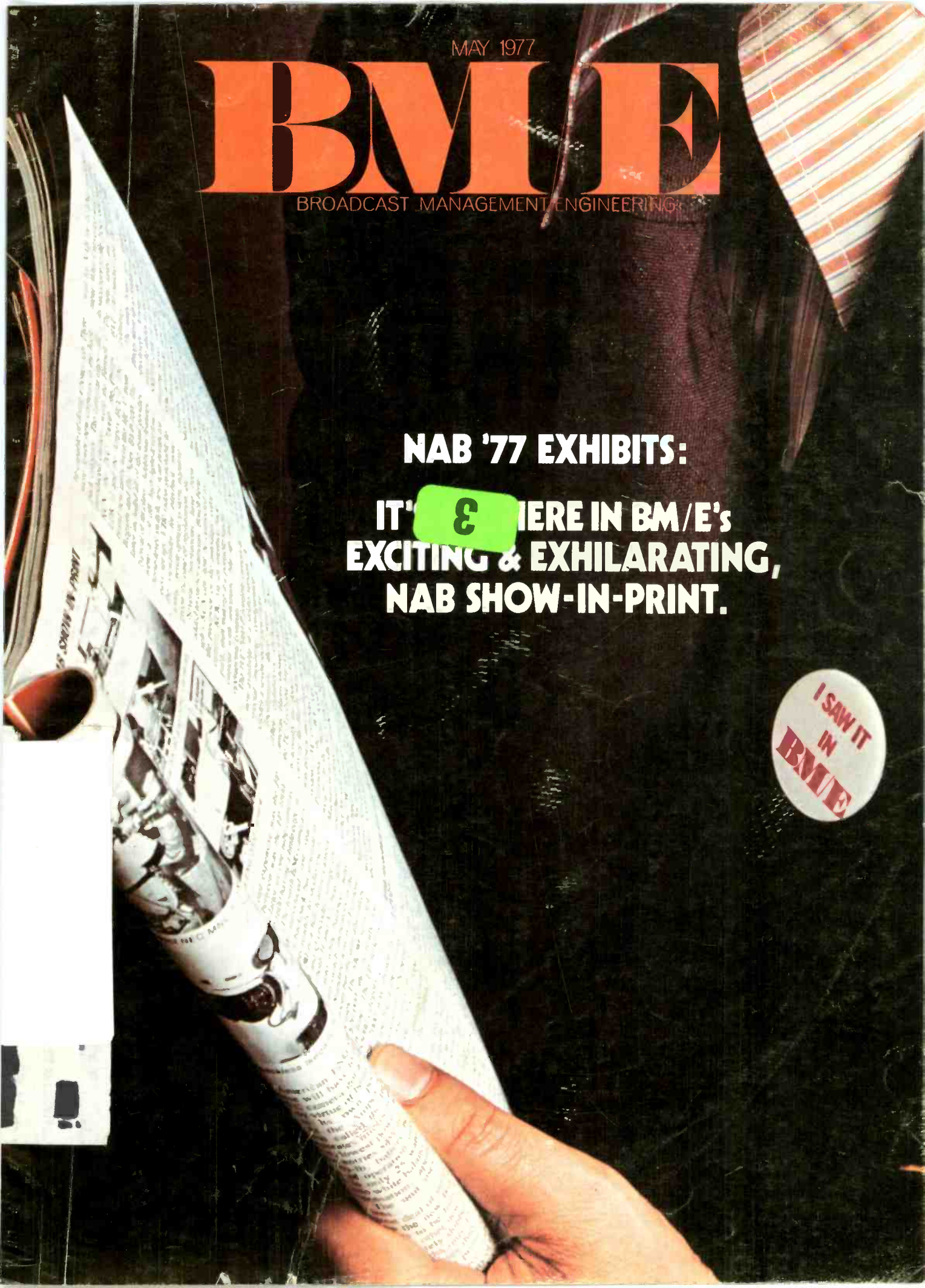
MAY 1977

BM/E

BROADCAST MANAGEMENT/ENGINEERING



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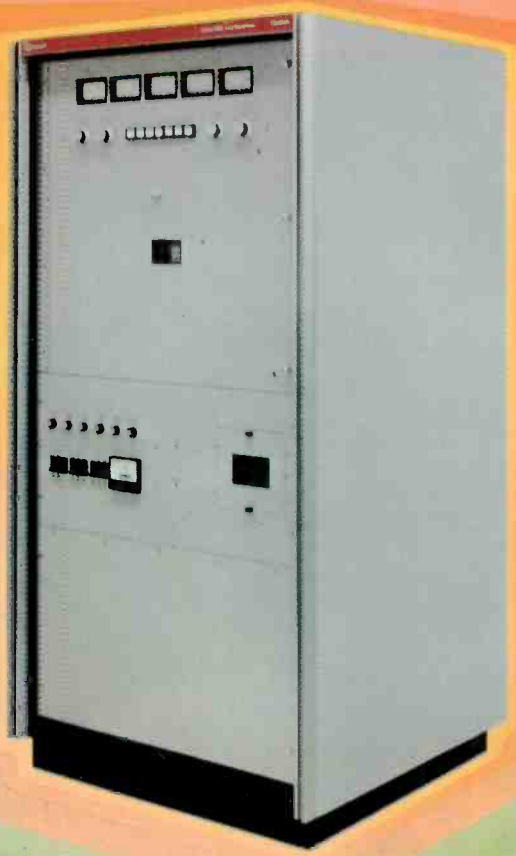

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"I saw it in BM/E" is a phrase we often hear. If you missed part or all of the NAB '77 exhibits, read this month's NAB Show-In-Print report carefully—over 170 new products are examined. You, too, can say, "I saw it in BM/E."

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Great Idea Contest *and* ***Broadcast Equipment*** *departments do not appear this month to provide space for an expanded NAB Show-In-Print report*

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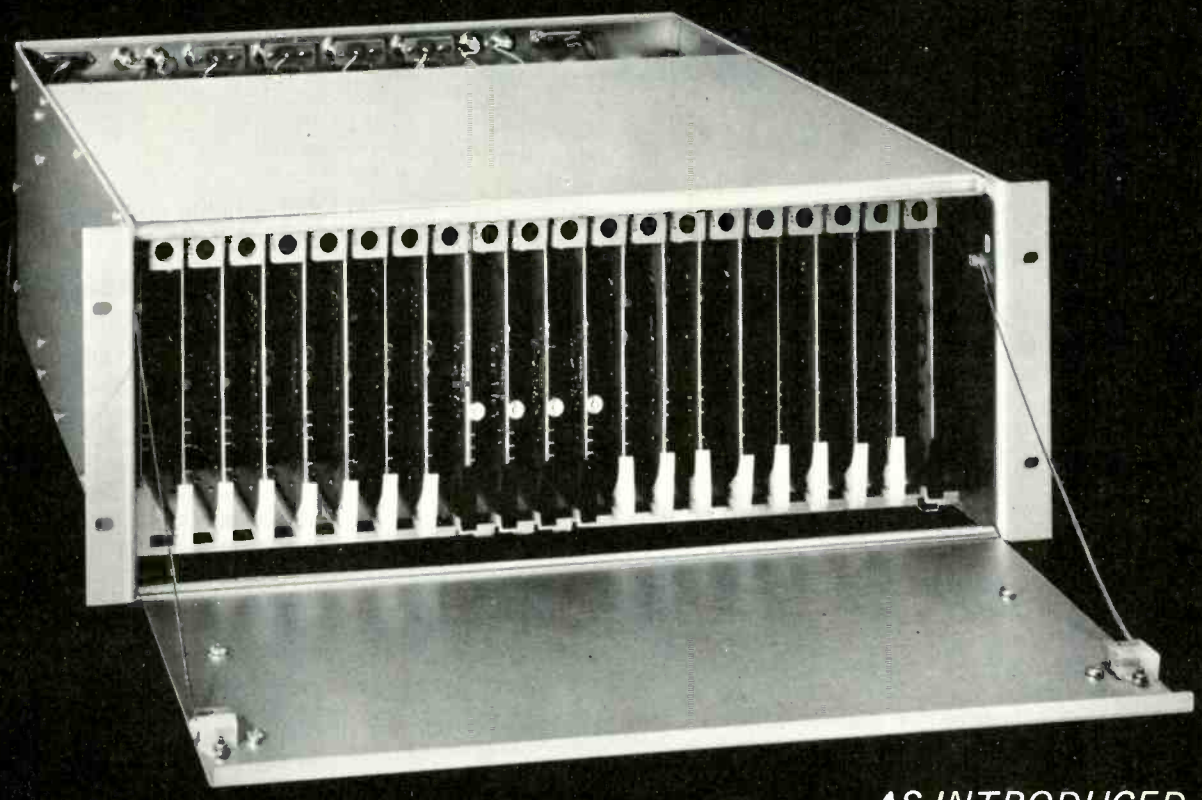

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BROADCAST INDUSTRY NEWS

RCA Shows Satellite Link Antenna For Radio

Clearly foreshadowing the use of hundreds, then thousands, of receive-only satellite earth stations for radio signals around the U.S., RCA American Communications demonstrated on March 21 a closed loop linkage up to the RCA Satcom "bird" and back down to an experimental 6-foot antenna on the roof of an office building in New York.

The demonstration was carried out in collaboration with United Press International in their New York offices. Officials of UPI predicted widescale use of such earth stations for delivery of news, data, audio feeds to UPI subscribers: eventually from 3000 to 5000 earth stations will be used by UPI alone, the spokesman said.

The six-foot antenna system has not yet been finally approved by the FCC but RCA officials said they were sure it met all the technical requirements and would, in a short time, get the approval. Advantages, of course, are far lower size, weight and cost than those of larger systems. Total weight of the antenna and its support is about 200 pounds; the electronics were in one cabinet weighing less than 100 pounds. The whole system is easily installed on most rooftops.

All the components of the system are fully developed in production. The antenna itself, made of fiberglass with aluminum sprayed on is by Prodelin, Inc., of Hightstown, NJ. A low-noise preamplifier, attached directly in back of the center of the antenna, is a GAAS FET unit by Scientific Communications of Garland, Texas, with 62 dB of gain, noise figure of 93 degrees Kelvin. The main receiver is from Comtech Laboratories of Smithtown, NY. It takes in the 4 MHz down signal and produces the baseband signal.

Quality of the voice and music signals was excellent. Philip Schneider, executive vice president of RCA Americom, pointed out that the single-repeater operation allowed maintenance of at least 65 dB of S/N ratio, with optional bandwidths of 5,8 and 15 kHz.

Six-foot satellite antenna on office roof.

Over-The-Air Pay TV Gets Going

BTVision, Inc. got its over-the-air pay TV system going in East Orange, New Jersey, March 1 and several other subscriber TV broadcast systems are getting ready to go.

BTV is offering Wometco Home Theatre to subscribers on a per-channel basis. The subscriber will pay about $12.95 per month for programming on channel 68, WBTB-TV, between the hours of 8:00 pm and 2:00 am. The programming will consist mainly of first run films and specials. Wometco plans additional over-the-air systems and is ahead of subscriber projections in its East Orange project.

The subscriber also pays an installation charge for a Blonder Tongue Laboratories decoder which has its own antenna and plays the programming on Channel 3.

A similar system went on the air in Los Angeles over Channel 52 on April 1. This is a joint venture between National Subscription Television, headed up by Jerry Perrechio, and Oak Broadcasting, licensee of KBSC. Oak Industries manufactures the decoder used in this system. Costs to the subscriber is $17 monthly plus installation charges and a deposit.

UHF Lobby Asks For Noise Reduction

The Council for UHF Broadcasting (CUB) has called on the FCC to reduce its allowable noise specifications for UHF to ten decibels within two and a half years. Present FCC rules specify that TV sets must have noise figures of 18 decibels or better.

Phillip A. Rubin of the Corporation for Public Broadcasting (CPB), which helped found CUB, explained that "every three decibels which sets are improved is equivalent to doubling the power of a station's transmitter."

The comparable noise figure for VHF receivers is approximately seven or eight decibels.

Even with the proposed parity of noise figures between the bands, UHF would continue to operate at a disadvantage with the handicaps of antennas design, propagation and tuner design, according to CUB.

NCTA Outlines Air Safety Plan

The National Cable Television Association has put forth a five-point program which it says will prevent frequency interference between cable TV and critical air navigational and emergency frequencies.

This potentially hazardous problem has been under considerable scrutiny since an interference incident in April of 1976, involving a CATV system in the Harrisburg, Pa. area. In this case, the local cable system was discovered to be interfering with the Harrisburg air traffic control approach frequency of 118.25 MHz.

In its plan, the NCTA claims that a drastic reduction of bandwidth availability is not necessary as was proposed by the FCC.

Under the NCTA plan:

- A list will be maintained by each cable system of frequencies presently in use.
- Systems operating carriers in the 108-118 MHz air navigation band will operate with a minimum carrier offset of 25 kHz on those frequencies used by

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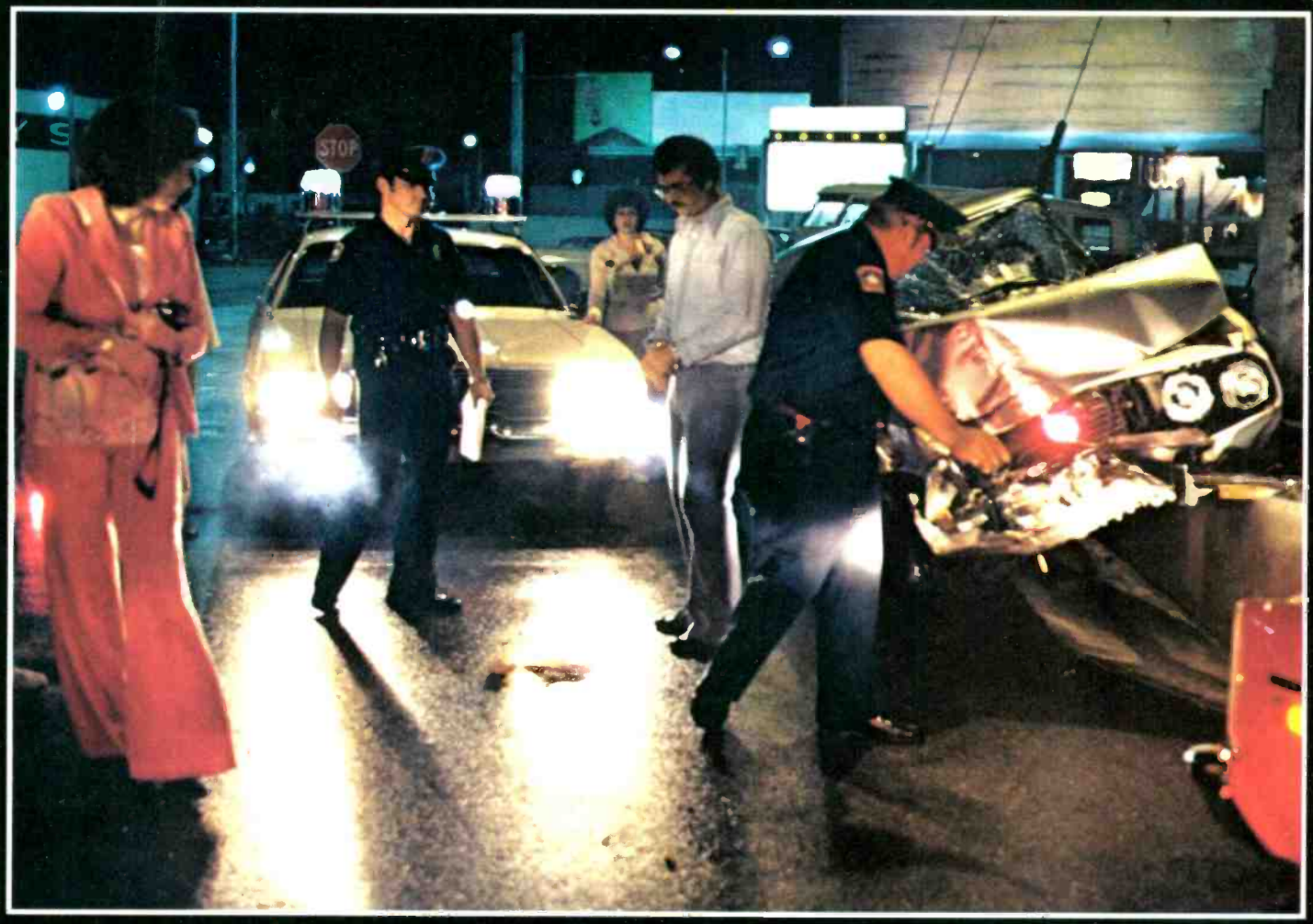

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air navigation facilities in the cable system's area.

