Companies reporting sales about the same as last year totaled 16% of those questioned, with just 1% (two companies) reporting decreased sales.





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## So much to see

continued from page 114

a 1-inch 8-track recorder, selling for about \$8,800. [382]

**HM Electronics** reported a lot of interest in their new triple diversity antenna system (AD-10). The system can be used to eliminate or minimize dropouts in RF mike applications. Among the AD-10's features mentioned by HME's Dale Scott are the use of three antennas to increase reception capabilities and the use of one receiver rather than two, which cuts costs. [383]

**Gotham Audio** exhibited the NTP video-displayed audio level indicator, designed to project both the scale and moving pointer of a program meter electronically onto the monitor. The video line to the monitor passes through the small, self-powered box, while the audio signal fed to the box is transformed into a butterfly-shaped black/white pointer moving on black/white scale marks generated in the NTP device. [384]

New on-air production audio consoles by **Automated Processes** received favorable reaction from many broadcasters. The company also unveiled a new microcomputer-based intercom system and new equalizers. [385]

Digital stereo STLs, a portable audio mixer, and a solid-state VHF transmitter were featured by **Bayly Engineering Ltd.**, a member of the AEG-Telefunken Group. Bayly's PC-79 15 kHz stereo digital STL, which costs \$5,500, has a September delivery date; the model 700 15 kHz stereo analog STL is available in August and costs \$6,000. [386]

**California Switch & Signal** had a wide range of products at this year's convention, including a pre-wired jack panel, cable tester, PC-mount audio connector, colored audio cable, and heat shrink ID collars for cable. [387]

A new broadcast cartridge, the Audiopak AA-3, was introduced by **Capitol Magnetic Products**, a division of Capitol Records Inc. The AA-3 has been designed to meet or exceed the dimensional and performance requirements as specified in the most recent revision of the NAB cartridge standard (1977). [388]

**Alan Gordon Enterprises** exhibited several new products, including the CSS-1 crystal sync recorder, Nu-Age mixer, Mark-9 dual-antenna diversity system, and Zeppelin wind screen and IS-shock mount. The CSS-1 is a lightweight, professional crystal sync cassette recorder for both

studio and location work. The Nu-Age mixer is designed for ENG and film work. [389]

New at the **Television Equipment Associates** booth was the Chyror 3/4-inch magnetic tape cleaner, evaluator, and a sportscaster head set. The company also carried the Matthey line of products, including video delay, pulse delays, video filters, chroma corrector, auto video equalizer, and line selector. Various headsets, headphones, and intercom systems were also exhibited. [390]

A new solid-state 1 kW transmitter was introduced by **Townsend Associates Inc.** of Westfield, Massachusetts. And, according to George Townsend, president, this transmitter obsolesces all other transmitters of similar power rating. The transmitter can be used as a driver to replace aging tube-type drivers in present transmitters; features include IF modulation, low maintenance, modular solid-state amplifiers, and no tuning. Townsend Associates also has a new and complete line of UHF transmitters using vapor-cooled klystrons and circuitry. [391]

**Broadcast Video Systems Ltd.** reported excellent interest in their television safe-area generator. Ben Verwey, president, said that this is a stand-alone unit which generates safe action, safe title borders plus a center cross, and keys these patterns into preview video. [392]

The **Camera Mart** booth included an array of cameras and camera related equipment. Among new products at the booth were the Anton Bauer silver batteries, the Ikegami HL-51 camera, and the Microtime 1600 TVC. The Camera Mart also featured custom camera consoles and switchers. [393]

The CATS (Computer Assisted Traffic System) drew good interest at the **Centro** booth. The CATS traffic log system self-computes changes, retimes, and flags possible timing errors. The system will automatically report machine availability and perform automatic assignment of machines. [394]

**Spectra-Vision** introduced the latest addition to its line of video tape editor-programmers: the EJ-104 Backspacer. The EJ-104 has full function VTR remote control at the backspacer; a three-channel audio mixer with tone on the front panel edit preview; edit review; and burst-record mode. The system, which gives frame-accurate video edits with most VTRs, is designed



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for quickly assembling breaking news stories with a minimum of operator training, and no complex data entry techniques. [395]

**Hallikainen & Friends** exhibited their program logging system, which consists of a LOG121 and a LOG122 decoder. Frank Calabresse, sales manager, said the logger works with any automation system. Also displayed was a television audio system (TVA series) intended for television applications. The TVA series features audio-follow-video connections as well as manual control; no customer-modification is needed. [396]

Edward Dempsey, international sales manager for **Cohu**, called his company's new model 7410 color television camera "the lowest light level color camera in the world," which resulted in a great deal of interest at the Cohu booth. [397]

The most innovative product at the **Computer Magnetics** booth was their Velocity Error Corrector, the VEC-1200 and 2000. Designed to maximize performance on quadruplex VTRs, this velocity error corrector extends useful quad head life, and improves interchange playback signal of standard and non-standard recordings, according to the company. [398]

A new time code reader/generator/character generator (model SP-722) was introduced by **Datametrics**. Among the other products on display at this booth was the SP-425 time comparator, which calculates, displays and outputs the relationship between a BCD-formatted time input and a selected time interval. [399]

Video switching systems were on display at the **Beaveronics** booth. Beaveronics introduced the J&D model 712 and their models 154 and 156. Also shown were clock systems, standby generators, and video hum stop coils. [400]

**Innovative Television Equipment** also introduced a compact, light-weight studio pedestal designed for ENG-type cameras. The ITE-P6 uses torque spring assemblies with lead trimming weights to provide counter-balance for cameras weighing up to 90 pounds. [401]

After announcing just prior to the NAB that its new Omni-Light was available for delivery, **Lowel-Light** brought the new light system to the show, with good results. The compact Omni-Light is a focusing spot-light with a broad spot-to-flood focusing range, and an extensive

system of front-end accessories for more flexibility. [402]

**Edutron's** new ccd-1h time base corrector, listed at under \$3,000, received good response at the show, according to Virgil Lowe, president. The time base corrector accepts NTSC standard 525-line 60 Hz signal or nonstandard industrial sync with horizontal rates of 15,735 Hz  $\pm$ 1%. However, Lowe said PAL and PAL M units are available. [403]

**Cine 60** exhibited a wide range of sun-guns, sun-gun powerbelts and powerpaks, and kits for assorted cameras: Sony, Philips, Ikegami, Hitachi, Sharp, JVC, and CEI. [404]

**Chroma III**, a component color signal system, was introduced by **Eigen Video**. According to Eigen president, Jim Hebb, the new system is designed for the company's slow-motion disc recorders. Three models are available: 20-second NTSC slow-motion model with "J" control; 10-second version; and PAL/SECAM version. All models have Chroma III signal systems as well as digital time base correction, making them fully broadcastable.

All Chroma III versions include the "J" control, with fast cueing and slide capability. The "J" control allows both slo-mo and slide-show operation. The 12-sector fast-cue (2-4 second access time) allows saving a replay while recording subsequent action.

The NTSC version is available now. The 50-cycle version, which will be field-switchable between PAL and SECAM, will be available in October. [405]

Engineers were able to talk with representatives at the **Fred A. Nudd Corporation** booth about custom fabrication of communication towers, all designed to EIA specifications. Services provided by the firm include regular inspections, relamping, repairs, new equipment installation, ground systems installations, and 24-hour emergency service. Attendees were also able to receive consultation on new towers and tower modification. [406]

The hottest product at **International Microwave's** booth was their EJ1013 portable microwave transceiver. Response was very favorable, according to George Knickerbocker, applications engineer, who reported company sales up a booming 50% over the same period last year. International Microwave also displayed the ICM1013 FM microwave transceiver,

*continued on page 118*

a tunnel diode amplifier, and other components. [407]

**Colorado Video** exhibited their newest generation of compressed video systems, with Glen Southworth, sales manager, reporting the product getting the most attention being their slow-scan television. Other products displayed included the 275 Video Expander, with solid-state memory and resolution to 256 x 512 pixels; the 262 Video Compressor, designed for transmitting video signals at 8 kHz bandwidth over FM subcarrier channels, microwave, or satellite; and the MS-200 freeze frame, which records and plays back a single frame of video, uses 4-inch magnetic disc memory, holds pictures indefinitely, and sells for \$2,000. [408]

A five-font character set of high resolution was the new item at the **Knox Ltd.** booth. The model MF246 can be delivered within 45 days, and costs about \$1,200. In addition to the MF246, Knox displayed the K600 character generator (an ENG feasibility model); the K50 low-cost titler; and the K128 character generator with disc memory. [409]

**Athena** billed their projectors as rivals to the RCA-TP-66 and the EK CT-500. Among the features of the Athena 4000 and 5000 projectors are freeze-frame, instant stop/start, animation, and slo-mo—all directed from film to tape by TV film chain; digital control using CMOS circuitry; and modular digital design. [410]

The new 5100 series of diplexers/uniplexers was the main attraction at the **Laird Telemedia** booth. The 5100 series allows two separate film images to be selectively projected for televising by a single camera. The two-input projector complement may include either 16mm or Super-8 motion picture film in combination with 35mm 2-inch by 2-inch slides. [411]

The Vinten Kestrel camera crane, featured in the **Listec** booth, is designed for two-man operation and can be used as a portable unit with its optional hard wheels and cable guards. The crane can be folded small enough to fit into small vans, although its approximate maximum lens height is 8½ feet. [412]

The **Mole-Richardson Company**, based in Hollywood, California, brought several new items to the convention, including a 4,000-watt Mole solar-arc solarspot; 2,000-watt molite kit; Mole power battery pack; and Mole quik-charger. [413]

At the **Merlin** booth, two new disc recorders were unveiled: the BDR-400 slow motion disc recorder and BDR-300 slide file disc recorder. The BDR-400 has full 30-second program storage capacity, with optional dual-channel operation, digital field counter, and electronic display of elapsed time with two cue markers. The BDR-300, with a 1200-frame slide storage capacity, features a digital frame counter, frame playback, and preset-reset address control. [414]

According to Marjorie Romans, sales director, the greatest interest at this year's **Olesen** booth was on the HMI spotlight and the memory system light control. Olesen dis-

video record drive switcher, high-band color duplicating system, digital tape timer, and audio monitor. [418]

The **Videotek** booth displayed professional color and ENG closed-circuit monitors. Philip Steyaert, president, said business was up 30% over last year, with the most interest centering on Videotek's ENG equipment. [419]

**Television Engineering Corporation** and **Wolf Coach Inc.** shared a booth near the front of the convention hall, which resulted in a steady traffic flow past their fully-equipped remote field production unit. With more stations looking at EFP applications, several broadcasters found this one to be an excellent choice. [420]

**MPB Technologies** reported a good response to their new Vista 80 character generator, graphics and animation system. In addition to the price (basic system is under \$40,000), the aspects of greatest interest were the range of character styles, the ability to overlay outputs of the two channels in the "on-air" display, and the smooth animation. [421]

Videoprompter systems were the main attraction at the **Q-TV** booth, with George Andros, vice president, reporting business up from last year. The Q-TV systems scan the copy by use of a vidicon camera; the copy then is transmitted to one or more prompter/monitor readouts mounted on or off camera. Two systems (VPS-100 and VPS-300) were displayed. [422]