- Systems operating carriers in the 118-174 or 216-300 MHz bands will offset appropriate carriers a minimum of 50 kHz from the emergency aircraft and vessel frequencies 121.5, 156.8 and 243 MHz.
- A responsible data collection program designed to develop suitable monitoring techniques and standards governing levels of leakage from cable systems will be set up. Levels needed to protect voice communications to aircraft have not yet been established.
- There is no need to impose total frequency channeling plan to control interference as these features are incorporated in preceeding recommendations.

The NCTA also noted that the Harrisburg incident, which did not cause "harmful interference," is the only reported case of cable annoyance to aircraft voice communications.

FCC Amends Definition Of Cable Systems

The FCC has adopted a number of changes in the definition of a cable television system, including the exemption of those systems with fewer than 500 subscribers from signal carriage restrictions.

This represents a compromise of an NCTA request to exempt systems with up to one thousand subscribers. But the FCC has indicated it will make a further ruling directed at stations in the 500-1000 subscriber range.

The Commission has also defined cable systems on a headend basis, except for signal carriage and franchising purposes. Such a definition is designed to simplify regulation and reduce paperwork.

An authorization for ad hoc filing of waiver requests to allow the extension of grandfathered signal carriage if minimal impact on broadcast stations can be demonstrated has also been granted.

CP Antennas for TV Finally Get Go Signal

Climaxing the several years of discussion, tests, and pro and con arguments, the FCC has amended its rules to make circularly polarized propagation acceptable for broadcast television, effective May 20, 1977. The big guns in the industry, as listed in the FCC notice, had lined up for and against CP for TV in nearly equal numbers, but the FCC found the pro arguments persuasive, especially the series of tests that gave good support to the contentions for CP. To the argument that economics would prevent many UHF stations from using CP, the FCC answered that the choice is up to each station—the rule is permissive, not mandatory.

Radio Network Rules Nearly All Removed

The rules which have governed the operation of the major radio networks since the 1940's have been, in the main, eliminated by the FCC, as a result of a year-long inquiry undertaken by the Commission. A new definition of "network" says it is any program source that feeds material to AM or FM stations entirely or chiefly by interconnection, so it is capable of simultaneous broadcast. This includes such services as Associated Press Radio and United Press Audio, in so far as the material can be broadcast as such. In general, the new status of radio networks reflects, says the FCC, the fact that there are now more than 8,000 radio stations in the US. Some of the items in the revised "statement of

continued on page 13

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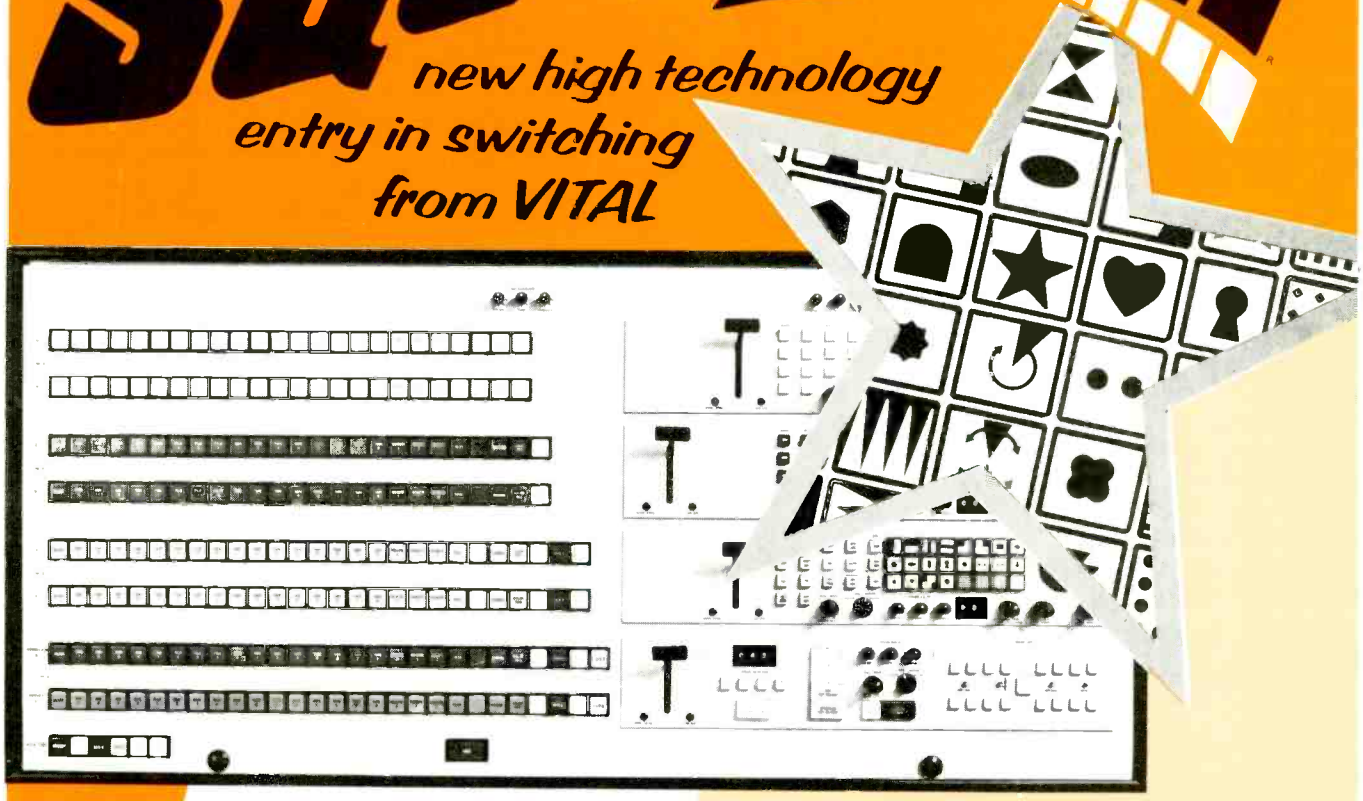

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We started with an annealed aluminum die-cast chassis.

Up to now selecting the right VCR deck or system left you with one major problem: To get the features you wanted, you had to pay a small fortune. Now there's Panasonic's new generation VCR. Series 9000. Two standard-performance decks. Two high-performance decks. And a high-performance, direct-drive editing system. Each with the kind of features and performance you may not find even in the most expensive ¾" decks.

Like an annealed aluminum die-cast chassis. For better stability of alignment, greater strength and long-term durability. Like individually removable cabinet panels on the outside. And low-density circuit boards on the inside. There's also a new jam-proof gear tape loading system. Less jitter. A high S/N ratio of 45 dB. And more.

For those who want a meaningful alternative in standard VCR performance, Panasonic offers the NV-9100 player. And the NV-9300 player/recorder with VHF and UHF tuners. Both decks include high resolution: 330 lines mono and 240 lines color. A VTR/TV antenna switch. An optional RF modulator. And just about everything else you need for the kind of picture you want.

There are also two high-performance, direct-drive decks. The NV-9200 player/recorder and the NV-9500 editing recorder. The NV-9200 gives you outstanding performance at a very affordable price. Because it gives you a direct-drive video head cylinder. Patented HPF video heads. Chroma level adjustments. As well as the capstan servo system.

The results: Highly stable color and black and white pictures with less jitter. High resolution: 330 lines mono and 250 lines color. And dubs that look more like masters than copies. But whether you use it as a high-quality master recorder, a CCTV studio deck or a dubbing deck, the NV-9200 will give you the performance you expect at a price you don't.

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With the NV-9500 editing recorder, you also get frame-by-frame insert and assembly edits that are crisp and clear. Without tear, roll or loss of chroma information. And with its two independently selectable audio channels, you can also edit audio without affecting video.

But perhaps the best part about the NV-9200 and the NV-9500 is what goes between them—the NV-A950 editing controller. With its five-minute memory for entry and exit points of video and audio inserts, the NV-A950 will let you perform insert and assembly edits automatically. What's more, at a complete system price of under $10,000 you can also achieve considerable savings over comparable editing systems.

And for complete ¾" mobility, Panasonic also offers the NV-9400 portable VCR, as well as the WV-2210 portable color camera. Both are compact, lightweight and operate on rechargeable Panalloid™ batteries.

But the best way to be convinced about our new VCR's is to see them in action. Ask your Panasonic dealer for a demonstration. He'll show you how to get the ¾" VCR system you want at a price you can afford. Series 9000 by Panasonic.

For more information write: Panasonic Company, Video Systems Division, One Panasonic Way, Secaucus, N.J. 07094. In Canada, contact Panasonic Video Systems Department, 40 Ronson Drive, Rexdale, Ontario M9W 1B5.

*Optional remote control for all Series 9000 decks shown below.

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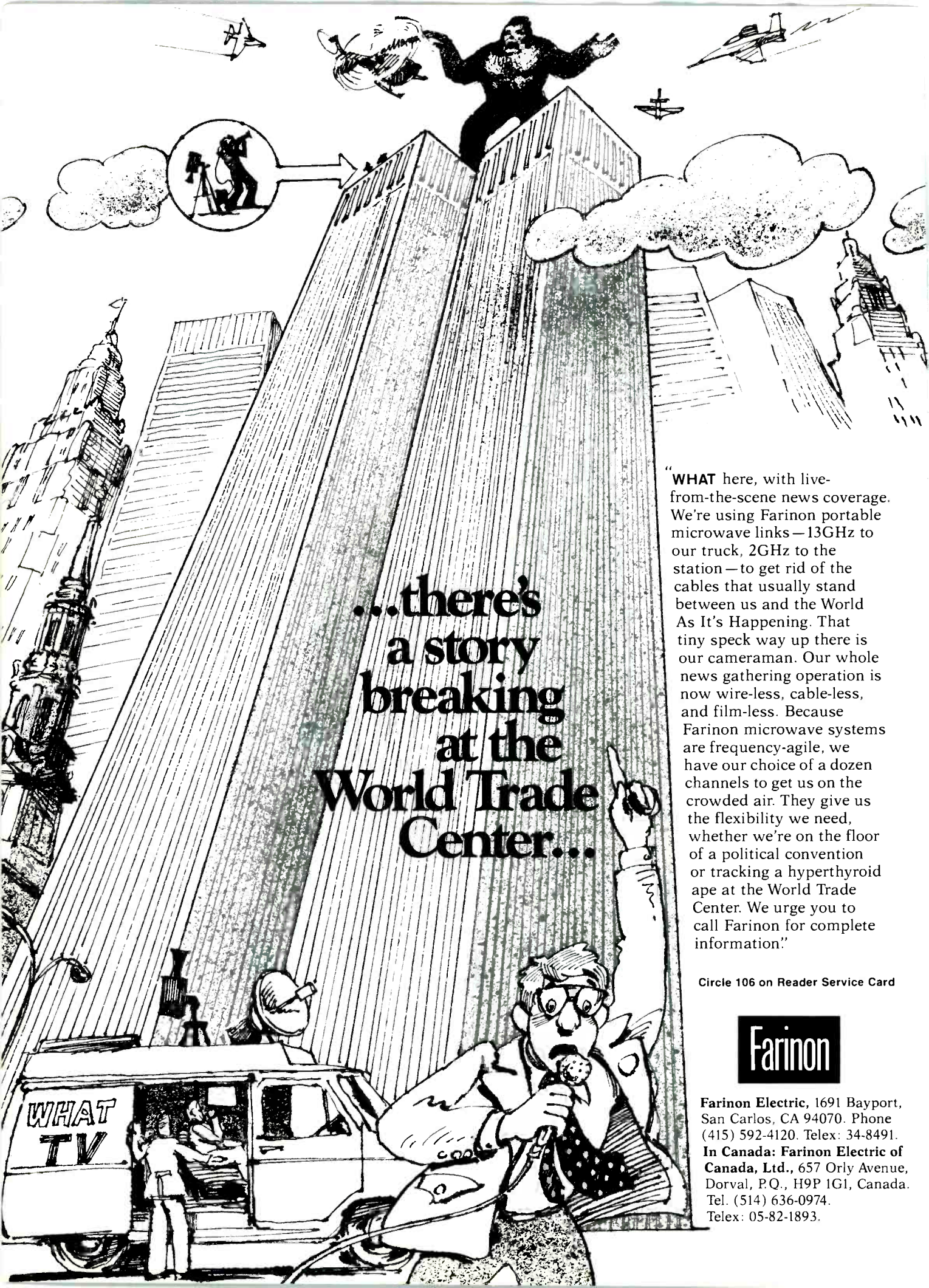

"**WHAT** here, with live-from-the-scene news coverage. We're using Farinon portable microwave links—13GHz to our truck, 2GHz to the station—to get rid of the cables that usually stand between us and the World As It's Happening. That tiny speck way up there is our cameraman. Our whole news gathering operation is now wire-less, cable-less, and film-less. Because Farinon microwave systems are frequency-agile, we have our choice of a dozen channels to get us on the crowded air. They give us the flexibility we need, whether we're on the floor of a political convention or tracking a hyperthyroid ape at the World Trade Center. We urge you to call Farinon for complete information."

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News

policy'' are: affiliates and networks must not enter into excessively long agreements; affiliates must always be free not to use network programming; networks should not interfere with affiliates choosing other sources, nor demand excessive option time nor try to influence non-network rates. Broadcasters interested in the complete, extensive new rules list should ask the FCC for decision in Docket 20721.

FCC Acts on Prime Time, Renewal Standards, Etc.

Among the long series of important actions by the FCC in recent weeks were the following: denied a plea to modify the ''prime time'' rule to prohibit showing more than one episode of a series in prime time each week (Report No. 14918); declined to adopt any quantitative standards for ''substantial program service'' in renewal hearings (Docket 19154); initiated an inquiry into the money activities of educational stations, such as auctions, sales, etc (Docket 21136); redefined a ''cable television system'' to exclude systems serving only subscribers in one or more multiple dwelling units and systems with fewer than 50 subscribers (Docket 20561); amended the multiple ownership rules to prohibit generally acquisition of a station resulting in common ownership of three stations where any two are within 100 miles of the third, with primary service overlap (Docket 20548).

US Court Says FCC Ruling Of Pay Cable Is Illegal

In a ruling that, if allowed to stand, would have momentous effects on the operations of cable television and its strained relations with TV broadcasting, Federal appeals court ruled on March 25th that the FCC has no authority to regulate pay cable. The whole question was remanded to the FCC for further review. The court at the same time affirmed the FCC rules for subscription over-the-air TV.

FCC Briefs

The June 1st **deadline for installation of type-approved monitors** on AM directional antenna arrays will not be extended, said the FCC; satisfactory quantities of approved units have been available for some time . . . . The FCC issued a list of **up-to-date forms** for broadcast applications and reports, taking into account the many recent changes . . . . The FCC asked for comments by May 20 on proposals to **drop-in VHF TV assignments** at Charleston, W. Va. (Ch 11); Johnstown, PA (Ch 8), or Altoona, PA (Ch 12); Knoxville, TN (Ch 8); Salt Lake City (Ch 13).

News Briefs

The **119th Technical Conference and Equipment Exhibit** of the SMPTE will be held October 16-21, 1977 at the Century Plaza Hotel in Los Angeles . . . . The **Society of Cable Television Engineers** (SCTE) will relocate its headquarters to 1523 O St., NW, Washington, D.C.; telephone, (202) 332-3598 . . . . **SCTE** also announced the formation of the Southeastern Chapter, covering South Carolina, Georgia, Alabama and Florida. The new chapter can be contacted through Guy Lee, telephone: (404) 892-2288.

Ten radio and eight television stations owned by **Rust Craft Broadcasting Co.,** Pittsburgh, PA., and **Starr Broadcasting Group, Inc.,** Westport, CT, have joined the NAB. This brings the Association's total membership to

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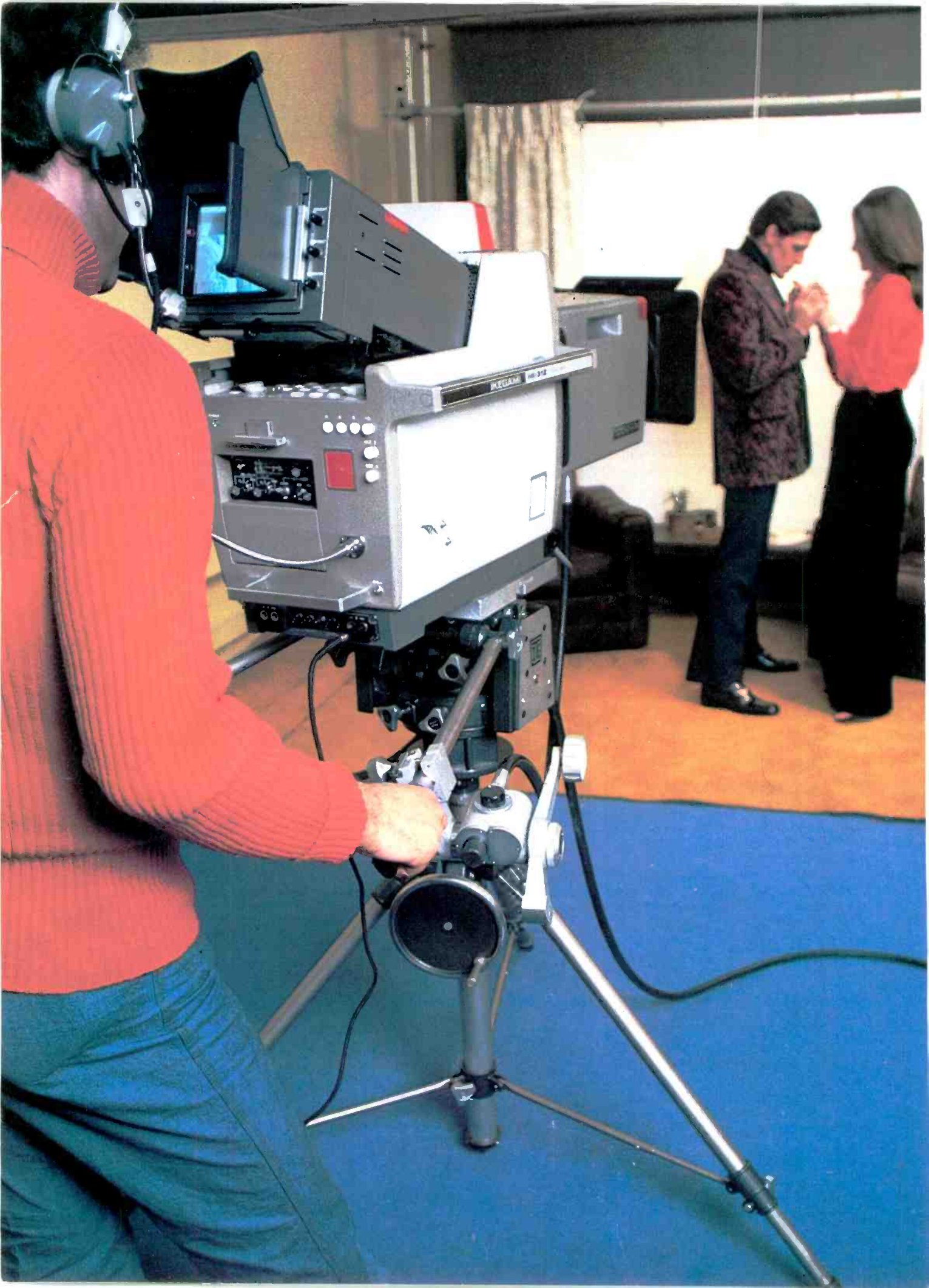


The fire, earthquake, election and touchdown company now brings you love scenes in Studio Two.

The new HK-312 studio camera from Ikegami, the ENG experts.

Wherever there's been news, from natural disasters to national elections to sport events, Ikegami ENG cameras have been there with the news teams. Now Ikegami makes news of its own: the introduction of our new state-of-the-art HK-312 studio and field camera.

We've built ENG cameras so good in the rough-and-tumble of news-gathering that more Ikegami ENG cameras are in use than all others combined. So imagine how good an Ikegami camera can be in the stable environment of a studio.

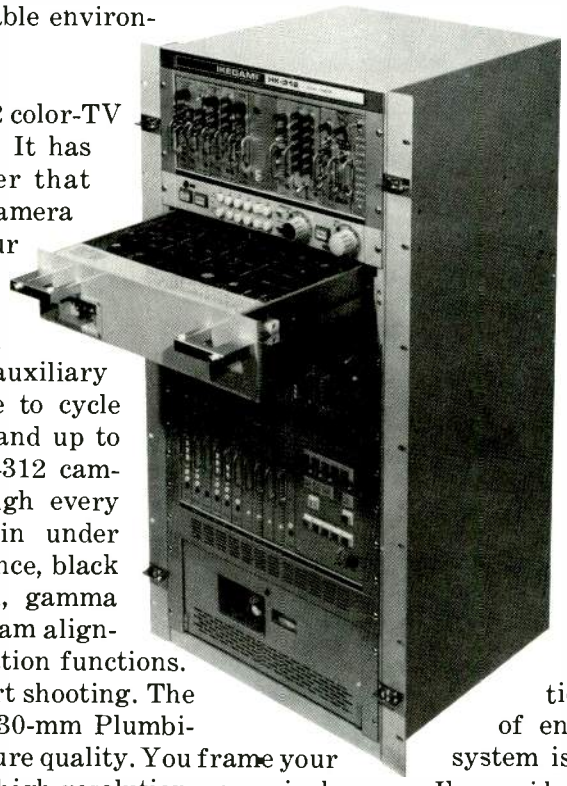
Very good indeed.

Ikegami's new HK-312 color-TV camera is like no other. It has a built-in minicomputer that helps trim the daily camera checkout from a one-hour ritual to an automatic run-through that's shorter than a 20-second commercial. With its auxiliary computer, you'll be able to cycle your Ikegami HK-312 (and up to four other Ikegami HK-312 cameras linked to it) through every adjustment parameter in under two minutes: white balance, black balance, flare correction, gamma correction, video gain, beam alignment, and eight registration functions.

All this before you start shooting. The HK-312 gives you three 30-mm Plumbicon tubes for highest picture quality. You frame your shot on a high-intensity, high-resolution, seven-inch tiltable viewfinder. Signal-to-noise ratio is better than 54 dB.

We've combined the zoom lens and camera tube into a single rigid assembly for highest accuracy of the optical axis. Class-A deflection amplifiers assure maximum linearity and best picture quality. Black level balance correction is automatic. Picture quality and brightness are maintained in spite of flare.

Camera-control unit for the HK-312



A complete two-line image enhancer provides horizontal and vertical detail correction. A special comb filter keeps background noise to a minimum.

All this and a lot more.

If your budget or production requirements are smaller, use our tried-and-tested TK-355 studio camera. Five were used for network feed at the 1976 Democratic National Convention where camera failure would blow a lot more than a few fuses.

The TK-355 uses three 25-mm Plumbicon tubes which are bias-lighted for reduced lag at low lighting levels. This reduces studio lighting and air conditioning power consumption. And the camera is more compact and lighter, a little easier to maneuver. The unique half-rack CCU facilitates multi-camera studio installations.

Both broadcast cameras use TV-81 minicable for ease of handling.

If you need a small, fixed-position camera for announcer booth and newscasting, check out the Ikegami HK-309. It can be operated remotely or simply turned on and left in fixed position.

For movies, the Ikegami TK-950 is a large-image film-chain broadcast camera system for 16-mm or 35-mm film or slides with highest quality color reproduction. Much of its operation is automatic, requiring a minimum of engineering support. Its unique optical system is dust-shielded and unusually compact.

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News

2409 AM stations, 1694 FM stations, 534 TV stations, the five national radio networks and the three national television networks.

NAB has **requested the FCC to amend forms** 301 (construction permits), 314 (assignment of license) and 315 (transfer of control) to make them shorter and less complex. Unnecessary questions could be eliminated, according to NAB, and the forms made similar to the new one page form for radio license renewal applications.

Lester W. Lindow, executive director of the **Association of Maximum Service Telecasters,** said in a statement to the press that MST was "disappointed that the FCC did not dismiss the short spaced VHF drop-in inquiry as it should have and that four drop-in proposals were selected for further consideration. MST apparently feels that the drop-ins will impair UHF in these areas and that the FCC's action will encourage additional pressure for VHF drop-ins in other locals working to the detriment of UHF in general . . . . President Carter has asked Congress to **increase its allocations for Radio Free Europe and Voice of America.** Part of the increased budget will be allocated for the purchase of a number of high powered transmitters.

Suffolk Cablevision, serving more than 65,000 subscribers on New York's Long Island, has cancelled its pay-TV sports programming, "Season Ticket," because of a court order obtained by a Long Island community restraining Suffolk Cablevision from advertising and marketing the sports channel to any new subscribers . . . . The first major **reorganization of the Associated Press' broadcast department** since it was founded in 1940 has been undertaken. Under the new structure, field operations of the department are being placed under the supervision of three general broadcast executives, one for the East, one for the Central states and one for the West. Each will have seven broadcast executives under his supervision.

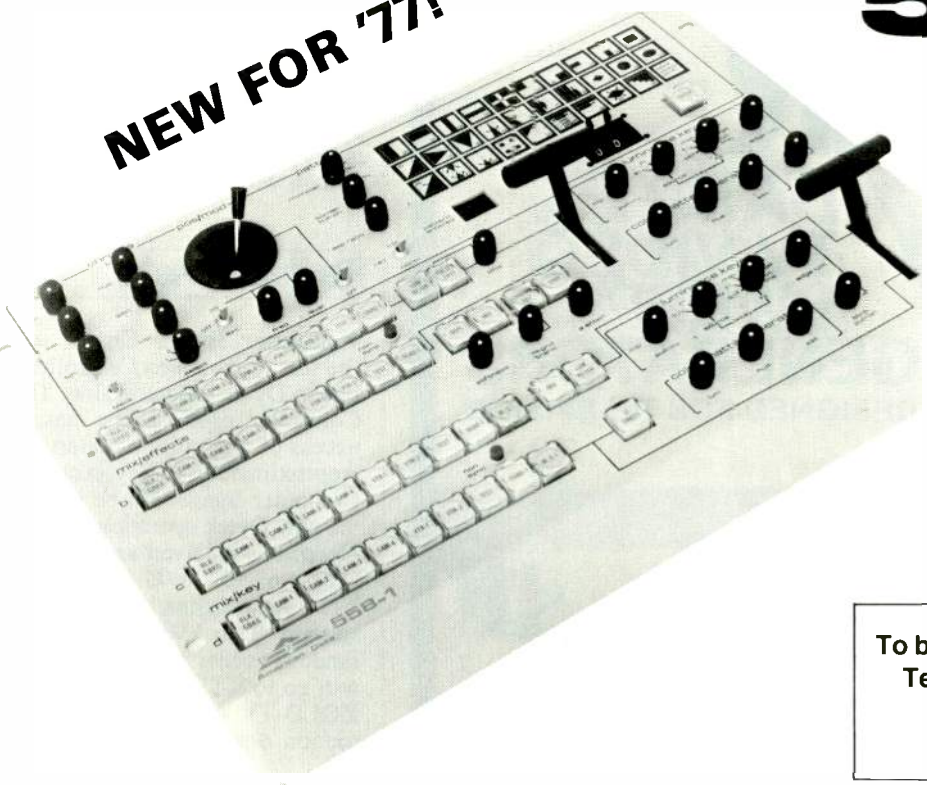
NCTA has urged the FCC to separate the issue of **franchise fee ceilings** from its pending rulemaking proceeding on certification and franchise standards. NCTA requested the FCC to put all parties on notice that fees more than the present 3-5 percent of gross subscriber revenues could not be adopted while the rulemaking proceeding was still unresolved.

Alex B. Best, staff engineer with Scientific-Atlanta, Inc., and **James W. Stilwell,** vice president of engineering development for Communications

continued on page 18

the AMERICAN DATA 558-1

NEW FOR '77!



To be shown at the International Television Symposium and Exhibition at Montreux—Stand 129

The 558-1 is a compact video processor that provides small studio and remote van operators with production capabilities found only in large studio systems. *Four Channel Parallel Video Processing* allows mix, wipe, luminance key, and chroma key functions to be performed *simultaneously* on a single mix/effects amplifier. This *revolutionary approach* to video systems flexibility is a continuation to the fourth generation of production switchers *pioneered by American Data.*

standard features:

- Nine primary inputs, including blackburst, plus five external key inputs.
- 100 soft wipe patterns, including rotational wipes; H and V multipliers; pattern positioner; pattern modulator, soft bordered wipes.
- Spotlight with 0-100% variable attenuation.
- Three independent key processing systems.
- Adjustable rate key blink; key invert.
- Two independent color matte generators.
- Full camera tally.
- Available for NTSC, PAL, PAL-M standards.

options:

- One Bus Quad Split.
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ADC WEST
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News Briefs

Properties, Inc., have been named recipients of the Outstanding Engineering Achievement Awards of the NCTA . . . . The **New Jersey Office of Cable Television** reports 16 percent increase in 1976 in the number of CATV subscribers statewide. The growth is expected to continue through 1977. Currently only 2 of the state's 21 counties remain without a cable system.

Business Briefs

Computer Image Corp. announced the sale of its Video Controller product line to Dytek Industries Inc. The Video Controller product line has sales in excess of one million dollars annually. Approximately 20 key personnel from Computer Image will be transferred to the new Dytek operation . . . . **Ampex Corp.** has received an order valued in excess of $500,000 from the **Evening News Association** to equip its four TV stations. Two AVR-3s and an RA-4000 random access television programmer will go to KTVY-TV; an ACR-25B to KOLD-TV and an HS-100C slow-motion disc recorder/player to WWJ-TV.

RCA has received an order valued at more than $800,000 to supply transmitting equipment to WITF-TV, Hersey, PA, a non-commercial station, and a $500,000 order from WDCN-TV, Nashville, TV, for the purchase of color cameras, VTRs, a telecine system and other broadcast equipment . . . . The **Nigerian Broadcasting Corp.** has placed into service two **RCA** equipped color TV mobile units valued at more than $2 million.

The **Philips Broadcast Equipment Corp.** is now offering its LDH-20 color camera system at a savings of more than $4500. The new price should be less than $23,250 . . . . **Harris Corp.** has expanded its sales and service network for its Laserfax 850 weather picture receiver system. **EMR Telemetry** of Sarasota, FL, has been appointed international distributor for this satellite communications system.