The **Spectra Vision** booth featured their JBT-104-BA editor programmer with backspacer editing, time code, random access, and decision storage. Also introduced was the EJ-104 editor programmer and RAM-CTL random access for videotape. Other products getting attention were the JBT-103-3/4 editor programmer and the search MOD-1 control unit for VTRs. [423]

C. E. Johnson, president of **Winsted Corporation**, said the hottest products in his booth were the super-density storage systems for 3/4 U-matic, quad, RCA, and Ampex cartridges and film. The unique features of these systems, according to Johnson, are their increased storage capacity, easy accessibility, steel construction, and "Pik-Quik" removal system. [424]

New at the **Unimedia** booth was a complete line of high-resolution, in-

continued on page 120

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## Video spotlight swings from slow-scan TV to videoprompters

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played a wide array of products, ranging from a disco dance floor to a sound organ with light effects. [415]

**Optek's** new 7400C automatic bulk tape degausser, designed to degauss multiple formats, was said to be deliverable within 60 days at a price of \$2,700. John Baumann, Optek president, said the 7400C can completely degauss standard ferrous oxide or digital tapes in a matter of seconds to levels exceeding -90 dB. Reel sizes up to 16 inches in diameter and tape widths up to 2 inches can be accommodated. [416]

**Mach One Digital Systems Inc.** featured their Mach One videotape editor which is built to the buyer's specifications. Features include storage of over 400 edits; multiple record capability; ability to mix drop and non-drop tapes; interface with any format; and decision storage. [417]

The ME-88 high-band color quadruplex VTR was the featured attraction at the **Merlin Engineering** booth. The ME-88 is available as either a complete quad VTR ready for service, or as a kit to upgrade existing Ampex VR-1100 or other older machines. Merlin also showed a new monitoring system for VTRs,



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## So much to see

continued from page 118

line CRT color monitors using the Diatron SSS system. This system uses a slotted mask, self-converging, in-line gun, internal magnetic shielded, striped-screen CRT. Some features of these monitors are chroma masking, external sync, adjustable scan size, and split-field color/luminance display. [425]

Varian Associates' William Galarneau reported sales this year up 30%, with the most attention being paid to Varian's UHF TV Klystrons and the new X-2203 Tetrode. [426]

The most popular item at the Video Tape Company booth was their line of quadruplex VTC-1000 videotape. The top of the line, VTC-1000 mastering tape, is available for \$160 per hour. Other tapes include VTC-1000-D duplicator videotape, VTC-1000-D bulk videotape, and VTC-1000-D pre-cut spot reels. All tape was said to be available in stock. [427]

Videographix, a relatively new company to the broadcast industry, introduced a pre-designed, fully packaged set of 150 news, weather and sports graphics. The package is being offered for chroma-key projection in center, left or right position, and can be adapted easily to full screen projection. [428]

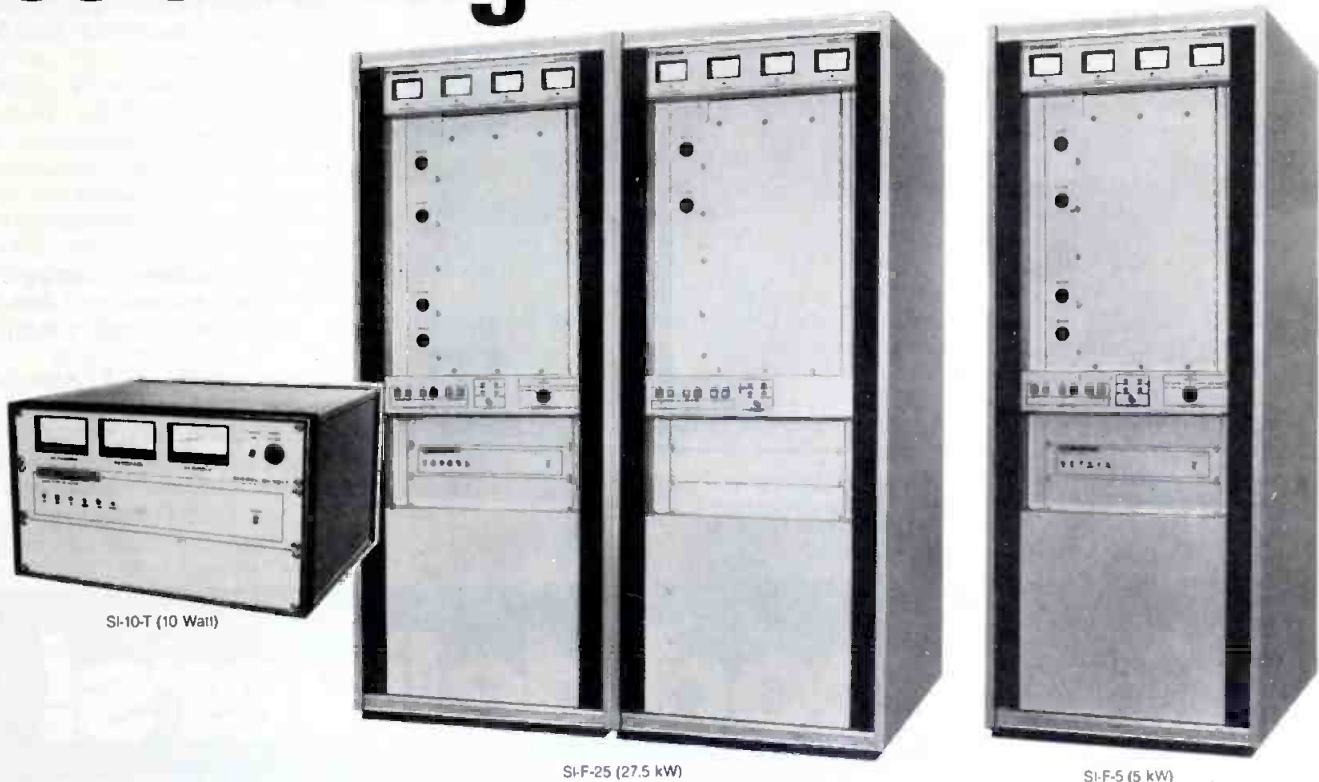
Studio Film & Tape had several products on display, but gaining the most attention were their dropout monitors. The DOM III monitor, for use with 1-inch or 2-inch VTRs, can generate three kinds of alarms: signalling instantaneous increase in dropouts; signalling when maximum dropout total is exceeded; and signalling when there is a loss of servo locks. Other monitors in the series are the DOM II, designed for ¾-inch videocassette recorders, and DOM I, for non-broadcast use on ¾-inch or ½-inch VCRs. [429]

With an increasing emphasis being placed on EFP applications, there is a need for equipment and accessories oriented toward this use. Telecommunications Industries Ltd. was one company at this year's NAB introducing such an accessory: the Porta-Pattern EFP three-chart system. This system accepts any combination of three charts presently available in the Porta-Pattern catalog. It consists of three plastic frames hinged end-to-end with a unique system which allows the plastic frames to be folded upon themselves; this allows surface protection for all three charts. [430]

continued on page 122



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Sintronic has been making FM and AM transmitters for more than 15 years. They are now operating in more than 34 countries, some in remote locations under severe environmental conditions.

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**Sintronic** CORPORATION

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## So much to see

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To meet the needs of ENG-type cameras, **Television Products Company** introduced their modified P-20 TV camera pedestal. This light-weight model provides 20 inches of height range (from 30-5/8 to 50-5/8 inches). Also displayed was their P-50 pedestal, which provides 36 inches of height range (from 21 inches to 57 inches). The pedestals feature a telescoping support column system, six 8-inch wheels for better support, and a Schrader valve system for adjusting the counterbalance force. [431]

Hands-on operation of several cameras conveniently focused on an attractive model resulted in a continuous crowd around the **Sharp Electronics** booth. The hit of their show, however, was the fine array of cameras. Although their XC500 and XC520 color cameras received the most attention, there also was much interest in Sharp's new XC-300U three-tube modular CCTV color television camera. The XC-300U is designed in four detachable sections: C-lens mount, camera

head, camera control unit, and 4.5-inch viewfinder. By varying the modular sections, this camera can be used in an assortment of ways, including both as a self-contained camera and an EFP camera. [432]

**Ross Video's** new 500 MLE (multi level effects) switchers were the main attraction at this booth. The MLE amplifier manipulates four signal sources, including RGB and encoded chroma keys; and, it has its own downstream keyer. Another key feature is a transition preview system which permits previewing complicated transitions with the same MLE amplifier that is on-air. [433]

**QSI Systems** introduced the Video Field and Frame Counter (VFF-6030), and according to Alfred Smilgis, QSI president, it became the item of greatest interest at their booth.

The VFF-6030 provides electronic identification of television-formatted display information by tagging each field or frame with a different numerical index. These indexes, in the form of video characters, can be

located in any active or inactive area of the television video display. The numbers change each time a new field or frame is developed during video generation, similar to numbering pages in a book.

Features of the counter include automatic internal or optional random external count; start and stop count; reset count to zero; six-digit display that counts 4.5 hours of fields; and optional preset and down count.

Also introduced was a Video Source Identifier (VSID), a type of electronic tagger designed to provide electronic identification to video sources all within a small p.c. card.

Among the other products shown were a video back timer; 24-hour audio/video logger; master clock system; test monitoring switcher; and video distribution amplifier. [434]

Reports from the **A. F. Associates** booth indicated a great deal of interest in their fully rebuilt VTRs and gated video systems. AFA completely rebuilds 2-inch VTRs and Slo

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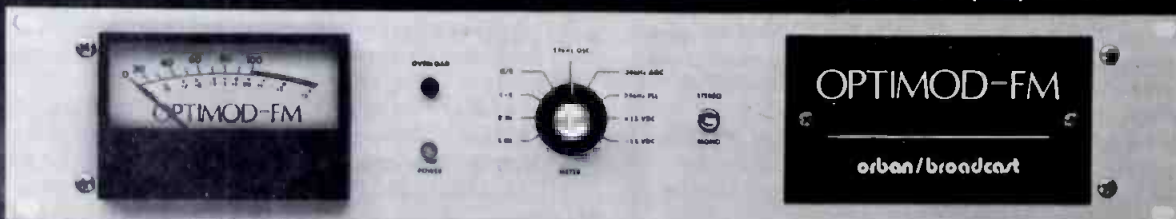
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o's, and can install optional accessories and special circuitry to solve specific operational problems. Also on display was the AF Gated Video Circuit, which now is being installed on the RCA TR-70 and TR-60 as well as the Ampex VR-1200 and VR-2000. [435]

The Re:DB Company brought their latest breakthrough to the convention: internally shielded audio heads for RCA VTRs priced for just \$295. In addition to the reasonable price, Re:DB says these heads fit all RCA VTRs both mechanically and electrically—no equipment readjustment necessary. To back up their claim, the company provides a full 2,000-hour unconditional warranty. [436]

Mike Dyer of Video Associates Labs reported that their DC drum servo and field framer modification kits for the Sony VO-2850A were getting a great deal of attention at his booth. Video Associates also displayed their de-pop kit for the Ampex AVR-2, which Dyer said eliminates the in-going thumps and out-going clicks often encountered during audio edits. [437]