TeleMation, Inc. has been awarded a $268,000 contract by ARAMCO Services (Arab American Oil Company) for a color television production system to be installed at ARAMCO's headquarters in Dahran, Saudi Arabia. The system will include film chain cameras, a multiplexer, distribution switching system and sync generator. It will be used to produce videotapes from film and slides for distribution to headquarters' personnel.

Imero Fiorentino Associates will conduct the 6th Regional Lighting and

continued on page 20

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Most videotape editing systems overlook audio. They solve only half your editing problem. The Convergence ECS-1B Joystick Editing System with Liplock™ solves both, and sets a new world standard for speed and precision in selecting audio edit points on ¾" videocassettes.

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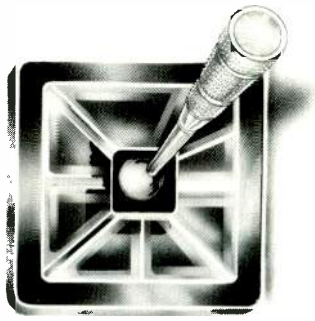

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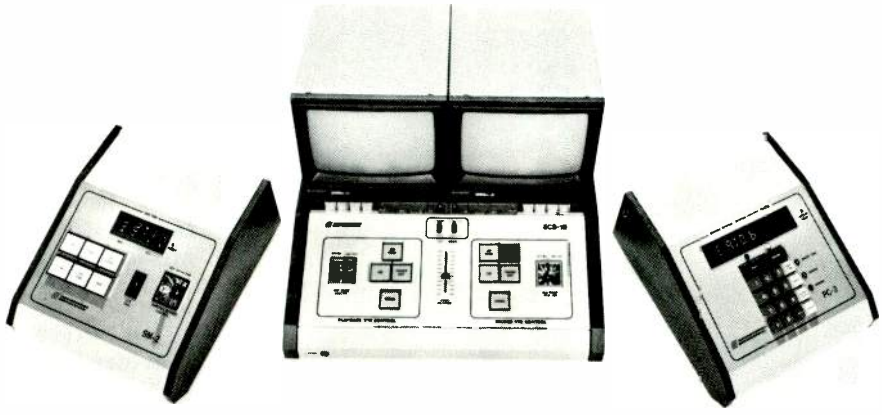

Circle 113 on Reader Service Card

Business Briefs

Staging Seminar/Workshop, June 13 through 15 at the New Jersey Public Television Studios, located on the outskirts of Trenton, NJ. Information on attending the session can be obtained by calling (212) 787-3050 . . . . **Sheridan Broadcasting Corp.,** licensee of WAMO AM/FM, Pittsburgh, PA, announced new call letters for the stations. The FM facility will remain WAMO but the AM facility is now WYJZ.

Christian Broadcasting Network has constructed a 10-meter dish earth station at its new CBN International Center, in Virginia Beach, VA. The transmit and receive station will be used to distribute non-denominational television programming on a 24-hour per day basis via the **RCA Americom Satellite** . . . . An $8.2 million order from the **U.S. Army** has been received by RCA for an additional 12 transportable ground stations.

Motion Picture Laboratories, Inc. has opened a new office located at 6990 Lake Ellenor Drive, Suite 120, Orlando, FL; phone (305) 857-2328 . . . . **Panavideo Productions Inc.,** a Forest Hills, NY production company, has expanded its production capacity with the addition of 2 new Hitachi SK-80 minicams and a microtime 2020 signal processor . . . . **Image Devices, Inc.,** of Miami, FL, has opened a branch office in Atlanta, GA, located in Suite 5, 1651 Phoenix Blvd.; phone (404) 996-0000.

SCTE (Society of Cable Television Engineers) has announced a contest to promote Sustaining Membership in the organization. The SCTE member signing up the most Sustaining Members will receive a $250 reward . . . . **John P. Kuehn** has been named Chief Engineer of **Audio Dynamics Corp.,** a BSR Company . . . . **Dynasciences** has appointed **Erwin (Bernie) Bernstein** as director of marketing.

Greenville Cablevision Associates, Greenville, SC, has awarded a contract for the construction of a 160-mile cable TV system to the CATV Installation & Equipment Operation of GTE Sylvania, Inc. . . . . **C-Cor Electronics Inc.** has signed a contract with **Tele-Media Company** for the expansion, strand mapping, system design and the supply of all electronic equipment for its Lake Erie System.

Belden Corp. has announced the establishment of a new western sales office to handle sales and service in the western states. It is located at 2222 Martin St., Douglas Plaza, Suite 220, Irvine, CA; phone: (714) 833-7700. Belden has also expanded its manufacturing space in Monticello, KY.

When you're shooting ENG, two things are certain: You never know where news will happen next. And you never know what will happen when you get there.

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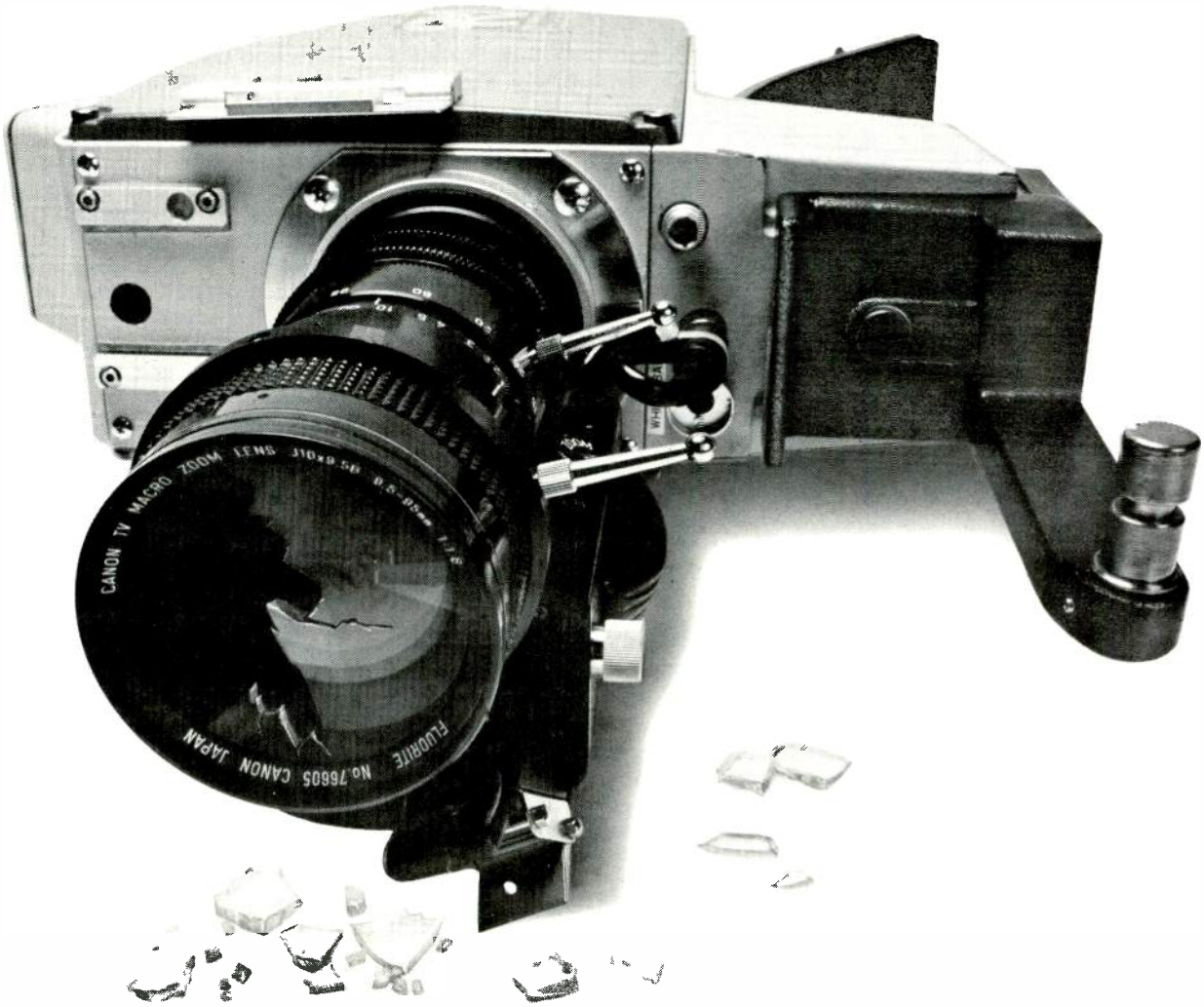
SOMETIMES, THE NEWS CAN HAVE TOO MUCH IMPACT.



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The "Winning Formats" Or You Can't Succeed In Radio Without Really Trying

WHAT ARE THE MAIN TRENDS in radio program success across the country?

An analysis of the fall/1976 Arbitron sweeps, prepared by the trade journal, Television/Radio Age, has several useful findings about what kinds of programming are winners today. These findings reinforce a number of the ideas advanced in *BM/E's* radio programming department since it started here four months ago.

First: there is no one kind of program that dominates the scene. The days of mostly-rock, hard rock, are gone. Diversification is in—there is a list of general kinds of programming most often used by successful stations:

- "Contemporary" music
- Beautiful music
- MOR
- All news
- All talk
- Rock (it's still there but down the list in many cities).
- Country

In medium to large markets, most successful stations have made a choice among this group and concentrated on that choice. But in very small markets it is more usual for a successful station to combine several of these elements: Television/Radio Age classified most of the small-market winners as "diversified" in format.

Large markets: many roads to success

Here are some examples from the largest markets. The top ten stations in New York were, in order: WABC, contemporary music; WOR, a "talker"; WINS, all news; WCBS, all news; WBLS, black-oriented; WRFM, beautiful music; WHN, country; WPLJ, rock; WCBS-FM, beautiful music; WMCA, talker.

That list makes the diversification point about as clearly as it could be made. There are more than 70 other radio stations on the New York dial, all struggling for bigger pieces of the pie. The top ten did not simply fall into the upper slots: they had to fight for their positions and the fact that they could win in a number of different ways is what we are saying here.

Los Angeles has a somewhat similar pattern with KABC, a talker, on top; followed by KBIG, pop-standard music; KHJ, contemporary music; KJOI, beautiful music; KNX, all news; KFWB, all news; etc. Chicago shows some differences, with WGN, a broad format of talk, news, pop music, in first; then WLS, contemporary music; WBBM, news; WLOO-FM, beautiful music; WLAK, beautiful music.

In Boston, WHDH, an MOR stations, shot from fifth to first during the year, and those following it were; WBZ, diversified; WEEI, all news; WJIB-FM, beautiful music; and WRKO, contemporary music. In Dallas, KVIL, an MOR station, passed WBAP, a country station, to reach top spot. KRLD, diversified, KNUS, contemporary, and KOAX, beautiful music, followed them.

The patterns in the other large markets are similar and what they all tell us is this: *any* of the popular formats can be ridden to success in a large city, depending on local competition conditions. So it is clear that it is the *quality of performance* that counts. That point is made over and over again by professionals in radio programming (see the profile of TM Programming, in this issue, for another such statement).

The point is especially forceful in the case of New York's WHN, making country music go in the biggest city with excellent promotion, balanced programming, ultra-smooth production.

Small markets: one station diversification

In the smallest markets, leadership in a great majority of cases was held by stations with formats broadly classified as "diversified." This is hardly unexpected: a single specialized format cannot find enough constituents in a small community to support a radio station. All-news, for example, was shown to be no-go in small communities by the failure of NBC's NIS (while all-news stations, as noted in the foregoing, are hitting the top rating groups in many larger cities).

The quality of performance in the small community includes, especially, successful identification with community interests, and service to the community, on many fronts. That kind of activity, well done, is an essential to success. The manager of the small-community station needs sensitive lines of communication into all parts of his audience, to keep assurance he is "right" with them. That communication will tell him more about how to program his station than the charts on format performance in a hundred other cities.

Program Sources

Chicago Opera syndicated across country by WFMT

The Lyric Opera of Chicago, one of the prides of the Windy City, was scheduled to go on the air on more than 200 stations around the country starting April 23 (after this was written), in a syndication operation by WFMT, Chicago, FM good-music station. The series is offered to each city's commercial concert-music station where one exists, or to a non-commercial station if not picked up commercially. Allstate Insurance Companies buy the time on commercial stations and underwrite the broadcast on the non-commercial. Broadcasts will be on most Saturdays at 2 pm (Eastern time), the slot in which New York's Metropolitan Opera is heard; the Met broadcasts will end the week before the Chicago broadcasts start.

Distribution is on tapes sent out simultaneously to all stations in the network. Tapes are available in both two-channel and four-channel stereo (the latter in SQ encoding). WFMT has for several years similarly syndicated the Chicago Symphony. Interested program directors should get in touch with Jess Brodnax at WFMT, 500 North Michigan Blvd., Chicago 60611, tel., 312-751-7117.

"The Lively Wire": news from the National Enquirer

A syndicated news operation called

continued on page 24

Station Master.

You can virtually drive coast-to-coast without leaving the sound of a radio station using a Shure microphone. In fact, you'll encounter almost as many different models of Shure microphones as you will states.

Case in point: the Shure SM7. It features a wide-range, ultra-smooth frequency response with show 'n' tell switches that allow the user to select any of four microphone response curves: (1) flat response; (2) presence boost; (3) bass rolloff; and (4) presence boost with bass rolloff.

The SM7 also uses an innovative "air suspension" integral shock mount for super-isolation against mechanical and shock noise.

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The Shure SM7 is a unidirectional dynamic microphone with a 40 to 16,000 Hz frequency response. Noise reduction systems cut mechanical noises, breath "pop," wind, and electromagnetic hum. "Add-on" filter devices are unnecessary. The SM7's integral foam wind/"pop" filter reduces even difficult close-up breath sounds. Impedance is rated at 150 ohms for microphone inputs rated from 19 to 300 ohms. Output level: −57 dB (0 dB = 1 milliwatt per 10 microbars); open circuit voltage: −79 dB (0 dB = 1 volt per microbar).

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Radio Programming

"The Lively Wire," produced by the National Enquirer, country-wide weekly newspaper, will get into operation in mid-spring, according to Blair Walliser, former president of the Mutual radio network, who is heading up Communications Capitol Corporation, the syndicating unit (address: Time-Life Bldg., NY, NY). Material will go out in the form of scripts for 5 minute daily newscasts, five days a week. Stations can use the material repeatedly during the day or break it into shorter segments spread through the day. The material will come from the National Enquirer's weekly production of stories for its estimated 15 million readers which, Walliser says, is the largest weekly volume of original stories of any paper in the U.S. The material will be ". . . to (ordinary) news what rock is to music," he added pointing to the "lively" character of the Enquirer, with massive readership in the 18-45 age group.

Weather: direct interface with the U.S.

There are a number of ways for a radio station to get regular weather information which can be put into news programs, including the excellent coverage by the major wire services.

However, if a radio management wants faster, or more frequent, or more detailed weather information, including bulletins on severe weather conditions and official weather warnings for particular areas, there are several ways to interface directly with the U.S. Weather Service (now part of the National Oceanic and Atmospheric Administration or NOAA). Two popular methods are the direct NOAA teletype service and the newer NOAA Weather Radio, which supplies official reports in audio form that can be put directly on the air.

Weather teletype. This is a 24-hour-a-day service that comes by telephone line from the nearest regional forecasting office. Generally two kinds of service are available: one directed just to the city and its environs, the second covering a wider area. A radio station wanting this service can probably get it lined up quickest by calling the commercial department of the local telephone company, who will be thoroughly familiar with the procedure: the radio station would have to make a contract with the telephone company in any case.

To encourage use of the service by news media, NOAA pays the line charges from their regional office into the telephone company office in the radio station's city. The station pays

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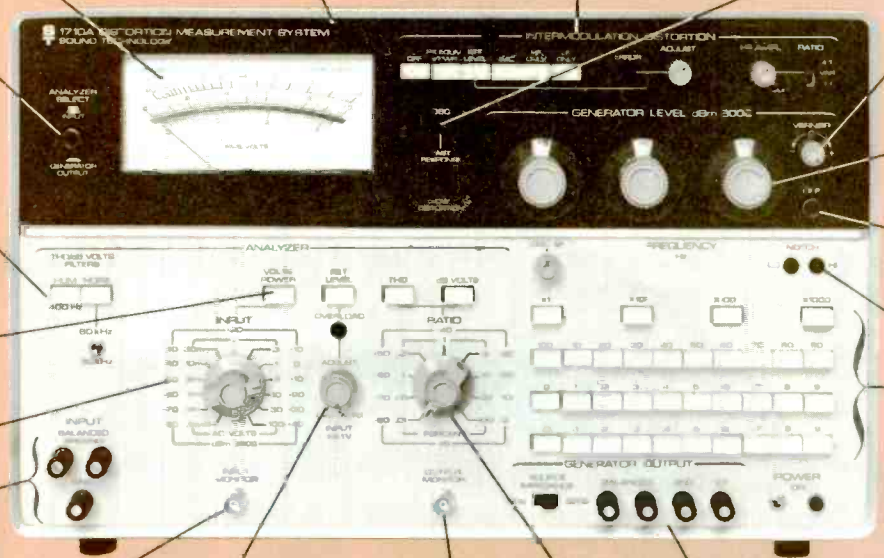
Here's how useful a distortion analyzer can be



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

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

Secondly, you can drive virtually any type of circuit from the signal source output — whether balanced, unbalanced, off-ground or whatever. That's because the signal source output circuit is fully **isolated and balanced.**

There is no output transformer to introduce noise or distortion.

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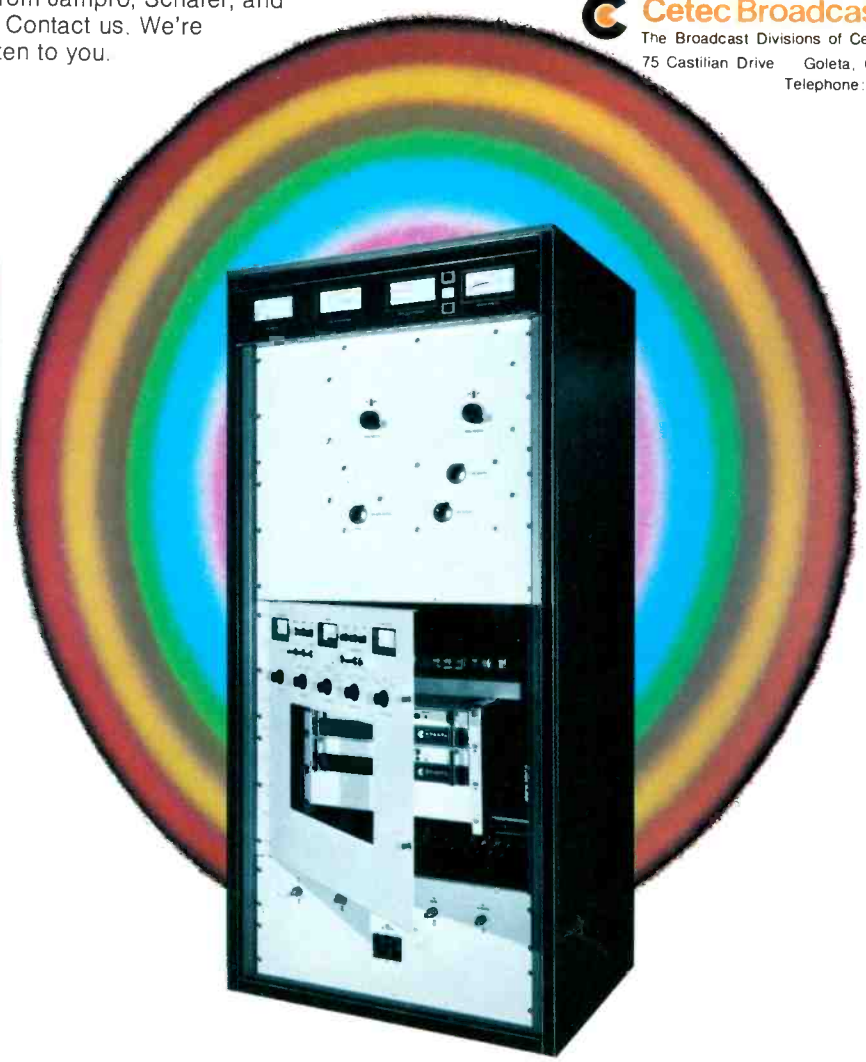

Circle 118 on Reader Service Card

the line charges from the telephone company central office to the broadcast studio. The teletypewriter equipment can, of course, be rented from the telephone company; or it can be owned by the station. If the station buys or already has a teletype machine, the only out of pocket cost of the service is the local line charge.

NOAA Weather Radio. This fairly new service consists of FM broadcasts from a number of stations around the country, on three frequencies—162.55, 162.40 and 162.375 MHz. This is also a 24-hour service and includes forecasts for the particular region, as well as severe weather warnings and other important weather information. Making it attractive for radio stations is the blanket authorization from the FCC to rebroadcast the material directly at any time. If the material is taped, it must be put on the air not more than an hour after the taping.

Receivers for NOAA Weather Radio are on the market in quantity.

At least 30 firms make one or more receivers apiece specifically for the NOAA Weather broadcasts, at prices ranging from about $15.00 (a fixed-tuned crystal kit) to about $200.00.

The NOAA broadcast stations are going up in many cities: as this is written there are more than 100 of them so that all medium to large cities and the great majority of small communities are within easy range of at least one station; eventually coverage will be total. If you want to check the service in your community, get in touch with the local office of the National Weather Service, U.S. Dept. of Commerce.

The real "golden oldies" have come back!

Fred Allen, Edgar Bergen and thirty or so more of the peerless program series of the great days of network radio have come back! In a sense they never went away: the programs (at least some of them) have been available in recorded form for years. But until fairly recently nobody wanted to put them on the air again.

Now many radio stations have begun to air the old programs, many of which had been on the shelf since they ended on the networks 30 years or more ago. The combination of radio's great comeback surge of the last few years (total radio take in 1976 was more than $2 billion!) plus the need for programming, especially talk programs, outside the standard music formats, plus the effort of a few organizations to get the old programs into use, has started a genuine revival. What used to be network staples now figure in the programming of individual stations looking for a "fresh" approach to their listeners.

Program Distributors, of 1001 Spring Street, Little Rock, Arkansas, has what may be the largest collection of the radio network favorites (*BM/E* would like to hear about other firms syndicating the old programs). The list will make anyone over 40 years old feel as though time had reeled back: Sam Spade, Ellery Queen, Sherlock Holmes, and other mystery favorites; Fred Allen (has there ever been another satirist in broadcasting who could touch him?), Phil Harris, Bob Hope (an earlier version!), Jimmy Durante, Abbot and Costello, Burns and Allen, Edgar Bergen, The Saint, The Inner Sanctum—there are a lot more but that gives the feeling.

Skip Kendel, manager of Program Distributors, reports a big upsurge in rentals just in the last year. He says the main problem now is that some of the best of the old series were not thoroughly recorded—only a few episodes have survived. Anybody have any of the old programs in a box somewhere? Let Skip Kendel and *BM/E* know about it.

Syndicators For Radio

TM Programming, Inc. (Subsidiary of TM Productions, Inc.)

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Dallas, TX 75247
Tel: 214-634-8511

WHAT HAPPENS TO THE LISTENING tastes of the millions of youngsters who grow up beyond their teen-age devotion to rock? As the country's young adults, they are obviously a prime target group of the radio industry.

The major syndicators, whose businesses depend on getting the right answer, have moved along with the young people. Bonneville (*BM/E*, January) has added their "Soft Rock" format. Schulke (*BM/E*, March) has concentrated on "Beautiful Music" as meeting the tastes of a large segment of the audience, and reaching into higher ages. Drake-Chenault (*BM/E*, April) has both a "Beautiful Music" and a rock format.

TM Programming, the subject of this month's profile, is another of the top syndicators, with around 200 subscribers across the country. TM has made what may be the most systematic study of the listening tastes of the young adult group. The study has encouraged and helped direct the development of TM's most recent format, which they call "Beautiful Rock."

TM Productions, the parent company, has been a producer of commercials, IDs and other promotional material for radio for the past 13 years. TM Programming, the syndicated programming division, started off about six years ago and its effectiveness is evident in growth to the top group in the industry in that short period.

Jim Long, now president of TM Programming, started in the marketing end of TM Productions some 11 years ago. While working full time he got his masters degree in psychology and his doctor's degree in psychological counseling. His graduate studies were in part directed toward the very kind of preference-research problems he was later to tackle for TM Programming. It was evident, in Long's interview with *BM/E*, that his academic achievements have served to sharpen, rather than dull, his feeling for popular music and the imperatives of radio station operation, developed through his years at TM. The growing complexity of programming choice on the national scene makes his additional skills highly relevant.

Psychological research pins music likes

With that background, we can understand why Jim Long and his associates decided several years back on a very ambitious project to pin down the likes and dislikes of that young adult audience, going beyond such "external indicators" as radio airplay and hit charts. They had already decided, based on their collective experience in programming, that a mellower rock was the music they wanted for their group. But at that time, Jim Long points out, the American music industry was not producing enough such music to make up a full radio format.

In the last two to three years, the quantity of the more mellow music has been sharply on the rise. As it went up, TM prepared to make the best use of it by careful audience studies.

The group TM was aiming for, the 25-44 slice, is often seen as the "top of the rock group" and the "lower end of the beautiful music group." Population statistics showed that in the 1980's this would be the largest segment of population in the country.

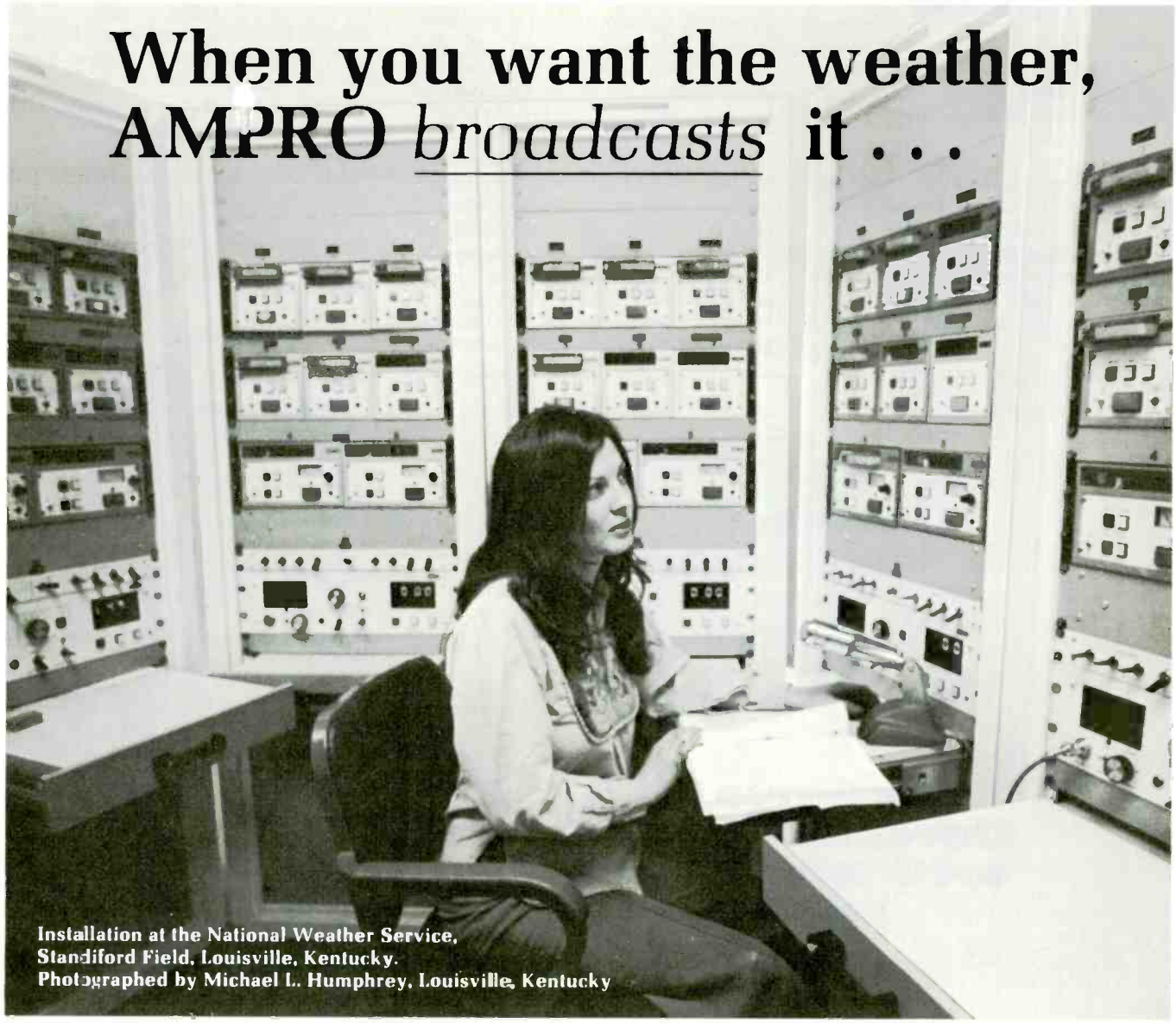
The music-preference study had two main parts. One consisted of five "focus groups" in different parts of the country, about 100 people each, who were followed over an extended period to find out what music they bought, what they listened to, which they liked best. At initial meetings, each member of the group was given a specific dollar sum to spend for records. There were regular meetings thereafter to gather the data, discuss it with the group.

TM also prepared some experimental tapes and tried them out on the groups. In analyzing reactions, Long used such psychology techniques as the "semantic similarity" and "semantic differential," sets of standard adjectives that pinpoint likes and dislikes.

The second part of the study consisted of telephone interviews with record store personnel, record distributors, rack jobbers and radio professionals, on a list carefully compiled by TM. The regular calls were directed not only to what music was selling to the target group, but also to general impressions and insights into the

continued on page 30

When you want the weather, AMPRO *broadcasts* it . . .



Installation at the National Weather Service,
Standiford Field, Louisville, Kentucky.
Photographed by Michael L. Humphrey, Louisville, Kentucky

Hurricane, tornado alert, winter storm watch . . . Ampro is the source equipment supplier for the National Weather Service national network of over 300 weather and emergency broadcasting stations . . . a critical application where the quality construction and rugged design of Ampro cartridge equipment pays off in continuous round-the-clock, month-after-month dependability. Ampro's reliability is coupled with top performance for your demanding studio applications.

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various activities in the music industry. The study also included careful listening to many stations which were using at least some of the kind of music on trial.

The format as finally developed combines matched—flow segments, for smoothness, with "category reels" that allow diversity in total programming and adjustment to different daypart requirements. The music can be blended in many ways by a station with three tape decks for alternating feeds.

Other formats

Getting this new format ready, however, is naturally just a part of what TM is doing. There are the several other formats on which the business has been built over the last six years:

"Beautiful Music, Series 1000-C" includes three basic tape categories, allowing custom-blending—up-tempo instrumentals; slow, lush instrumentals; and vocals. By controlling the play between three tape machines, the station can set its own tempo curves, put its sound anywhere from high-involvement foreground, to middle ground, to "background," according to competitive need. Basic library supplied is 175 hours of music; 72 additional hours are supplied each year.