A logic analyzer designed as an accessory for the Ampex ACR-25 cartridge VTR was introduced by Glentronix. The analyzer, model PB-1000, displays diagnostic data on 6 individual LEDs, one at each test point. The PB-1000 monitors all direct test mode inputs, all emergency stop inputs, all motion micro switches, and micro switch transition times. Other products gaining attention at the Glentronix booth were their time code center, routing switcher, and clocks and drivers. [438]

**Torpey Controls & Engineering Ltd.** of Canada featured their CLK-2 Master Clock, which was billed as an inexpensive clock drive system suited for television control centers, production houses, and mobile units. The CLK-2 uses NTSC sub-carrier frequency. [439]

Another Canadian firm, **Telcom Research** of Ontario, displayed a SMPTE time code generator (model 8900) and a SMPTE time code reader/character generator (model 8910). [440]

A new large-image optical multiplexer that can accept up to three film inputs was unveiled by **Zeimark**, a Connecticut-based company specializing in both CCTV and broadcast optical multiplexers. The model 750 optical multiplexer can work with either broadcast TV  
*continued on page 124*

cameras which include an integral field lens, or (when equipped with a field lens) TV cameras using an objective "taking" lens. [441]

Industrial Sciences Inc. (ISI) introduced a fifth-generation AFV routing switcher utilizing COS/MOS logic. The new switcher, model 982, features vertical interval switching; 10 inputs with two video and two audio outputs per bus; and expandable modular construction. Only 1 3/4 inches of standard 19-inch rack space are required with this self-contained unit. According to ISI, the low power requirements of this switcher result in an inexpensive power supply system. The vertical interval switching pulses are derived from either house sync or video. [442]

New at the Comrex booth was the LX system, an encode/decode system extending the low frequency response of dial telephone, microwave, satellite, and cable circuits. The system, which Comrex says provides significant reduction in low frequency noises encountered on common carrier circuits, can be

used in several broadcast applications, including special programming, STL backups, and news.

Comrex also showed a RENG repeater system and a complete van package (audio, cueing and control tools for the TV ENG van). Each piece of the van package is designed specifically for broadcast field operation. [443]

A completely self-contained color camera which can be used for remote or on-site locations as well as in the studio was the highlight of the Toshiba booth. The new camera, the PK-39, comes in two configurations: a self-contained color camera (backpack-less camera) and a handheld camera with separate CCU. This versatile camera also can be used in the studio with a large screen viewfinder which can be mounted on the side of the camera head.

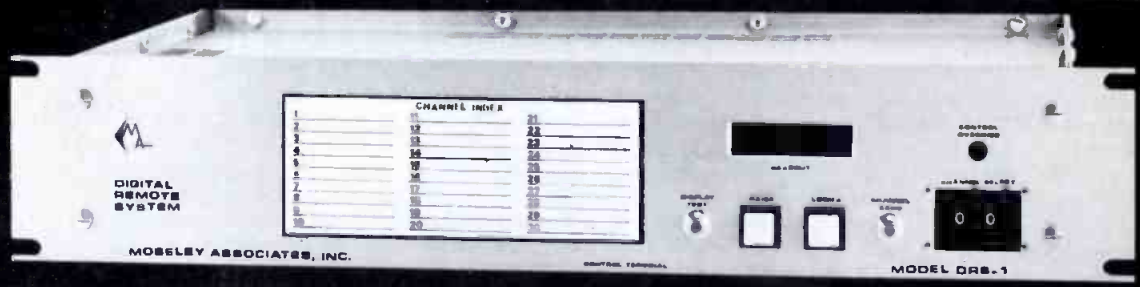
In addition to the PK-39, Toshiba had their complete camera line on display. For both field and studio applications, Toshiba has the PK-36 and SK-36; with the optional lens adapter, a wide range of lenses can

be used with these models. The PK-36A, a lightweight model with a 10X zoom lens and viewfinder, is designed for ENG applications. A studio model, the PK-31A, is a computerized automatic color camera featuring a built-in micro-computer for quick setups. [444]

The featured product by the Widget Works was their Automatic Transmitter Operator™, a complete ATS system for the FM or non-directional AM broadcaster. This new unit is also available as a single system to handle AM-FM combinations. It features optional auxiliary transmitter capability; microprocessor-based calibration; easy operation of monitor and alarm unit; and tower light provisions. C. Fred Mullins, director of engineering, also said the Widget Works promises to have a directional ATS ready when the FCC finally approves such a system. [445]

Anixter-Mark added a satellite ground antenna to their already wide line of point-to-point antennas, including microwave, two-way, amateur, and CB. Their microwave

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Killion introduced two products at the convention: Microlock II automatic satellite receiver control system, and the CMC-201A 7-day real-time microprocessor controller. [450]

Constantine N. Polites and Company had scaffolding couplers for lighting grids and antenna construction—their only product line. [451]

David Lint Associates, a West Coast manufacturers' representative, sold two Scully machines off the floor on the second day of the convention, and reported an excellent response overall. They carry a host of products, ranging from tape equalizers, limiters, and professional recorders, to bulk erasers and mixing boards. [452]

One of the few companies reporting lower sales at this year's convention was Dielectric Communications—a result that can be attributed, in part, to the odd placement of the Dielectric booth. That was the opinion of Stan Thomas, sales manager, who complained that while Dielectric's booth number was 901A, it was actually in the 1000 aisle. Dielectric sells RF loads, switches, and wattmeters. [453]

An audio analyzer system that  
*continued on page 126*

antennas, backed by more than 20 years' experience, span the frequency range from 350 MHz to 13.5 GHz. [446]

For broadcasters interested in obtaining demographic services, the booth to attend was Jefferson Data Systems. This company offers broadcast demographic services available through the JDS minicomputer set up on-line at the station. Jefferson Data Systems was also offering an IBM software lease and a stand-alone general accounting system. [447]

A 15 kW calorimeter, directional wattmeter, and dry FM loads were among the products exhibited by Electro Impulse Labs. The directional wattmeter, introduced at the show, is available from stock for \$300-\$355, according to Mark Rubin, president. [448]

Radar data remoting system and radar for color television were featured by Enterprise Electronics. Ninety-day delivery can be expected for the radar data remoting systems; they're available for \$22,500-\$30,000. [449]

Sales in 1978 are up more than 300% over last year for Channelmatic. That was the word from Channelmatic president, Bill Killion.

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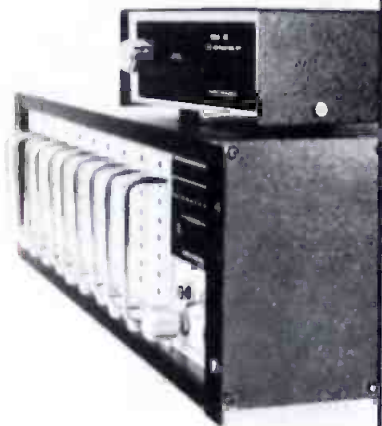
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## So much to see

continued from page 125

combines an SPL meter and spectrum analyzer in one instrument was the hit of the **Ivie Electronics** booth. The model IE-30A includes both a real time analyzer (full octave/ $\frac{1}{3}$  octave) and a precision sound level meter. Calibrated in both dB SPL and dBuV, the portable unit measures a wide variety of simple and complex signals. [454]

**Kings Electronics** displayed front-load patch panels, and a BNC plug with crimp/captive contact. Fred Pack, sales manager, said he was pleased with the show, pointing out that sales were up by about 10% over last year. [455]

**Lightning Elimination Associates** of Downey, Calif., introduced a triaxial, hi-power power line surge eliminator; high-frequency transient eliminators; and a newly designed dissipation (hemispherical) array. [456]

Most of the attention at the **Electro-Voice** booth was on their new CL42S condenser cardiline system; CO90 electret tie-clasp microphone; and CH15S hypercardioid condenser system. These new mikes are available from stock, according to Greg Silsby, sales manager. **Electro-Voice** exhibited their full line of professional mikes and accessories, as well as their Sentry V studio monitor. [457]

Although this year's convention found several exhibits of ENG/EFP vans, **ENG Mfg. Company** drew a lot of attention with their new ENG 4-door sedan, which fully equipped sells for about \$25,000 (not including the price of vehicle). Standard equipment on the minicam sedan includes a 20-foot (AGL) pneumatic mast with control; manual pan and tilt control for microwave antenna; 1.5 kW generator; power distribution panel; shore power input with automatic changeover; combined routing switcher; VHF TV receiving antenna; portable microwave cart; internal wiring; alarm system; cable reels; and sun roof. [458]

**Telescript** showed their monitor prompting systems, which feature a vidicon camera which can enlarge typed copy on a monitor as the copy moves along on a precision-crafted transport. One- and two-monitor systems are available. [459]

Several production houses and programming companies attended the '78 convention. The companies and services include:

- **Thomas Valentino Inc.**—production music library and sound effects library. [460]
- **TVAC (Television For All Chil-**

**dren)**—children's television shows. [461]

- **Communication Projects (COM-PRO)**—program syndication of "The Country Traveler" series. [462]

- **Broadcast Programming International**—syndicated music formats. [463]

- **The Money Machine**—production/sales of music libraries. [464]

- **Charles Michelson Inc.**—radio programs; new radio series entitled "Suspense." [465]

Three new products highlighted the **TSC Development Labs** booth: a time lapse recorder, the WRS-20 weather radar, and a radar remote converter. [466]

**Tiffen Mfg. Corp.** exhibited a line of filters, including star effect, multi-image, vari burst, color grad, center spot, vari-color, polarizer, fog, and diffusion filters. New at the show was a honeycomb multi-image filter. This was Tiffen's first time at the NAB convention. [467]

**Trompeter Electronics** introduced tip-ring-sleeve digital and coax video patching systems for use in controller-to-terminal interface circuits. Also new were an improved BNC connector and 4x6 circuit audio patching. Trompeter carries a complete line of coax, twinax, triax and quadraax connectors; patch panels; plugs; jacks; patch cords; cable assemblies; networks; and accessories. [468]

Test equipment was on display at the **Ultra Audio Pixtec**, and according to Oliver Berliner, president, business was booming at the show and in 1978 overall, with this year's sales up 65%. Included in the exhibit were vectorscopes, waveform monitors, and an audio remote amplifier. [469]

Computer business/accounting systems were also in evidence at the convention. **Paperwork Systems** showed their BAT 1750 and BAT 1700 billing, accounting and traffic systems; they introduced the Datapoint 6600 computer and automatic data capture from automation switchers. [470]

**Groton Computer** had their line of logging, reporting, and accounting systems, providing broadcasters with a terminal linked directly with a computer which can receive or send requested information. According to Groton, any part-time employee can run the system easily. [471]

**Digital Products** was not at last year's convention, but indications were that 1978 was a good year for them. Their number one item was



the TELSOL programmable telephone dialer, which they call "the robot operator." This system can automatically make up to 1000 calls a day without an operator, without supervision, and without a phone set. [472]

A standard approach to styling of cabinets and consoles was the sales pitch at the Amco Engineering booth. [473]

Anvil Cases, noted for its protective cases for the musical instrument industry, came to the NAB with a new line of cases for portable television products used in ENG/EFP productions. On display were cases for VTRs, TV cameras, monitors, mixers, lighting kits, editors, and associated test and monitoring equipment. [474]