"Beautiful Music, Series 2000-S." Provides a controlled, *high-intensity* character that may be required for success in highly competitive market situations, with other "beautiful music" formats in the market. TM says this format is not for every market, and must be handled with great care—they offer extensive advice on operating with it. The flow is carefully controlled in each quarter-hour segment.

"TM Stereo Rock." A rock format that eschews the "screaming DJ" and contests and other gimmicks designed for teenage audiences; it is, says TM, "main-line" rock, not hard rock nor acid rock, and thus captures the teenagers who have grown up but not lost their love of rock.

"TM Country." The programs are chosen with the guidance of award-winning country programmer Ric Libbey and are designed to supply the right blend of old and new, and all stylistic elements in the country tradition.

TM, with its long background in commercial and ID production, is well placed to supply the full-scale operational advice, customized IDs, promotional ideas, that go to every subscriber. As do several of the other large syndicators, TM undertakes to lay out an operational plan aimed at each station's particular market situation. Consultants in all aspects of station operation sit down with station personnel to make sure everything will hang together, and will make a unified, total impact on the listener.

However, Jim Long, like top personnel of other syndicators, emphasizes that in the end success is not possible without total dedication and effort by the station staff. The best format can lose all power if the station does a sloppy job of putting it on the air. News, community affairs, PSAs, all the other program segments needed to identify the station closely with the community, must *all* be produced in a smooth, professional manner to maintain the high image of the station. TM, says Jim Long, can give the right advice, but it cannot do the job for the radio station.

TM's rates range from a minimum of around $600 a month with full services, rise to about $2500 a month for stations in the largest markets. In their initial analysis of a station's market situation and prospects, supplied to prospective clients, TM, says Long, asks only that the station stay with them for two to four weeks while the analysis is made. Then, after studying the proposal, the station management can make a final decision. **BM/E**

LOOK who's bought OPTIMOD-FM

ABC Bartell *Bonneville International CBS* *Christian Broadcasting Metromedia* *Plough Broadcasting SJR Communications* *Sonderling Susquehanna*

AL	Birmingham	WVOK	LA	Houma	KHOM	NY	Ithaca	WEIV	TN	Memphis	WQUD
CA	Los Angeles	KMET	MA	Boston	WCOP	NY	Newfield	WOIV	TX	Houston	KAUM
CA	Los Angeles	KNX	MA	Boston	WCOZ	NY	New York	WCBS	TX	Houston	KQUE
CA	San Francisco	KCBS	MA	Boston	WEEI	NY	New York	WKTU	TX	Pasadena	KIKK
CA	San Francisco	KDFC	MD	Chevy Chase	WJMD	NY	New York	WNCN	UT	Salt Lake City	KSL
CA	San Francisco	KIOI	MD	Baltimore	WCAO	NY	New York	WNEW	VA	Fairfax	WEZR
CA	San Francisco	KOIT	ME	Orono	WPBC	NY	Wethersfield	WBIV	VA	Portsmouth	WXRI
CA	San Francisco	KSAN	MI	Detroit	WDRQ	NJ	Bayville	WOBM	WA	Seattle	KEUT
FL	Miami	WMJX	MI	Detroit	WRIF	NJ	South Belmar	WADB	WA	Seattle	KISW
FL	St. Petersburg	WSUN	MI	Detroit	WWWW	OH	Cincinnati	WEBN	WA	Tacoma	KTNT
GA	Atlanta	WKLS	MN	Minneapolis	KQRS	OH	Cincinnati	WLQA	DC	Washington	WASH
GA	Atlanta	WLTA	MN	Minneapolis	WCCO	OH	Cleveland	WCLV	DC	Washington	WHUR
GA	Atlanta	WPLO	MN	St. Paul	KSTP	OH	Cleveland	WQAL	DC	Washington	WKYS
IL	Chicago	WBBM	MO	Columbia	KFMZ	OH	Toledo	WLQR	DC	Washington	WMAL
IL	Chicago	WDAI	MO	St. Louis	KMOX	PA	Bala Cynwyd	WYSP	DC	Washington	WMOD
IL	Des Plaines	WJJD	MO	St. Louis	KSLQ	PA	Holland	WSBA	DC	Washington	WWDC
IL	Oak Park	WBMX	NC	Charlotte	WROQ	PA	Philadelphia	WCAU	Ont	Toronto	CFRB
IL	Skokie	WCLR	NC	Fayetteville	WQSM	PA	Philadelphia	WDAS	Man.	Winnipeg	CJOB
IN	Indianapolis	WFMS	NH	Laconia	WLNH	PA	Philadelphia	WMGK	Man.	Winnipeg	CKY
KS	Manhattan	KMKF	NY	Bristol Center	WMIV	PA	Philadelphia	WMMR	Que.	Hull	CKCH
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And that's only a fraction of the several hundred OPTIMOD-FM's already purchased. These sophisticated broadcasters have realized that OPTIMOD-FM is the first real breakthrough in FM signal processing in fifteen years. By combining compressor, limiter, and stereo generator in one integrated system, OPTIMOD-FM has given these stations 2 to 3 dB more loudness, absolute peak modulation control, tight bass, detailed midrange, and an open and transparent high end.

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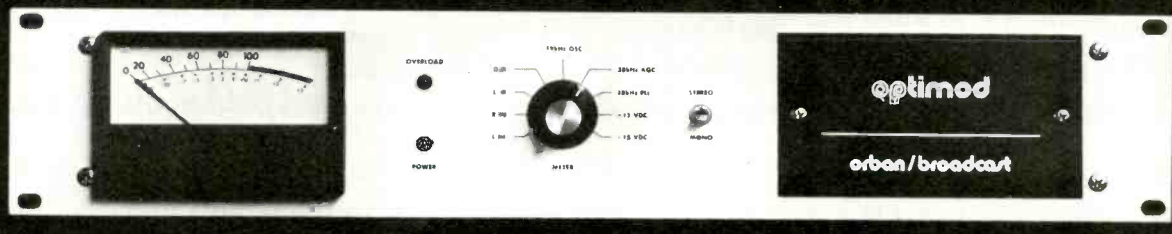

Orban/Broadcast products are manufactured by Orban Associates. San Francisco, CA

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Quad or the best comes

AVR-3

Ampex is the only company in the world that manufactures both helical and quad videotape recording systems.

The best of quad comes from Ampex. AVR-3 with "intelligence," Super High Band Pilot, and full teleproduction capabilities. AVR-2 with optional switchable Super High Band Pilot/High Band Color, plus optional EC-2 Edit Controller capability.

The best of helical comes from Ampex. VPR-1 with AST, a realistic alternative for broadcast applications, plus optional, broadcastable, slow motion, still-frame and editing capability. VPR-10 with a portable,

AVR-2

battery-powered field acquisition capability that's fully compatible with VPR-1 playback.

So you can get dependable guidance from Ampex, if that's what you need. And you can get the best of either quad or helical from Ampex as soon as your needs are defined.

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Helical, from Ampex.

VPR-1

VPR-10

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Latest Achievements, Future Tech Problems On Montreux Agenda

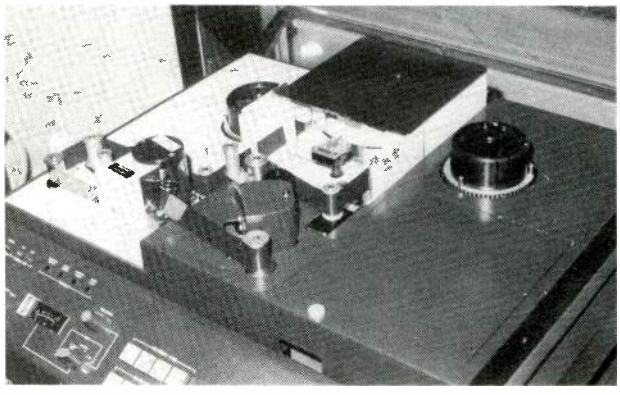
World's leading TV experts will gather at the 10th International Television Symposium, Montreux, June 3-10, to exchange ideas/knowledge. Exhibition promises to be spectacular; more American manufacturers participating.

PROGRESS IN DIGITAL EQUIPMENT and satellite distribution are two major topics at the forthcoming 10th International Television Symposium convening in Montreux, Switzerland, June 3 to 10. Other key topics will also be thoroughly explored at this important biennial event which now draws attendance of TV engineering experts from around the world.

Most of the opening day (June 3) papers will review the latest developments in television as they have occurred in various parts of the world over the last two years. On the second day, a roundtable conference of equipment manufacturers and broadcasters will discuss possible and desirable developments in the coming years. At parallel meetings from Monday, June 6, to Thursday, June 10, papers will be read on production engineering, progress in digital equipment, terrestrial and extra-terrestrial (satellite) distribution and transmission systems as well as cable television.

As has become the rule at the International Television Symposium, the morning meetings will, in general, be reserved for papers of fundamental importance, while the afternoon meetings will deal with more specific subjects and equipment specifications. The program has been arranged with the help of Messrs. H. Fix, Rundfunktechnisches Institut (Munich), J.A. Flaherty, Columbia Broadcasting System (New York), and J. Polonsky, Thomson-CSF (Paris). The Symposium is again held under the auspices of Mr. F. Locher, director general of Swiss Posts, Telephones and Telegraphs (PTT).

The Executive Committee is composed of Messrs. H.R. Probst, managing director of Radio-Suisse Ltd. (Bern), Prof. Dr. F. Borgnis, Federal Institute of Technology (Zurich) and R. Jaussi (Montreux).



Cartridge laying version of the one-inch BCN videotape recorder/player, above, will be shown by Robert Bosch GmbH. The new professional-quality one-inch VTRs are likely to create a lot of interest. Ampex is expected to show a PAL version of the VPR-1. Sony and Thomson-CSF will show the BVH-1000 in a Secam configuration.

Program details

What broadcasters want will be discussed by Messrs. W.G. Connolly, CBS; H. Fix, IRT; P. Hansen, Denmark Radio; H. Jushkevitshus, USSR-TV; T. Miura, NHK; P. Rainger, BBC; M. Remy, TDF. A status report on solid state pickup devices will be presented by Dr. K.H. Zaininger, RCA Research Labs, Princeton, N.J.

Among digital TV highlights will be lead papers on digital coding of TV signals by H.G. Musmann, Technische Universität Hannover, Hannover, and digital distribution of television signals by L.S. Golding, Digital Communications Corporation, Maryland. Digital video magnetic recording will be discussed by J.L. Baldwin, IBA, U.K.

A number of papers will discuss transmission of teletext data. Presentors will describe developments in the U.K., France, Germany and Italy—all of these countries have done more research on the subject than has the U.S., for example.

Among the CATV papers will be several discussing interactive systems planned or operating in Germany and Japan.

Stimulating exhibits

The Television Engineering Exhibition portion of the symposium is expected to draw a heavy number of buyers since many countries are still in the process of establishing their own national TV systems. Others are expanding their services.

More than 100 companies from 15 countries (Western and Eastern Europe, North America, Japan) will be exhibitors.

All classes of equipment will be shown with heavy emphasis on newer systems now emerging—electronic news reporting, electronic editing, use of VTR recorders, more sophisticated production and cable-, microwave- and satellite distribution. New digital video products will be highlighted by many. Digital developments in telecommunications equipment will be the special focus of a North American exhibit sponsored by *BM/E* Magazine. Companies in the *BM/E* exhibit area include Arvin/Echo, CMX, CVS, Convergence Corp., Farinon, System Concepts, Vital and Ward-Beck Systems Ltd.

Other U.S. exhibitors include American Data, Ampex, Berkey Colortran, Broadcast Electronics, Cinema Products, Conrac, Dynair, Harris, Hughes Aircraft, Innovative Television Equipment, IVC, JBL, Jer-

continued on page 36

STEADICAM™

Video/Film Camera Stabilizing System (Universal Model)

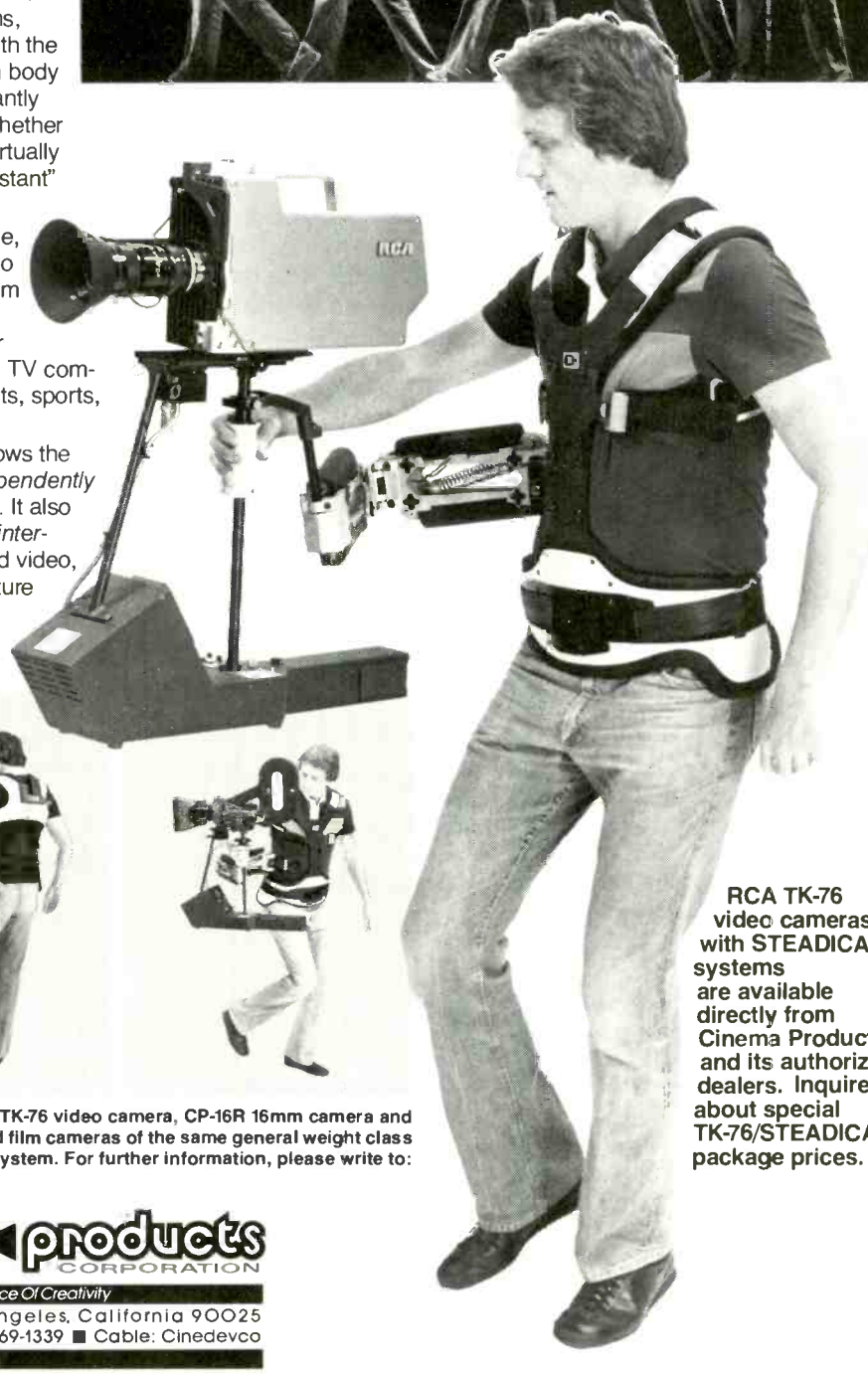
Video, 16mm or 35mm! If you shoot handheld, you *need* STEADICAM – Cinema Products' unique camera stabilizing system currently revolutionizing video and film production methods all over the world.

Designed to provide total freedom of movement while recording extremely steady and jitter-free handheld moving shots of dolly-quality smoothness, STEADICAM greatly enhances the creative latitude of the director and cameraman while effectively *reducing production costs.*

Releasing the camera from the constraints of dollies, tracks, and heavy camera platforms, STEADICAM permits the camera to move with the operator as if it were an extension of his own body and part of his internal "servo-system," constantly adjusting and correcting for body motions, whether walking or running. And STEADICAM turns virtually any vehicle – car, boat or aircraft – into an "instant" camera platform.

Whether on location or on a soundstage, STEADICAM permits the *handheld* camera to capture the scene with a new sense of realism and a steadiness of image never achieved before. It is ideal for use in the videotaping or filming of television specials, documentaries, TV commercials, live theatre productions and concerts, sports, and other special events.

The "Universal Model" STEADICAM allows the camera to be easily removed and used *independently* of the system, on-the-shoulder or on a tripod. It also permits the use of *one* STEADICAM system *interchangeably* with any one of several handheld video, 16mm or 35mm cameras – an important feature for television stations and production houses using *both* video and film cameras.



"Universal Model" STEADICAM shown in use with TK-76 video camera, CP-16R 16mm camera and CP-modified Arri IIC 35mm camera. Other video and film cameras of the same general weight class can also be adapted for use with the STEADICAM system. For further information, please write to:

RCA TK-76 video cameras with STEADICAM systems are available directly from Cinema Products and its authorized dealers. Inquire about special TK-76/STEADICAM package prices.

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rold, Eastman Kodak, Microtime, Microwave Associates, 3-M, Moseley Associates, Nurad, Oak, RCA, Recortec, Shure, Tektronix and TeleMation.

Among the larger European-based exhibitors will be AEG-Telefunken, Robert Bosch GmbH, Crow, Marconi, Philips, Rank, Siemans, Thomson-CSF. Cooperating group exhibits include those by the British Consulate, Elektroimpex Hungarian Foreign Trading Co., Kovo Foreign Trade Corp., Czechoslovakia.

Looking at some of the more popular equipment categories (based on information available to us at press time) the following can be expected:

ENG equipment: RCA will stress the TK-76 camera (in PAL and Secam), the HR-1020 portable recorder, TBC 1000 A and Tactec mobile radio equipment. Bosch Fernseh will stress the KCN camera in conjunction with two BCN portable recorders. Ikegami will be there with a full line of ENG cameras as will Sony. Philips will stress the Video 80 system as well as one-inch cameras for ENG. Thomson-CSF will have the Microcam. Link and EMI are expected to have ENG-type cameras. Sony will show its new 14.3 lb. record-only portable VTR and the 25 lb. BVR-100. Portable microwave equipment will be shown by Farinon and Microwave Associates. Nurad will show antennas for ENG use and in 2.5 MHz band. Editors for ENG will be stressed by Convergence Corp.

TBCs. For use with ENG equipment—and new one-inch recorders—standalone TBCs will be stressed by CVS, Microtime (the 2020 in PAL and Secam), Ampex, Quantel and perhaps others.

One-inch VTRs: Ampex, Sony and Bosch Fernseh will all be emphasizing, as strongly as they can, the virtues of their respective system. Sony's device will get an added boost because of the Secam and PAL version that will be sold by Thomson-CSF.

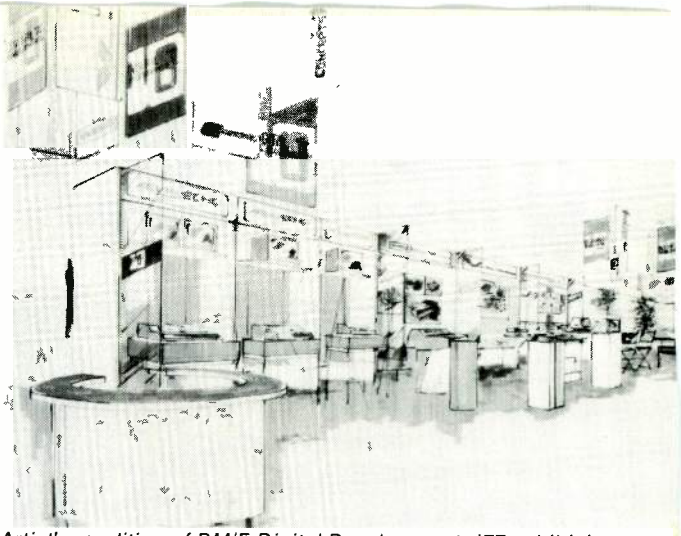
Bosch is likely to put on the most complete exhibition of one-inch devices. A working model of the new BCN-5, a portable 20-minute cassette type, will be demonstrated along with the BCN-20 reel machine. Playback of these portables through a new BC WQ portable playback processor is sufficiently stabilized for over-the-air broadcasts.

Bosch will also feature a digital frame store unit and transport control system that facilitates editing and turns the BCN system into an electronic still store or picture archive system. For editing purposes, the frame store offers single field display (stop motion), jogging and high speed search. (Another controller will show a slow-motion playback feature.)

A BCN 40/50 transport deck capable of playing a cartridge will also be shown. From this, it is a small step to arranging a series of cartridge players into a television automation system. This concept is expected to be shown at Montreux.

BCN systems will also be shown by IVC, which has an alternate portable recorder of its own now going into production, and Philips. Philips may be making announcements of its own regarding manufacturing plans.

Other recorders: Arvin/Echo Systems will show its floppy disc frame store approach found useful in covering sporting events and its system, BESS, for showing a series of electronic stills. Arvin may also unveil a slo-mo recorder.



Artist's rendition of BM/E Digital Developments '77 exhibit in Montreux, Switzerland.

Switchers/distribution systems: This is one area where U.S. manufacturers will by no means dominate but American Data and Vital will be there (and we suspect Grass Valley as part of the Tektronix exhibit). Dynair and TeleMation will be showing distribution systems. Vital will exhibit small switchers but will play a videotape of its capabilities in the automation and digital video effects area.

Large editors: CMX will show its systems which are internationally known for their versatility and unique features. They offer frame accuracy, color stable edits in less time and with less trouble than has ever before been possible. One feature is the ability to store a series of alternative edit decisions and then to do trial runs without re-entering a lot of information, making new time calculations, etc. RCA will show the AE-600 editing system and the new low-cost SE-1 system. Ampex may have the EDM-1 editor. Philips/Central Dynamics are expected to show the latest in editing techniques. Bosch-Fernseh is known to be into editing systems. A new system from them might be shown.

Character Generators: A great number of generator/graphics systems are likely to be displayed. System Concepts will show its microprocessor controlled approach to flexible, but inexpensive, character generation. Chyron will be represented in the Ampex stand. TeleMation will have its Compositor I system (featuring alphabets of several Mid-East nations). 3-M's Datavision system will be shown. A British firm, Aston, will be offering a product in this area.

Audio consoles: The best of the U.K., France, Germany and North America will be shown in this area. All of these countries pride themselves in their quality productions. Taking on all comers will be Ward-Beck Systems as part of the *BM/E* exhibit.

Other areas: Harris will be stressing the TC-80 camera with triax cable, TV transmitters (the BT-1300L with new visual exciter) and radio automation systems. Broadcast Electronics will show single and multiple cartridge players. Eastman Kodak will stress its high speed news film 7250. Tektronix will feature a Secam instrumentation station. It will also show 653 and 656 PAL and Secam Monitors, a Secam 143 signal generator and a 1480 Test Signal Generator with individual line identifying capability.

This preview obviously favors U.S. companies because of the availability of information at press time. A more comprehensive survey of International Television Symposium will appear in September. **BM/E**

WARC 1979—Setting Telecommunications Policies To The End Of The Century

By Frank W. Norwood

U.S. position at WARC could have important long range effects on how U.S. broadcasters conduct domestic operations.

Editors note to international readers:
While this article was prepared to provide an overview of the domestic issues at stake and how they affect or might affect U.S. users of the spectrum (particularly broadcasters), etc., we hope our international readers of this issue will benefit by a broader understanding of the competitive demands for more spectrum in Region 2.

UNLIKE THE WORLD ADMINISTRATIVE RADIO CONFERENCE which met in Geneva for six weeks early this year, the 1979 WARC will be a plenary session with a broad mandate to consider the entire electromagnetic spectrum and authority to make rules effecting all allocations for over-the-air services, broadcast and non-broadcast alike.

WARC meetings are convened by the International Telecommunications Union, a United Nations agency whose roots go back a hundred years to the earliest days on international telegraphy. Most WARC's are called to deal with a specific topic: the 1971 World Administrative Radio Conference on Space Telecommunications (WARC/ST) made new allocations at 2.5 GHz and in other bands for satellite services. The most recent WARC on Broadcast Satellites parceled out specific frequencies and orbital slots to European, African and Asian nations for satellite broadcasting in the 12 GHz band. (In the Western Hemisphere, space allocation of the band is shared with the fixed satellite service, and additional negotiations are to be undertaken at a regional meeting no later than 1982.)

In the United States, preparations for the 1979 meeting have been long underway. As with all WARC's, the FCC has established a Joint Government/Industry Committee with a wide range of subcommittees, called Service Working Groups, each dealing with the needs of a particular over-the-air service. Working parties under the aegis of the CCIR (International Radio Consultative Committee) have provided technical back-up and IRAC, the Interdepartmental Radio Advisory Committee, serves to coordinate the views and needs of government users of the spectrum.

The FCC's Third Notice of Inquiry both reviewed the issues and indicated the Commission's current thinking on the best trade-offs among conflicting interests. While many spectrum uses are involved, a substantial number impinge directly upon broadcasters and broadcasting.

Broadcaster's positions worked out by SWGs

The FCC's AM Spectrum Service Working Group has not only recommended that the present AM band be maintained, but urges that the allocation be extended at both ends. Current Commission proposals would extend the band downward to 525 kHz (creating a new channel at 530 on the dial) on a primary allocation basis in ITU Regions 1 (Europe and Africa) and 2 (Western Hemisphere), and upward to 1615 kHz on a shared primary basis in Region 2. (Present allocations at 1606, 1622 and 1646 kHz for auxiliary broadcast services would be continued on a secondary basis.)

Further expansion to 1805 kHz was suggested by the

continued on page 40

Frank W. Norwood is Executive Director fo the JCET (Joint Council on Educational Telecommunications), a Washington-based consortium on regional and national nonprofit organizations in education and public broadcasting.

The CVS Time Machine

It's the CVS-520, only digital TBC that can colorize a quad from the past . . . bring quad quality to today's ENG . . . and handle signal processing breakthroughs yet to come. In fact, just about any TBC job you can think of, the CVS-520 can do. For segmented and non-segmented VTRs, both quad and helical.

For example, the CVS-520 automatically detects direct or heterodyne color. So, you can switch at vertical intervals between any vertical locked VTRs, no matter what color system they use.

In addition, an automatic burst-add circuit provides burst at the output at all times (unless programmed to be deleted) even when you're processing monochrome signals.

There's also a built-in fully adjustable proc amp, a built-in digital drop out compensator, a line by line velocity corrector, and a gen-lockable sync generator. You also get digital output drives for future expansion.

As for quality, a few specs tell the CVS-520 story. Like a signal to noise ratio of 60 dB. A differential phase less than 2 degrees. And differential gain less than 2 percent.

In short, the CVS-520 is all the TBC you're likely to need for a long time to come. For a demonstration, call or write.

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AM SWG, but the Commission is withholding its support of that suggestion (such new stations would be beyond the tuning range of most present consumer sets), noting, however, that "additional spectrum space in this band for AM Broadcasting will continue to be considered in view of the potential heavy demand for new stations by commercial, non-commercial, and minority group applicants and in view of the direct public interest benefits of this service."

Another technique for creating room for additional stations gets a less enthusiastic response. In Regions 1 and 3 (Asia), plans have been adopted for reduced channel spacing (e.g., 8 or 9 kHz), but such a scheme applied in the U.S. would affect adjacent channel interference, the development of AM stereo, and would pose serious transition problems. Since the late 1930's, the last time a major program of station re-location was undertaken, the AM service has been greatly expanded through the widespread use of directional antennas, designed for use only on a specific frequency.

The FM Broadcasting SWG, noting that the FCC's original allocation of 2830 channels to 1858 communities is now 84% utilized, also seeks growing room for the younger aural service. The new terrestrial FM broadcast band which the SWG seeks, however, is in the hotly contested 470-890 MHz band, originally allocated to UHF television. At first the FM SWG sought 24 MHz at 782-806 MHz, TV channels 66-69. Later the request was amended to specify 806-830, spectrum now occupied by Land Mobile and a number of TV translators.

In fact, the 470-890 MHz spectrum is the locale of as much confusion and contention as the barroom brawl scene in a Hollywood western. The combatants include: Aeronautical Mobile, Broadcasting Satellites, Citizens Radio, the aforementioned FM Broadcasting, Maritime Mobile, Radio Astronomy and, of course, Land Mobile. Against all of these are arraigned the terrestrial TV broadcasters, hoping to hold off the invaders. And as if those were not enough, OTP says the government needs a total of 100 MHz for Fixed, Mobile and Mobile Satellite services of its own. Finally, independent of the 1979 WA RC preparations, Congressman Lionel Van Deerlin, chairman of the House Communications Subcommittee is eyeing the same piece of spectrum for a possible new terrestrial FM broadcast service: 450 narrowband channels for low power, low tower, local radio.

TV is not happy with any of it

The Television Broadcasting SWG opposes it all, of course, calling for a termination of Land Mobile's present access to UHF-TV channels 14-20 and requesting continuation of TV translators on channels 70-83. They point out that the number of UHF TV broadcast stations increased from 85 in 1960 to 352 in 1975. Now, more than 160 public television stations are in operation in the band, and the Public Broadcasting Service projects more than 420 stations in the band by the year 2000.

As for broadcasting satellites, the Satellite Broadcasting SWG actually requested 6 MHz for aural satellite broadcasting below the beleaguered band, in the 420-450 MHz region but Commission staff rejected the notion of sharing in those frequencies and unilaterally shifted the Satellite Broadcasting SWG's request to 470-806 MHz.

How such a vast array of irreconcilable differences are to be resolved remains to be seen. The Commission's only firm commitment is to ask the 1979 WARC to align the international frequency allocation table for Region 2 with U.S. domestic practice in the band 806-890 MHz, i.e., to allocate Mobile on a primary basis. Otherwise, it asks contending parties to slug it out.

"Since it is not possible to satisfy all broadcast and non-broadcast services stated spectrum requirements in the band between 470 and 890 MHz, each service is requested to provide justification which may provide a basis for selection of one service's requirements over the others. What quantitative and qualitative benefits are expected to derive from use of UHF spectrum for one service as compared with another? What opportunity benefits may be lost or future costs incurred due to inaccessibility of spectrum as between services?"

In October, 1976, the Commission formed a task force to assist in dealing with the vexing questions of the UHF-TV band, but the work of the task force is not yet far enough along to provide much indication of the eventual outcomes. One thing is clear, in reference to the 1979 WARC, and that is the FCC believes that "the United States must strive to maintain maximum flexibility when including requirements in the 470-806 MHz bands as in all bands."

Other broadcast signals to be considered

Two other forms of broadcasting figure in the 1979 WARC deliberations: international shortwave and satellite broadcasting.

American listeners, most of whom have a multitude of AM, FM and TV signals to choose from, often forget that over much of the surface of the earth the only available broadcast service is in the HF band. The Voice of America, the BBC World Service, Radio Moscow and the rest are, for many listeners around the world, more than occasional names in the news magazines.

Like those of most of the other services, the International Broadcasting Service Working Group would like more room to expand, seeking to double its present 2000 kHz allocation. But, the Commission notes that some 95% of U.S. HF broadcasting is undertaken by the government through the Voice of America and the Board for International Broadcasting (Radio Free Europe and Radio Liberty). Only ten HF transmitters are licensed through the FCC to non-government broadcasters. While U.S. program hours decreased in the 1970-72 time frame, according to the Stanton Study Commission, so did those of the U.S.S.R., and the total world figures remained essentially unchanged.