Also exhibiting cases was Cases Inc. of Gardena, Calif. New to this line was a portable rack-mountable equipment case that can hold all 19-inch standard spacing rack-mountable equipment, from two to 44 spaces. The depth including lids is 22 inches, and is available deeper or narrower by special order. Cases Inc. has a complete line of other types of cases. [475]

Amber Electro Design Ltd. featured their model 4400 multipurpose audio test set. The 4400 generates several test signals, including sine, triangle, square, asymmetrically clipped sine, and asymmetrically clipped triangle. Of note is the unique digital memory which consists of two location pairs making a total of four possible positions. [476]

Although available previously, this was the first showing of RTS Systems' TW intercom system, the model 1400 in-line mike preamp, and the model 4420 IFB one-way interruptible feedback communications system. Doug Leighton, president, reported excellent response at the show, and said sales are up 30% in 1978. [477]

Storeel Corp. showed mobile U-matic cassette storage cabinets. New this year was a 3/4-inch cassette storage cabinet selling for \$175 to \$450. [478]

Bill Black of Tayburn Electronics said many broadcasters were interested in Tayburn's components for custom-designing the news department. According to Black, Tayburn handles the complete system, and can deliver it within 20 days from P.O. receipt; however, delivery may vary depending upon the system, Black said. Tayburn carries turnkey systems for ENG, such as

continued on page 128

# PERFECT TIMING

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## So much to see

*continued from page 127*

transmitters, receivers, modem controllers, pedestals, antennas, power amplifiers, and earth station simulators. [479]

**Beston Electronics** exhibited their inexpensive character generator for production and special applications, and featured their BEI-709 Automatic Light Control, which Donald MacClymont, vice president, said is designed for large and small image film chains. [480]

R. F. Richardson, president of **Duca-Richardson**, said business in 1978 is up 15% over last year, and business at the convention was right in pace. Key products at this booth: production and master control switchers. [481]

**Van Ladder's** new microwave dish carrier, costing \$6,000 and available for delivery in six weeks, drew continuous crowds. Also receiving notice at this booth were a self-propelled man lift and a van-mounted aerial ladder. [482]

An aluminum equipment carrier weighing just 17 pounds was featured by **Lee-Ray Industries** of Mesa, Arizona. Key features pointed out by Ray Russell, owner, are its completely-welded construction, convenient cable holders, padded shelves, and room for tapes and batteries. [483]

**General Electric** was represented by their lamp division, which exhibited a line of light sources for television and motion picture production. [484]

Also at the convention was **GTE Sylvania**, which showed a portable DC-powered ENG lighting system as well as stage lamps. [485]

**AEL Communications Corp.** introduced their 25 kW transmitter, the FM25KG. AEL transmitters are easy to spot, because they locate their control meters at waist height and near the transmitter tuning controls. [556]

**Richmond Hill Laboratories** displayed video accessory products, including test signal generators, downstream keyer, distribution amp, and pulse delay amp. Paul Lines, marketing department, said there was also interest in their production switchers. The company recently moved to 1080 Bellamy Road N., Scarborough, Ontario, Canada M1H 1H2; (416) 431-2953. [557]

**Yves Faroudja Inc.** showed two new signal processing products. The YFI Record Booster is a pre-processor in the record mode that overcomes playback deficiencies of color-under VTRs. The other new

product is the YFI comb-filter decoder. It accepts standard encoded signals and yields clean composite red, green and blue outputs. [558]

The array of companies displaying various equipment and services seemed endless. From the small companies to the large corporations, the broadcast industry is being served well. The incredible list of NAB exhibitors included the following:

- **E G & G Inc.**—lightweight antenna obstruction light; high-intensity obstruction lighting equipment. [486]
- **CECO**—solid-state replacements for vacuum tube rectifiers. [487]
- **Soll**—builders of broadcast installations. [488]
- **Uni-Set**—modular systems for set designs. [489]
- **Automated Industries**—telecasters color weather radar. [490]
- **Western Union**—Westar satellite. [491]
- **Unarco-Rohn**—solid-leg guyed towers. [492]
- **Sescom**—professional audio components. [493]
- **SWR Inc.**—CP antennas and 3-1/8-inch coax switch (patchless panel). [494]
- **High-Lite**—antenna masts and light towers. [495]
- **Motorola C & E**—portable transceivers, Flexar UHF base station, and RENG-related accessories for hand-held transceivers. [496]
- **Automated Business Concepts**—billing, traffic, and accounting systems. [497]
- **Edco Products**—cartridge equipment, color sync generators, stereo phase enhancer. [498]
- **Microprobe Electronics Inc. (MEI)**—automation system, programmer. [499]
- **Saki**—long-life ferrite replacement audio posts for Ampex VR-1200 (new product). [500]
- **Comark Industries**—remote control systems; components and subsystems; demodulators; and solid-state peak detectors. [501]
- **Interand**—solid-state scan converter, and multi-page telestat or storage. [502]
- **Power Optics**—electronic color analyzer, and remote control camera systems. [503]
- **Television Technology**—solar-powered translators. [504]
- **Packaged Lighting Systems**—stage master power grid system, and electronic remote dimmers. [505]
- **NTI America**—program timer and digital color monoscope signal generator. [506]
- **Bardwell & McAlister**—television lighting instruments. [507]
- **Boston Insulated Wire & Cable Company.** [508]



# Station-to-Station

## Automated EBS

By John Shepler, Chief Engineer, WROK/WZOK, Rockford, Illinois

Our FM station, WZOK, is automated during part of the broadcast day. We wanted to interface our EBS tone generator to the automation system so that EBS tests and alerts could be programmed to run automatically.

The automation system is a SMC DP-1 and the generator is a McMartin TG2/EBS—both common items. The audio output of the generator can be connected directly to the audio switcher on an unused channel. The control system involves making certain modifications to the EBS generator and adding a few components.

Figure 1 shows the modified start circuit. To start a source, the DP-1 audio switcher provides a logic signal that goes from +24 VDC to ground whenever a channel is energized. Capacitor  $C_A$  blocks the normal DC voltage but allows the negative start pulse to pass to the base of the transistor  $Q_A$ . This turns on the transistor and triggers the IC timer of the tone generator.

After the tone has run for 20 to 25 seconds, a signal is needed to tell the automation to advance. This signal can be provided by a momentary relay contact closure similar to that provided by a tape deck or cart machine.

Figure 2 shows the circuitry needed to accomplish this. LED 1 is the front panel indicator on the tone generator that is illuminated whenever the tone is activated. A resistor is paralleled to the LED so that the voltage measured at the collector of  $Q_1$  is +5VDC when the

transistor (and LED) is off. When the tone is activated, logic circuitry in the tone generator turns on  $Q_1$  and the collector goes to ground. This lights the LED and places the positive side of the capacitor at ground potential. When the LED is extinguished, the collector of  $Q_1$  goes high and the resulting positive pulse is conducted by the capacitor to the base of transistor  $Q_B$ . This transistor conducts momentarily, causing the relay to close the normally open contacts for a half-second or so. These contacts are wired to the terminal strip, TB1, in place of the 45-ohm loudspeaker connections. The audio switcher auxiliary control lines are then connected to this terminal strip.

To use the modified generator for an automatic EBS test, three steps are programmed into the automation controller. The first step is a cartridge which gives the opening statement of the test. An auxiliary (150 Hz) tone at the end of this message steps the machine to the next event which is the tone generator. When the tone is completed, the machine steps back to the cartridge which then gives the closing statement of the test message. The cartridge must stop between the first and second messages.

The primary advantage to making these modifications is that a lot of manual steps are eliminated in running an EBS test. This not only tends to make the tests more reliable, but could prove useful during an emergency when actual alert bulletins need to be broadcast.

*continued on page 130*

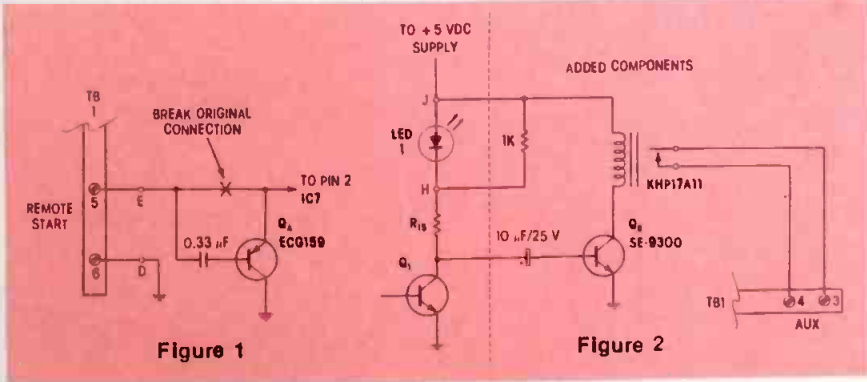


Figure 1

Figure 2



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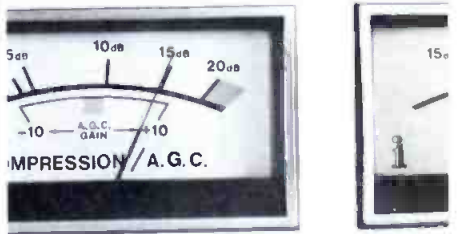
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## Station-to-Station

continued from page 129

### Keeping an ear on on-air personnel

By Charles A. Davis, Engineering Supervisor, WMEB-FM, Orono, Maine

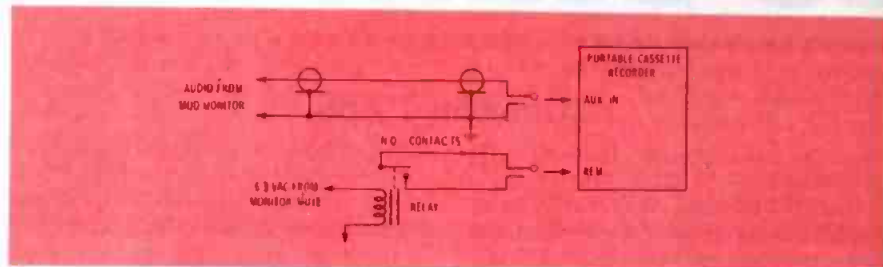
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We are a small-market AOR college FM station with an exceptionally large on-air staff. With up to 40 people jockeying during one week, personnel management gets to be a big problem. Having many people in training on the air, how do we listen to an inexperienced jock's vocal presentation and airability without sitting glued to a radio for hours on end?

We came up with a simple system that records everything said over the air on a low-priced cassette machine. We use the 6.3 VAC muting voltage to switch a small relay. This relay controls, through the remote control switch jack, the cassette recorder. The audio is

tapped from the mono modulation monitor and wired into the auxiliary input of the machine. The sound quality of the machine isn't great, but for our application it's sufficient. This whole assembly was placed in a corner of our on-air studio.

Materials required are a mini plug (audio input); sub-mini plug (remote control); cable; and a cassette recorder which can be remote controlled.

This system provides good tape and listening time economy, and simpler monitoring of on-air personnel—which allows us to control the station's sound better and to train our operators more effectively.

### Feeding stereo from mono with some degree of isolation

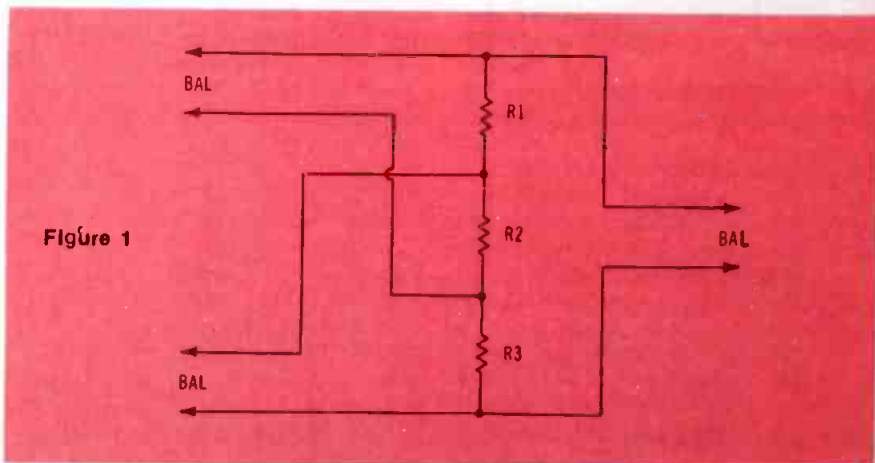
By Donald Stuursma, Chief Engineer, WJBL AM/FM, Holland, Michigan

Figure 1 shows a circuit we use at WJBL AM/FM to feed stereo sources from mono outputs and still maintain some degree of isolation between the stereo channels.

The value of each resistor should be identical and depends upon the impedances involved; however, the greater the resistance, the greater the isolation. For 600-ohm circuits, I

use about 1,000 ohms per resistor.

The circuit will function only when all legs are balanced; if any unbalanced connections are made, isolation transformers must be used. Also, if any pads are used putting them in the legs of the stereo, output will increase the amount of isolation equal to the total attenuation of the pads.



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## Feeding programs with sufficient volume to other stations

By Claude Van Horn, Chief Engineer, KFLA-KULL, Scott City, Kansas

Since many radio stations (particularly in small markets) broadcast local high school ballgames, here's a tip that a lot of engineers might be looking for.

The standard method for broadcasting from a remote location is to use a special "repeater transformer" in the station's incoming telephone lines. The transformer has a split primary and a split secondary with each section at 300-ohm impedance. The phone side of the repeater coil is wired in series with a "blocking capacitor" or the coil would hold the phone line open all the time. The console side of the transformer is generally wired in parallel for a 150-ohm impedance. This is done for better equalization. Figure 1 shows an illustration of this arrangement.

The major problem that has come up for us, and for many other stations with whom we deal, is that of feeding a ballgame or program source down the phone line to another station with sufficient volume. Too many times when we have been fed a ballgame from another station, the quality has been poor, due to the fact that the feed has to be amplified so much that the line noise is louder than what's left of the announcer.

We came up with a system that gives plenty of volume down the telephone lines for feeding any station a level they can use without

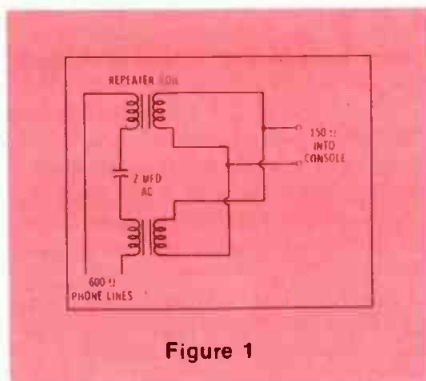


Figure 1

additional amplification. We also can record directly into any of the station's tape recorders without fiddling with patch cords.

The key to our telephone-air system is flexibility, and all it cost is a couple of spare double pole switchers. The system (Figure 2) can be adapted to many configurations. In the KFLA-KULL system, we have two telephone lines wired through repeater coils. The outputs of the repeater coils are hard-wired to the console multi-inputs and to the patch panel. Then the lines are wired to the "tape feed" switches and to the "phone feed" switch. The "phone feed" switch is fed from the headphone output jack on our console. This is possible because we use an amplifier from our modulation monitor to feed the headphones

*continued on page 132*

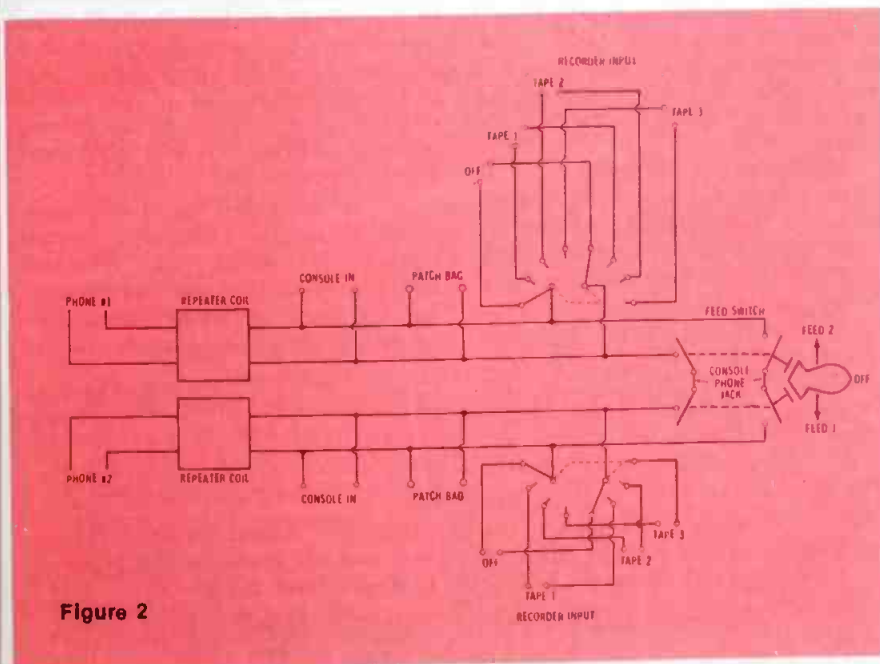


Figure 2

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## Station-to-Station

continued from page 131

and the console headphone jack is not otherwise used.

The "headphone volume" pot on the console is used to control the volume of the feed down the phone lines. One caution: make sure that the headphone volume pot is not left turned down all the way. If it is, it takes all the volume out of the phone lines...in all the phones in the building.

We leave the volume pot at least half of the way up at all times, and leave the "phone feed" switch at the center off spot when not in use to prevent this problem. Since the headphone jack can be switched to either the program or audition side of the board, we also can use this arrangement to feed an audition of a spot to a client over the phone. This feature alone has paid many times over the initial investment in time and materials.

Another plus feature is that when the "tape input" switches are both turned to the same tape recorder

number, the phone lines are tied together through the recorder input terminals. We use this as an emergency "conference line." When someone calls the station and wants to talk to the general manager when he is not at the station, we can call him on the other line and switch the lines together through the "tape input" switches. True, sometimes you have to yell a bit to be heard, but the convenience has been worth the trouble when needed.

Without ever touching a patch cord, we can play a ballgame on the air, record it on any recorder we choose, and feed it to another station on the other phone line. We can even record two different things over two different phone lines and switch between them on the air, all without upsetting any other function. By investing a few minutes time and a couple of double pole switches, you need never again be accused of feeding poor volume to another station. And setting up to feed another station a ballgame or other program becomes something any board operator can do easily.

## Microprocessor courses are what's happening

After coming back to recoup from the rigors of another NAB convention, it occurred to me that we're all in danger of falling behind in the race with the technologies. As suggested in my new equipment preview in the pre-convention issue (March), microprocessors are finding ever more applications in broadcast equipment. No doubt, that pace will be stepped up in the coming years.

Some months back, I took the Heath microprocessor course. It was hard to keep from jumping into the interesting experiments once I had built the microprocessor/experimenter. But I made it through the course.

Immediately, I found I was in better shape to talk with manufacturers (but I'm still trying to catch up). At about the same time, one of my consultants took the same course, and wrestled with the same temptations. Being a chief engineer, he immediately saw applications in broadcast assist circuits that, undoubtedly, will begin to show up in this column some day.

The point is, taking a course in your spare time will help bring you up-to-date on what's happening in the black boxes you're buying (or will buy). And it may help you discover how microprocessors can solve some very real problems.

If you look at the price of the 6800 or 8080, you will find that they're not expensive. It's just not that hard or expensive to get started.

Meanwhile, those of you who've started in this direction are invited to contribute to Station-To-Station. We do pay for your efforts. And if you're interested, drop me a line, and we'll run a list of kit manufacturers, and mini- and microcomputer magazines that will whet your appetite even more.

The address for the Heath company is Heath Company, Benton Harbor, MI 49022. Or, you can circle number 100 on our Reader Service Card for more information on the Heath microprocessor course.

Ron Merrell  
Editor

### Correction

In the March article, "Calculating TV Aural Subcarrier Modulation," by Dane Ericksen, there was an error in the  $J_1(x)$  power series formula on page 148. It should have read:

$$J_1(x) = 0.5x \left[ \frac{1 - (0.5x)^2}{1!2!} + \frac{(0.5x)^4}{1!3!} - \frac{(0.5x)^6}{3!4!} \dots \right]$$





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## Certification exams given to applicants

The SBE Certification exams are being given to applicants through June 10 in 28 cities in the United States, one in Canada, and one in Puerto Rico. They began May 20.

In order to take the exam for Broadcast or Senior Broadcast Engineer, persons must submit an application form to the national SBE office for processing. When the completed application is returned to SBE national, it is reviewed by members of the certification committee. Since all members are full-time broadcast engineers and are located in various cities around the country, it takes several weeks to process an application.

Filing an application now will

allow the necessary processing time for the next examination. Anyone interested in the SBE Certification Program should write to the Certification Secretary, P.O. Box 50844, Indianapolis, IN 46250.

Coverage of SBE's annual meeting held recently in Las Vegas is included in the Industry News section, which begins on page 8.

### CHAPTER REPORTS

#### Chapter 1—Binghamton, New York

The main focus of the April meeting was computers, with Henry Vaughan of Computerland, Ithaca,

N.Y., discussing his product line. He demonstrated a test editor running on an IMSAI computer plus some A/D conversion with an APPLE computer. He also gave a glimpse into the future by showing the PAIA 8700 computer/controller and the DYNABYTE-Basic Controller™.

#### Chapter 2—Northeastern Pennsylvania

Roger Peterson of Eastern Microwave Inc. was the guest speaker at the April 3 meeting, held at WVIA-TV studios in Pittston. He spoke on "The State-of-the-Art in Microwave Technology." Areas covered included his organization's activity in providing microwave relay service; typical systems and problems; and future plans.

#### Chapter 9—Phoenix, Arizona

The April 26 meeting, hosted by Ed Loya and Dalis Electronics, included a short business meeting and reports on the NAB convention and the SBE annual meeting.

#### Chapter 16—Seattle, Washington

At the April 19 meeting, Charles Morris of KIRO led a panel discussion on the NAB convention.

#### Chapter 20—Pittsburgh, Pennsylvania

Rockwell International Broadcast Group conducted the April 20 program. Keith Leach presented "Switch Mod State-of-the-Art—AM" and an introduction of the MK8 stereo console. Also, James Hurley, SBE president, spoke on the direction he feels the society is going and some of the problem areas he is going to deal with.

#### Chapter 41—Central Pennsylvania

WHP, Harrisburg, was the site of the April 20 meeting. Glen Winter of Susquehanna Broadcasting discussed directional antenna systems.

#### Chapter 43—Sacramento, California

The program at the April 25 meeting was on satellite broadcasting. Ken Leddeck, manager of Broadcast Applications, Atlanta, gave a visual presentation of receive-only earth stations and a picture of satellite broadcasting today and up to the year 2000.

#### Chapter 45—Charlotte, North Carolina

Hewlett-Packard furnished a videotape entitled "What is a dB?" for the April 10 meeting. Regardless of present agility in working with decibels, it was improved after viewing this tape. □

Dear members:

For the last twelve months there has been a growing feeling of satisfaction in the confidence, growth and purpose of the national office of the Society of Broadcast Engineers. I was privileged to view these improvements as your vice president. Although many of these changes were subtle, they were necessary and time-consuming.

As your new president, it is my responsibility to maintain the present momentum and to further improve the posture of the national office as viewed by our membership, corporate management, those in allied fields, and the governmental regulatory agency.

We have proposed an annual national meeting of chapter chairpersons. It was received at the national membership meeting with enthusiasm. A committee will be in touch with the chapters to work out the details for such a meeting.

I am especially proud to be a part of an organization whose officers and directors are so genuinely dedicated to the betterment of the broadcasting industry.

Many problems still exist that require solutions. We will, in subsequent articles in **Broadcast Engineering**, keep you informed of our activities. Since the SBE is moving ahead, we invite those eligible non-member readers of **Broadcast Engineering** to seek membership in the Society of Broadcast Engineers.

Jim Hurley  
SBE President

This is the official column of the American Society of TV Cameramen (ASTVC). The ASTVC can be contacted by writing to P.O. Box 296, Sparkill, NY 10976; (914) 359-5985.

## Take 1...Tony St. John visits NAB for ASTVC

Dedication is defined as going to Las Vegas and taking your wife along. And so it was with ASTVC's Northwest regional rep Anthony St. John, who calls San Francisco and KRON-TV home.

Tony, bursting with enthusiasm, wrote to tell us about his visit to the 1978 NAB convention and all the spanking-new equipment on display. One of his first stops was the Sony exhibit where he and his wife were taken in tow by Bob Daines. Sony's Northwest regional representative from Brisbane, California.

"One of the first things to catch my eye was the BVP-300, Sony's re-designed version of the Thomson Microcam. They did a fantastic job on the design of this hand-held Ej camera," St. John reports.

Another piece of gear that held St. John's attention was the BVE-5000, Sony's CMX-type computer/editor which, he says, was tied-in to four VTRs and performing its programmed functions with efficient dispatch.

Leaving the Sony area, St. John's next stop was a visit with Jack Keyes of Canon, U.S.A. at their exhibit. Here, Tony was able to learn the fine points of Canon's new 113x9, featuring a 9 through 118mm capability (with corresponding f.1.6/f.1.9 stop) designed for the

TK-76 and similar hand-held gear.

Not satisfied with viewing all this for his own edification, St. John has gone on to set up a seminar to be sponsored jointly by Sony and ASTVC and to be held in an area provided by KRON-TV (for which we extend our thanks). This seminar is scheduled to take place soon, and will be covered in an upcoming issue.

## Take 2...Take it from Janet!

**(Editor's Note:** This contribution is from Janet Doka, an administrative assistant of the ASTVC, largely responsible for coordinating the student intern program with Fairleigh Dickinson University.)

Breaking into broadcasting is no easy task. The various ports of entry are limited, and for most job openings, there are long lines of applicants. Communications majors are now encouraged to reassess their career objectives.

Part of the problem for the newcomer is the lack of information channels in the industry. The ASTVC brings together the newcomer and the seasoned professional to share occupational interests and experiences.

To acquaint you with some of the education services of the organization, the ASTVC recently took some of its student members (communica-

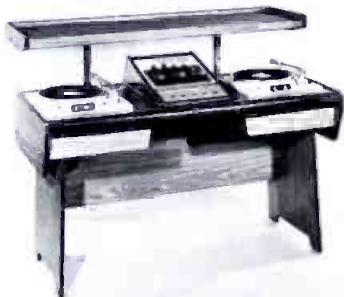
tions majors from local universities) on a tour "behind-the-scenes" at various network facilities. They visited control rooms and observed the operations of network news broadcasts. The group saw how the technical director, lighting director, cameraman, and others played an integral part of the show. They were escorted to various other operational points by different members of the ASTVC liaison team.

Through questions and answers, and demonstrations, they were introduced to some of the latest equipment and techniques. These members, whose training had been in a one-room college TV studio, were anxious to see this sophisticated equipment in action.

An area of concentration for the ASTVC is its seminars. Student members find these events most rewarding when given the chance to attend. They will see first-hand the latest in state-of-the-art hardware demonstrated by corporate sponsor members such as Central Dynamics and 3M Company.

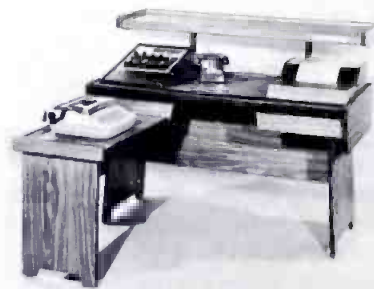
Even with the pressuring schedules of the business, many members attend and receive the presentation enthusiastically. Emphasis is put on the importance of continuing education, both for the newcomer and for the seasoned professional as well.

**Fade to black!**



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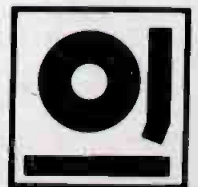


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# new products

## Digital counter

International Tapetronics' new up/down digital counter reduces the time spent with the mechanics of broadcasting, according to the company.

A single counter connects to as many as eight reproducers (or seven reproducers and one recorder/reproducer), making operation less complicated. The counter is operable with three front panel controls. The counter functions in three distinct modes of operation. First, it acts as a conventional timer/clock by displaying the "running length" of a cart. Secondly, the counter may be used as a conventional stopwatch, for timing live events, network programs, or records. Finally, its most unique feature is the ability to decode a previously encoded cue track message and display the length of the cart in digital readout. As the cart runs, the counter will continuously countdown the remaining length of that cut.

Circle (117) on Reply Card

## Production switcher

American Data's model 2103 production switcher is a broadcast performance switching system for use in compact studio and remote applications. The control panel and matrix are contained in a single unit occupying only 7 inches of vertical rack or console space. Eight composite bridging inputs are provided for synchronous signals, plus two downstream program inputs for composite non-synchronous sources.

In addition to an additive A/B mix, the 2103 produces nine wipe patterns which may be positioned anywhere in the raster via separate horizontal and vertical controls. A black burst and color background generator is included, enabling the operator to mix or wipe to any color or black. A linear keyer is independent of the mixer so that all keys may be dissolved in and out.

Model 2103 systems are shipped complete with module extender, button designations, and instruction manual. The 2103 is available in NTSC, PAL and PAL-M versions. Power line voltage and frequency must be specified.

Circle (118) on Reply Card

## Squeezoom

Squeezoom from Vital Industries can handle one channel, or up to

four channels in one frame. The electronic zoom makes it possible to see or read heretofore unreadable information. The zoom can be used on remote or recorded scenes, and while chroma-key tracking. Movie-type and personal effects are realized with the preprogrammed micro-processor.

The frame synchronizer locks all remote signals to house sync. Network, ENG, remote pickups, and satellite signals will mix with local signals with no disturbance. The time base corrector will NTSC the color and sync of low-cost VTRs.

Also featured is a frame freezer which acts like an additional camera in the studio for still shots. No matter how a slide or scene comes in, the video compressor can change its aspect ratio down to one picture element, and position it anywhere on the screen.

Circle (119) on Reply Card

## Noise reducer

A noise reducer designed to lessen signal/noise ratio caused by poor video signal and to diminish chroma noise signal-to-noise ratio was unveiled by NEC America.

Also improving picture quality under poor lighting conditions, the TNR-15 features an auto threshold control which automatically selects the operating point most suitable for the input video source. An auto-mode feature selects the operating point for the input video source and can pass a live signal as well. Additionally, signal-to-noise ratio improvement can be chosen at 6, 9, 12 or 15 dB by dialing to the desired setting.

The TNR-15 series is available in rack-mount or portable models. The TNR-15A model is designed for stand-alone operation; the TNR-15D operates as an accessory to the FS-15.

Circle (120) on Reply Card

## Audio console

The UMC/Beaucart audio consoles are 8-channel, stereo units easily expandable to 16 channels with the addition of top plug-in channel modules. Modules plug into the console's mother board with gold-on-gold connectors for better electrical contact and less corrosion.

Each channel module has three

continued on page 136

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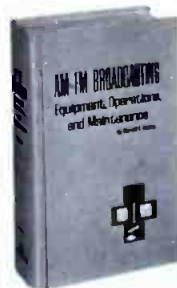
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# new products

continued from page 135

selectable inputs allowing a maximum of 48 hard-wired inputs for the console. The console incorporates three fully metered matching stereo busses out (program, audition, and utility) plus a fully metered mono feed buss as standard. Four program sources can be fed simultaneously from these busses.

Other features include Waters conductive plastic; log taper fader (attenuator) with 100mm travel; momentary, cue buss access, select button on each channel; on/off buttons for noiseless DC switching; and a built-in cue amplifier.

Circle (121) on Reply Card

## ANSWER system

Tektronix's ANSWER system has applications in common-carrier satellite and terrestrial systems; broadcast plant monitoring; unattended TV transmitter systems; and video equipment manufacturing quality control.

ANSWER automatically measures signal amplitude, phase, and timing parameters. A high degree of measurement accuracy is made possible by signal offset and gain control, dither generation, and signal averaging, which by itself can reduce noise on the incoming signal by up to 15 dB. These techniques provide an effective resolution of 12 bits. A self-diagnosis routine enables verification that the system is functioning correctly. If not, the routine will detect and isolate internal problems in ANSWER.

ANSWER has both RS-232-C (ASCII coding) and optional GPIB interface capability, so that it can be adapted to a wide range of applications, including unattended and remote systems and systems under computer control.

Circle (122) on Reply Card

## Switching equipment

The Series 10 solid-state video and audio switching equipment from Dynair Electronics provides 10-input/10-output high-quality vertical-interval monochrome or color video switching and on-air quality audio switching. Each 10 x 10 matrix is housed in a 5½"H x 14½"D x 19" rack-mount chassis, which includes power supply.

The control system is micro-processor-based and allows local

and remote operation. Remote master and individual output bus control panels are available to operate over a single coaxial cable control line. Up to four levels of switching (e.g., one video and three audio) can be controlled locally and/or remotely. A total of 16 remote control panels may be used to control a system.

Models SVA-100A, SVA-101A, SAA-110A and SAA-111A include 10 form-A tally relays and facilities to control the slave matrices, models SVA-102A and SAA-112A.

Circle (123) on Reply Card

## Modular radio consoles

Ward-Beck System's model R1200 and R2000 consoles are designed specifically for AM/FM stereo radio. Both models are fully wired for stereo operation and complete input channel module interchangeability.

Construction is all-metal, providing shielding against spurious and RF interference. CMOS integrated circuit techniques have been utilized throughout to provide transient-free operation of all controls and making possible the use of silent pushbuttons. Complete DC tally and control logic is provided for muting and control of turntables, cartridges and tape machines.

Monaural or stereo operation is determined solely by the modules installed. A mono console may be converted to stereo at any time by the customer, making the consoles well-suited for future AM stereo operation. A variety of optional equalizers, filters and compressors may be fitted to the R1200 and R2000 consoles.

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## Audio distribution systems

Standard DA504 broadcast audio distribution systems from McCurdy are supplied with up to six active, balanced AT310 distribution amplifiers, with c/w self-contained PS855 power supply. Each amplifier is supplied with 12 600-ohm output splits. Remote, DC, or computer ramp gain control is available.

Standard DA505 systems are supplied with up to six AM487 self-powered amplifiers. The input and output transformer is coupled with the output, strappable for 4, 8, 16, 150 or 600 ohm impedance. Each amplifier is capable of driving a maximum of 75 output splits, 600 ohm, or delivering 20W into an 8 ohm load. Other features include a remote-controlled mute circuit in each AM487; and front-mounted power heat sinks providing a cool

interior operation. Larger audio distribution systems are also available.

Circle (125) on Reply Card

## Color signal system

TRICHROMA-U by Television Research International is an advanced recording and reproducing color signal system designed to provide ¾-inch recorders with multi-generation capabilities.

TRICHROMA-U, as a new electronic format for ¾-inch VTRs, offers improvement in the area of chroma noise, system linearity, and multiple-pass erasers. Color signals are recorded using a proprietary color-under FM process which purposely avoids the recording on tape of NTSC and coded signals, thus minimizing the sources of velocity errors, chroma noise and non-linearity, and carrier eraser.

The product is available for incorporation into any ¾-inch U-format recorder, and it becomes an integral part of it, retaining the existing signal systems for capability with a modified unit and existing libraries at the slip of a switch.

TRICHROMA-U allows the use of ¾-inch VTRs in mastering, editing, distribution, and on-air applications, without sacrifice in the quality of the multi-generation materials displayed.

Initially unit upgrade will be done at the factory in Palo Alto, California, but later will be available for field installations.

Circle (126) on Reply Card

## Portable color camera

A new, lightweight, compact portable color television camera was introduced by Philips Broadcast Equipment.

The Philips LDK-14, a ¾-inch Plumbicon camera, is a fully automatic, self-contained ENG portable

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BROADCAST ENGINEERING



of minimal weight and low power consumption, together with a rugged, shockproof design.

The camera is supported by an array of studio and field-fixed, standard zoom and extended-range zoom lenses. Additional mounting accessories enable the camera to be quickly mounted on a tripod with a top- or side-mounted 5-inch viewfinder for flexibility in studio use or field production.

Other features include a camera shake reducing focus power and operating temperatures; increased static and dynamic resolution; f/1.4 optics; low-light operation; contrast compensation; and highlight discharge circuitry.

A new Philips development, dynamic beam control (DBC), automatically adjusts beam current. By allowing beam to increase above normal only in hot highlight areas of the picture, both the picture de-focusing and tube life compromises are eliminated.

Circle (127) on Reply Card

#### Production switcher

A production switcher (model 1600-1A) for use in small studios, remote vans, and post-production rooms is available from the Grass Valley Group. Offering NTSC, PAL, and PAL-M versions, the 1600-1A is a compact, flexible, and economical video switching system.

A standard 1600-1A switcher is supplied as a completely tested, ready-to-operate system consisting of remote control panel, switching matrix, mix/effects system, flip-flop mixing amplifier, color black generator, color background generator, tally system, power supply, set of interconnecting cables 25 feet/7.5 meters, extender modules, and instruction manuals.

The basic design of the switcher lends itself well to modifications by future options, and interchanges with other 1600 series modules.

Circle (128) on Reply Card

#### Videotape editing system

VIDEOLA is a simple, low-cost, off-line videotape edit logging system from CMX Systems. It is used to prepare a videotape workprint. While the editor concentrates on aesthetics of the program or commercial, the VIDEOLA equipment stores all the information that will be needed to automatically complete the edited master tape.

VIDEOLA may be adapted to a wide variety of videotape recorders and edit controllers. For example, the system demonstrated by CMX at the NAB utilized Sony 3/4-inch U-

matic recorders and a Convergence ECS-1B edit controller.

The editing system is sufficiently portable to allow its use in almost any location. The basic system consists of two videotape recorders: one is used for playback; the second records the work tape.

The VIDEOLA logger is a micro-processor control system, with a mini-floppy/computer disc that stores the edit information. A single disc is capable of storing up to 1600 edits. The system is automatic and only requires that the disc be inserted in the front of the logger, and a single button on the control panel be pressed before an editing session begins.

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#### FM transmitters

Reliability with multiple amplifiers and power supplies plus low operating cost are achieved with the FM-2000SS, FM-1000SS and FM-500SS solid-state FM transmitters by Wilkinson Electronics.

Each is housed in a single custom-built 19-inch rack cabinet 72 inches in height. The FM-2000SS uses two such cabinets. Very little floor space is required. All operating controls are on the front panel and the power amplifiers, power supplies and exciter are accessible through doors or drawers on the front of the transmitter. The rear door provides access to the cooling system and main frame of the exciter and IPA, but if required either side panel may be removed for greater accessibility.

The cooling system is located at the lower rear of the transmitter where it can't interfere with transmitter output transmission lines.

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#### Recorder/reproducer

The die-cast Scully 250 recorder/reproducer will take on all assignments. For portable needs, the mike preamps plug in for news or sports. Studio needs are solved with only 19 1/4 inches of rack space. Configurations include full or half-track mono, two or quarter track stereo.

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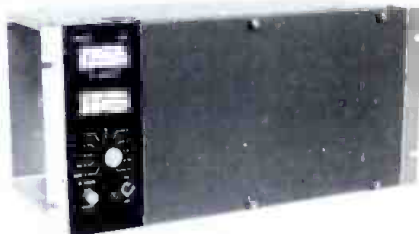
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**SALES ENGINEER—PROFESSIONAL AUDIO PRODUCTS.** A major manufacturer of Professional Audio Products to Television, Radio and Recording Studios is opening a Sales Office for the Southeastern U.S. We have an immediate position for qualified Sales Engineers to be responsible for this area. This person must be a responsible self-starter capable of working with a minimum of supervision. The ideal person will have an in-depth knowledge of audio production techniques and a reasonable technical background. Excellent starting salary plus commission. Send resume and salary history or telephone collect to: **MARKETING MANAGER, AUDIO DESIGNS AND MANUFACTURING, INC.**, 16005 Sturgeon, Roseville, Michigan 48066. (313) 778-8400. An Equal Opportunity Employer. 6-78-11

**TV MAINTENANCE ENGINEER—Aggressive,** young video production company located in the San Francisco Bay Area is looking for a top maintenance engineer with at least 5 years experience in the set up and repair of studio and ENG color cameras, 3/4" and 1 VTRs, TBCs and editing systems. This is an excellent growth opportunity. Send resume and salary history to Video Production Services, 1442 San Pablo Avenue, Berkeley, Ca. 94702. 6-78-11

**TECHNICAL OPERATOR,** part time, vacation relief. Needed immediately. Experienced in air switching, videotape, camera and transmitter operation. Must have First Class license. Salary negotiable. Address resume and salary requirements to: Chief Engineer, WTVG, P.O. Box 296, West Orange, N.J. 07052. An Equal Opportunity Employer. 6-78-11

**TECHNICAL OPERATOR.** Must be experienced in air switching, videotape, camera and transmitter operations. First Class license. Salary negotiable. Address resume and salary requirements to: Chief Engineer, WTVG, P.O. Box 296, West Orange, N.J. 07052. An Equal Opportunity Employer. 6-78-11

**TELEVISION BROADCAST TECHNICIAN.** Available immediately. Maintain studio and transmitter equipment, including cameras, 2" Quad VTR, 3/4" VCR, switchers and monitors. First Class license required, previous experience mandatory. Salary negotiable. Address resume and salary requirements to: Chief Engineer, WTVG, P.O. Box 296, West Orange, N.J. 07052. An Equal Opportunity Employer. 6-78-11

**VIDEO OPERATIONS** and maintenance engineer needed for a major market TV station production facility. Extensive experience in setup and operation of broadcast cameras, quads, time code editing, etc. Excellent salary and benefits—An Equal Opportunity Employer M/F. Send resumes and salary requirements to: Broadcast Engineering, Dept. 421, P.O. Box 12901, Overland Park, KS 66216. 6-78-21

## HELP WANTED (CONT.)

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Busy corporate non-broadcast studio midtown Manhattan seeks staff engineer for all maintenance and some operational duties. 3 Harris TE 301 cameras BVU 200 recorders with editor, Grass Valley 1600A switch, equivalent sync/sig. processing, distribution and monitoring equipment. 5 years relevant technical experience. Must be able to troubleshoot and repair IC/transistorized circuits, both analog and digital. Degree helpful but not mandatory. Good benefits and working conditions. Salary to low \$20's depending upon qualifications.

Resume to: Box 415, Suite 1501  
182 Madison Ave., New York, NY 10016  
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**TELEVISION—CCTV Video Maintenance Technicians.** Full Benefits. Greater New York, Suffolk County or New Jersey Area. Send resume to: VPC, P.O. Box 268, New Hyde Park, N.Y. 11040. 6-77-1f

**VTR & PRODUCTION ENGINEERS—Chicago VHF** station has immediate openings for engineers experienced in the operation of VTRs, film chains, studio cameras, & video shading. We are seeking persons with a minimum of two years technical training, four years experience, & first class FCC license. Send your resume in confidence to: Larry W. Ocker, Director of Engineering, WTTW-TV, 5400 N. St. Louis Ave., Chicago, Illinois 60625. 5-78-21

**CREATIVE ELECTRONIC ENGINEER—For East-Tennessee based VT production company with RCA TKP-45's/TR600 recorder, all-mobile operation with small studio facility. Excellent opportunity for engineer capable of maintaining professional equipment, troubleshooting in field. Also requires creative production talent for contributing to quality image for which company is known throughout Southeast. Interested in moving ahead with a growing company? Contact: Ross Bagwell, Sr., Cinetel Productions, Inc., 2 Forest Court, Knoxville, Tennessee 37919; or call (615) 584-2232. 6-78-11**

**TV CHIEF ENGINEER,** position immediately available in New York City. Solid experience w/AE600's, PC 70's, RCA computer, studio facility, shirt-sleeve. **SOLID EXPERIENCE** required. Salary open. North American Video, (212) 688-9884. B. Grodin, Home (914) 238-9229. 6-78-11

**T.V. STUDIO MAINTENANCE ENGINEER.** Prefer Experience with Ampex 1200, RCA TR-70, RCA -TK - 45 and Sony BVU 200. Experience only. Write or phone Don Smith, C.E., WRDW-TV, Drawer 1212, Augusta, Georgia 30903. (803) 278-1212. An Equal Opportunity Employer. 6-78-11

**CHIEF ENGINEER** needed for Alaska's first station above the Arctic Circle. KOTZ, Kotzebue, 5 kw AM, full-time non-directional. First Phone plus 5 years experience in AM operations and studio equipment maintenance. Unusual opportunity for ambitious self-starter. Send a complete resume of professional experience to: Paul H. Davis, Engineer, Alaska Public Broadcasting Commission, 308 G Street, Anchorage, AK 99501. Salary: \$22,000 per year. Kotzebue Broadcasting is an equal opportunity employer. 5-78-21

**AUDIO/VIDEO MAINTENANCE TECHNICIANS.** Top 35 market, in Southeast. Need two persons for routine and emergency repairs of all technical equipment used at a television station. Persons must be able to diagnose equipment troubles using test equipment and must be proficient in both analog and digital circuitry. Must have FCC First Class. Send resume to P.O. Box 420, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. EEO M/F. 6-78-11

**AM-FM CHIEF ENGINEER—50 KW Ampiphase** directional 30 KW ERP FM, Schafer Automation systems. Send resume with references and salary requirements to: A. L. Ladage, Dir. of Eng., XYZ Television Inc., P.O. Box 789, Grand Junction, CO 81501. An EOE. M-F. 6-78-11

## HELP WANTED (CONT.)

**A CALL TO SERVE—**We have continuing and varying needs for experienced engineering personnel. More professional people are wanting to make their lives and talents count for something worthwhile with external consequences. If you feel a call to serve and can be happy with hard work, sacrifice and modest remuneration, you could become a part of one of the world's most exciting happenings. Send resume to Personnel Division, Drawer C, Christian Broadcasting Network, Virginia Beach VA 23463. CBN, producer of "The 700 Club," is an Equal Opportunity Employer. 6-78-4f

**TELEVISION SYSTEMS ENGINEER.** Are you a television systems engineer with a track record in designing color television studios, videotape and telecine facilities, and RF and baseband distribution systems? Or, do you have equivalent experience in broadcast television or in a large CCTV operation in business, industry or education? Do you want to advance your professional future by working with the leading television and audio-visual consulting and design firm in the field, with worldwide clients and projects? Would you like to work in New York City, with top professionals, on projects that are setting industry trends? If so, send your resume and salary history, in confidence, to: Robert J. Nilsen, Vice President, Hubert Wilke, Inc., 280 Park Avenue, New York, New York 10017. Salary commensurate with experience. Full company benefits. 6-78-11

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# BROADCAST engineering

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**Indianapolis, Indiana—Roy Henry,** 2469 E. 98th St., Indianapolis, IN 46280. (317) 846-7026.

**New York, New York—Stan Osborn,** 60 E. 42nd St., Room 1227, New York, NY 10017, (212) 687-7240.

**Mountain View, California—Dennis Triola,** 2680 Bayshore Frontage Rd., Room 102, Mountain View, CA 94043. (415) 961-0378.

**London, England—John Ashcraft & Co.,** 12 Bear St., Leicester Square, London, WC2H 7AS, 930-0525.

**Badhoevedorp, Holland—John Ashcraft & Co.,** John J. Lucassen, Mfg., Slotenweg 303, 1171-VC Badhoevedorp, Holland, 2968-6226.

**Tokyo, Japan—International Media Representatives, Ltd.,** 2-29 Toranomon 1-chome, Minato-ku, Tokyo 105, Japan, 502-0656



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Station or Company \_\_\_\_\_

Address/City \_\_\_\_\_

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1	25	49	73	97	121	145	169	193	217	241	265	289	313	337	361	385	409	433	457	481	505	529	553	577	601	625
2	26	50	74	98	122	146	170	194	218	242	266	290	314	338	362	386	410	434	458	482	506	530	554	578	602	626
3	27	51	75	99	123	147	171	195	219	243	267	291	315	339	363	387	411	435	459	483	507	531	555	579	603	627
4	28	52	76	100	124	148	172	196	220	244	268	292	316	340	364	388	412	436	460	484	508	532	556	580	604	628
5	29	53	77	101	125	149	173	197	221	245	269	293	317	341	365	389	413	437	461	485	509	533	557	581	605	629
6	30	54	78	102	126	150	174	198	222	246	270	294	318	342	366	390	414	438	462	486	510	534	558	582	606	630
7	31	55	79	103	127	151	175	199	223	247	271	295	319	343	367	391	415	439	463	487	511	535	559	583	607	631
8	32	56	80	104	128	152	176	200	224	248	272	296	320	344	368	392	416	440	464	488	512	536	560	584	608	632
9	33	57	81	105	129	153	177	201	225	249	273	297	321	345	369	393	417	441	465	489	513	537	561	585	609	633
10	34	58	82	106	130	154	178	202	226	250	274	298	322	346	370	394	418	442	466	490	514	538	562	586	610	634
11	35	59	83	107	131	155	179	203	227	251	275	299	323	347	371	395	419	443	467	491	515	539	563	587	611	635
12	36	60	84	108	132	156	180	204	228	252	276	300	324	348	372	396	420	444	468	492	516	540	564	588	612	636
13	37	61	85	109	133	157	181	205	229	253	277	301	325	349	373	397	421	445	469	493	517	541	565	589	613	637
14	38	62	86	110	134	158	182	206	230	254	278	302	326	350	374	398	422	446	470	494	518	542	566	590	614	638
15	39	63	87	111	135	159	183	207	231	255	279	303	327	351	375	399	423	447	471	495	519	543	567	591	615	639
16	40	64	88	112	136	160	184	208	232	256	280	304	328	352	376	400	424	448	472	496	520	544	568	592	616	640
17	41	65	89	113	137	161	185	209	233	257	281	305	329	353	377	401	425	449	473	497	521	545	569	593	617	641
18	42	66	90	114	138	162	186	210	234	258	282	306	330	354	378	402	426	450	474	498	522	546	570	594	618	642
19	43	67	91	115	139	163	187	211	235	259	283	307	331	355	379	403	427	451	475	499	523	547	571	595	619	643
20	44	68	92	116	140	164	188	212	236	260	284	308	332	356	380	404	428	452	476	500	524	548	572	596	620	644
21	45	69	93	117	141	165	189	213	237	261	285	309	333	357	381	405	429	453	477	501	525	549	573	597	621	645
22	46	70	94	118	142	166	190	214	238	262	286	310	334	358	382	406	430	454	478	502	526	550	574	598	622	646
23	47	71	95	119	143	167	191	215	239	263	287	311	335	359	383	407	431	455	479	503	527	551	575	599	623	647
24	48	72	96	120	144	168	192	216	240	264	288	312	336	360	384	408	432	456	480	504	528	552	576	600	624	648

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### BUSINESS OR OCCUPATION

- A. AM Radio Station
- B. FM Radio Station
- C. TV Station
- D. ETV Station
- E. CATV Facility
- F. CCTV Facility
- G. Consulting Engineer
- H. Educational Radio
- I. Recording Station
- J. Distributor
- K. Government Agency
- L. Corporate Officer
- M. Technical Management/Engineering
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3	27	51	75	99	123	147	171	195	219	243	267	291	315	339	363	387	411	435	459	483	507	531	555	579	603	627
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20	44	68	92	116	140	164	188	212	236	260	284	308	332	356	380	404	428	452	476	500	524	548	572	596	620	644
21	45	69	93	117	141	165	189	213	237	261	285	309	333	357	381	405	429	453	477	501	525	549	573	597	621	645
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24	48	72	96	120	144	168	192	216	240	264	288	312	336	360	384	408	432	456	480	504	528	552	576	600	624	648

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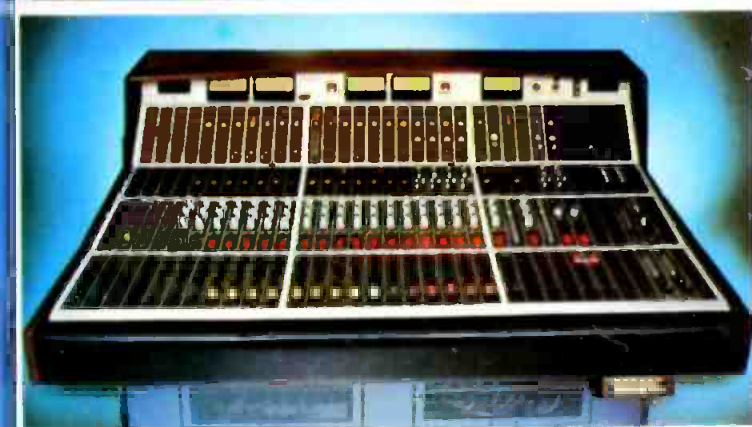
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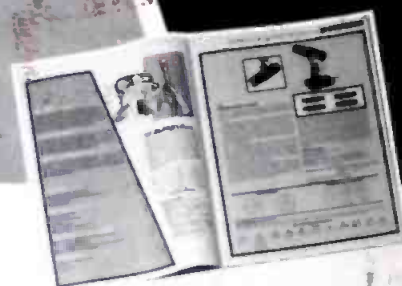
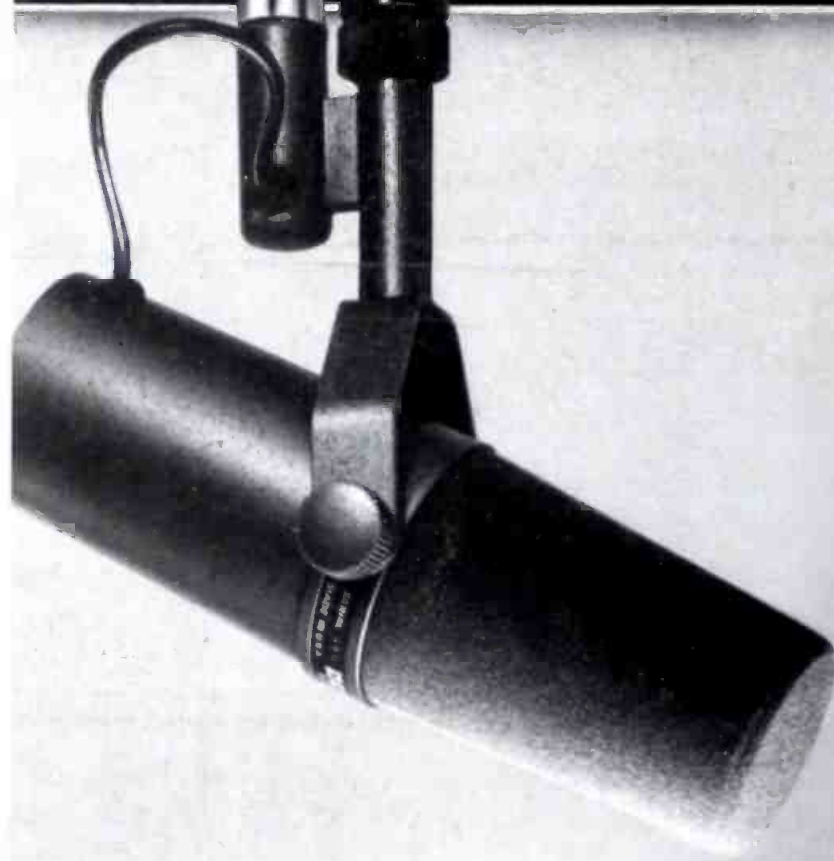
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