The Commission proposes not to add more International Broadcasting frequencies but looks to the longest range possibility of some frequency sharing between Fixed and Broadcasting services in this band, since International Broadcasting's frequency use is largely in the evening and mid-morning hours. Another approach (which appears to be more attractive to the FCC than to the practitioners) is the use of single side band. The technical questions of conversion to SSB are more complex in a broadcasting service than in other areas, and the CCIR currently has compatible SSB transmission for AM broadcasting under study.

As to broadcasting satellites, the principal question is whether additional frequencies are needed for a service for which there is no past, little present, but a potentially

significant future. Both proponents and opponents generally agree that, in this country at least, direct-to-home television is unlikely to be a real threat to either our present system of terrestrial TV broadcasting or to the growth of cable. Satellite broadcasting in a community reception mode, could, however, find a viable niche in the U.S. for specialized services (as in education and health) and might well be a major service in developing nations.

The Broadcasting Satellite SWG's pleas for additional allocations fell on ears which are, so far, stone deaf. In fact, one of the presently allocated bands, 2.5-2.69 GHz, is to be reduced according to present FCC thinking by reallocating the top 20 MHz to the radio astronomers. Requests to extend the Broadcasting Satellite allocation down to 2300 and to add a new band from 3400-3700 were turned aside, as were the requests for extending the present 11.7 GHz band to 12.5 GHz (as in Region 1) with co-allocation between Broadcasting and Fixed satellites, and sharing in the 19.7-21.2 GHz band currently allocated exclusively to Fixed Service satellites.

The reasoning on which the denials was based is subject to considerable question. The Third Notice of Inquiry assumes that spectrum adequate to broadcast satellite needs through the year 2000 can be provided in the present 2.5-2.69 and 11.7-12.2 GHz allocation. But the assumption is based upon the dubious proposition that broadcast satellites will be permitted to grab off 75% of the available orbital arc. Further, the Third NOI was issued before the conclusion of the 1977 RC on Broadcasting Satellites which dealt specifically with this band and made its decision on the basis of technical parameters far different, values which greatly reduce the number of broadcasting satellites that can be placed in orbit.

In their comments, Comsat and Satellite Business Systems urge that the Broadcasting Satellite Service's share of the 11.7-12.2 GHz band be reduced to zero, reserving that part of the spectrum exclusively for Fixed Service satellites in Region 2, and shifting the BSS allocation up to 12.2-12.75 GHz.

In that same 11.7-12.2 GHz band, the Television Broadcasting SWG requested continued co-allocation to terrestrial broadcasting. Although the international allocation exists, the FCC has not introduced such a terrestrial TV allocation in its own table because the U.S. position continues to favor suppression of all terrestrial services in the band to permit greatest flexibility in developing space services. (Existing auxiliary TV services are eventually to be removed.) Instead, the Commission proposed to meet future needs for terrestrial TV broadcasting by retaining the allocation in the 12.2-12.5 GHz region.

A good bit of "fine tuning" will still be required before the United States has its act together for Geneva in 1979. Even then, as the 1977 WARC well demonstrated, what the U.S. proposes and what ITU decisions emerge can be very different things, indeed. The U.S. proposals will be sound and sensible in direct proportion to the participation of knowledgeable and interested parties in the effected communications spheres. Thoughtful and lively debate is not only the democratic ideal, it is also a necessity in an arena in which the technical and market assessment problems are many and complex and in which no individual or agency has enough of the answers or a sufficiently clear view of the future to do the job alone. **BM/E**

TK-76: rain-checked at NAB.

Our NAB "rain shower" demonstration doused the TK-76 44 times. No other TV camera went through any test like it.

Viewers saw the TK-76 come right out of its case and go on-line from cold start to crisp picture in just five seconds.

And they watched the great pictures this portable delivered with only 20 foot-candles of light.

These are just a few of the high-performance features of the lightweight self-contained, highly automatic TK-76. It's no surprise that more than 400 are already in use.

If you missed seeing the TK-76 swinging in the rain at NAB, check with your RCA Representative.

Call him today.

RCA

The Dependables

NAB '77
Better Than Fantastic

In our Pre-NAB report in March, we predicted that NAB '77 would be a "Three Ring Circus." It was, but broadcasters didn't let the difficulty of getting from place to place dampen their enthusiasm for taking in this fabulous carnival of new products and trends.

☐ TV at NAB page 45.
☐ Radio at NAB page 97.
☐ Test Equipment at NAB page 124.

To help you get more information on products introduced at NAB, Reader Service Numbers are provided in specially marked boxes.

IT WAS A HECTIC NAB SHOW. It was a *good* show, (best yet, said many), but with exhibits spread out in three hotels, attendees were apprehensive that they had missed or would miss something. *BM/E* reporters were repeatedly stopped on the floor by visitors and invariably the question was, "What's the hottest thing at the show this year?" We hope to report on most everything we saw at the exhibits during those four busy days, March 27-30, but first let's answer briefly that key question as best we can.

"What's the hottest thing at the show?"

If you are a TV broadcaster, the answer has to be those digital video manipulators. If you are a radio broadcaster, it's a little harder to be unequivocal. We'd say ATS systems followed by AM stereo, which is still on the come. That is, there was a lot of talk about AM stereo but not much hardware. Most interesting radio exhibits to look at were those showing giant multi-cart random access automation systems.

Much very significant equipment was shown and there were definite trends that characterized the exhibits. One such trend was the application of microprocessors by dozens of equipment manufacturers. A new component that became the hallmark of several pieces of equipment was the surface acoustical wave filter—the S.A.W. filter, a remarkable little device that could be shaped to have very sharp cutoff. But first, those "hottest" equipments.

Television's hottest products

- The Digital Video Processor, the DVP-15 by NEC, as exhibited by Grass Valley, has to head our list. This unit, in conjunction with an NEC FS-15 frame synchronizer and a GV 1600 switching system, produced special effects heretofore not possible except optically. For four days, visitors were awed by such effects as variable picture compression, picture magnification, picture splits, hall of mirror effects, etc. But the NEC device was not alone in its class. Squeeze, zoom and freeze techniques were the highlight of the Vital exhibit. In principal, Vital could do everything shown by GV using its *own* video processor. But Vital had a few bugs to be cleaned up so we put NEC/GVG at the head of our list.

Privately, in the Micro Consultant's suite, Quantel Inc. demonstrated some 20 effects it could do with its Digital Framestore Processor, the DFP 5000. This unit should be on the market soon—either as a standalone device or from other switcher manufacturers who will be scrambling to offer these new digitally produced effects. (There will be other digital processor manufacturers, too. Digital Video Systems has been contacted by at least one switcher manufacturer, Duca Richardson, regarding the use of its digital video effects system.)

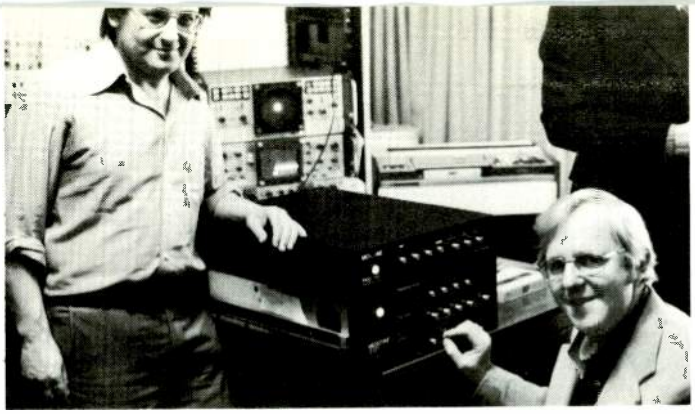
Noise reduction was an inherent feature of the DFP-5000 and that brings up the next class of hottest new products.

- Dramatic noise reduction capabilities were shown on the exhibit floor by Thomson-CSF and Microtime. The first is a digital device, but the latter was a highly refined analog processor.
- Convertible portable/studio cameras were a significant new development shown by CEI, Philips and others.
- New Saticon pick-up tubes were shown by Hitachi and RCA.
- A 14.3 lb. record-only ¾-in. cassette VTR was unveiled by Sony. This lightens the load for the one-man ENG crew.
- Cartridge-type portable recorders made their debut at the 1977 NAB. Bosch Fernseh showed a BCN console playing a cartridge and displayed a mock-up of a forthcoming cartridge portable field recorder. NEC showed a working under-30 lb. portable recorder using a cartridge.
- One inch professional quality recorders came into their own as evidenced by production line models shown by Bosch Fernseh, Ampex and Sony.
- Electronic still store is here in a variety of forms.
- Inexpensive slo-mo is here as demonstrated by Eigen (floppy disc) and Ampex (the VPR-1).
- Mini 2 GHz ENG microwave transmitters are now available from all the major microwave suppliers.

Radio's hottest products

- ATS systems that are ready for installation were shown by QEI, Telcomex and Widget Works.
- Super-sized random access multicart machines that can automate your system for weeks were displayed by three companies.
- There were more new audio processor from more manufacturers.
- There were more solid-state transmitters from more manufacturers.
- Growing application of processor logic in audio consoles was a trend.

There *was* a radio technical change of highest significance very much present at the show, even though scarcely represented on the exhibit floor: AM stereo. The "presence" of AM stereo was mostly in two events: a series of demonstration tapes reproducing experimental AM stereo programs put on jointly by Cetec-Sparta and radio station WKDC of Elmhurst, Illinois, using the Motorola system; and an AM stereo workshop, in the radio engineering program, that drew a full house of several hundred people. The



Yves Faroudja (left) displayed his latest enhancement device, Image Plus, which has been licensed to Microtime. Dave Acker of Microtime is on hand.

workshop would clearly have gone on two or three times the alloted hour and a half if all questions from the floor had been answered fully. Those questions showed that some large proportion of AM broadcasters are eager for stereo and the account of the workshop further on suggests *why* they are eager for it.

The "new" audio processing was quite like AM stereo in generating very strong interest at an engineering panel session. But interest in audio processing also had the stimulus of a considerable number of new systems on the floor aimed at the new, higher level of processing performance.

A brand new function in radio, automatic transmission systems or ATS, was represented by a scattering of equipment, or prototypes of equipment, or promises of equipment. This extremely important new line in radio technology obviously will take about a year to get underway.

The all-solid-state transmitter, which kicked up a fuss last year and the year before by simply appearing, was on hand in a few examples that hardly constituted a sweep. They represented, rather, steady slow growth. On the transmitter front, in general, most manufacturers continued to expand their lines, to make equipment for this function more competitive than ever. One noticeable trend was the appearance of several new high-power FM transmitters of 50 and 55 kW rating.

On the automation front, the multicart machine reached a startling new level of random-accessible program capacity with at least two systems holding 1000 or more carts at once. Automation systems almost without exception were improved, refined over earlier models, in a number of cases by the application of microprocessors to control.

Audio consoles, for years the biggest family on the floor, kept their front spot in the quantity race. It was more than quantity though: there was plenty of useful, even exciting refinement in console design, in the direction of easier operation, often through automation.

On the radio side, great strength appears, not on the spate of shake 'em up hardware innovations, but in the quality refinements in nearly every functional area of radio broadcasting. Accomplishments in this specific area continue on page 97.

TV AT NAB

You can't tell a box by looking at its cover

One of the more apparent developments in television technology displayed at NAB was the evolution of digital devices. The distinctions between framestore, field store, frame synchronizer and TBC are becoming blurred as more powerful microprocessors and increased memory permit the "black boxes" to solve more complex problems. In fact, the language of mathematics becomes more prevalent in the description of these new broadcast tools. It was not uncommon for a manufacturer to explain that the difference between his device and a competitor's is that "our arithmetic is better."

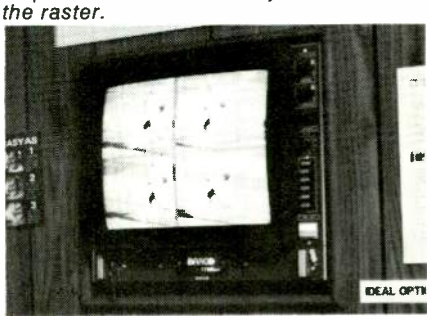
Time base correction, where all this digital technology got its start, is increasingly becoming a feature of the system rather than a sole function. Added to correction of time base errors is noise reduction, velocity error correction, dropout compensation and an ever increasing correction window. Though in many machines these tasks are add-on options, in some, they are integral. As memory chips become cheaper and more powerful, TBCs are beginning to come very close to the capacity of frame store devices. TRI introduced a TBC designated the DPS-1 (Digital Processing System) which it was reluctant to describe as "simply" a TBC. With a correction window of 32H lines and numerous options, the system is designed to expand to a full frame synchronizer.

In its basic configuration the DPS-1 uses a 4x subcarrier sampling rate and all controls use 256 levels through 8-bit application. Signal to noise ratio is better than 60 dB (P-P Video to RMS Noise), and the 32H window will pass VITS and VIRS. Considerable improvement on normal ENG gyro effects is claimed and, with the larger window, no floating window is needed. Another feature of the DPS-1 is a microprocessor controlled all digital proc-amp. The control panel is interfaced with the microprocessor so set-up is repeatable automatically. Blanking, burst and sync are all inserted by the TBC.

Microtime introduced a couple of innovations including something new in the TBC line. Just as you get a handle on "digital time base correction," Microtime brings you the first practical application of CCD (Charged Coupled Devices) technology to this field. The Microtime 1600 uses CCDs to create a TBC especially designed for remote and mobile use. Though its signal-to-noise ratio is rated at better than 50 dB as compared to a digital TBC like the 2020 at better than 58 dB, it is extremely compact, weighing less than 25 lbs., and uses less than 50 watts of power. This reduction in size and weight is attributable to the use of CCDs. During a demonstration of the device, John Larkworthy, president of Microtime, held up one of the 2020's boards next to the comparable CCD to show that all the memory in the board could be accommodated in the CCD which was about the size of common tin pillbox.

The reduction in size of the CCD TBC also results in a pleasant reduction in cost. The 1600, with a 4H window, will cost about one-third the

Steve Rutt displayed his $6800 Video Repositioner, the 1080. The device will "reposition new video" anywhere within the raster.



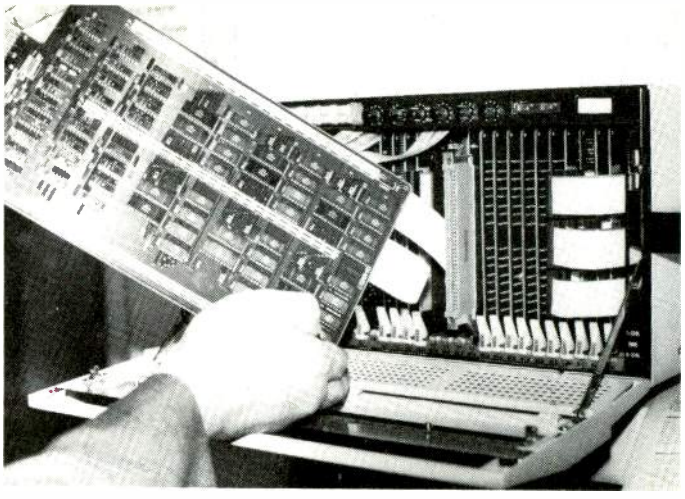
The 1080 is used in a variety of applications both in production and post production. Graphics, titles or other picture elements can be moved about to accommodate new requirements.

price of a comparable digital TBC.

Last year, Microtime introduced Image-X, a image enhancement device licensed to them by Yves Faroudja. This year Faroudja has licensed Microtime to manufacture a significantly improved device called Image Plus. Plus is a totally new product in its own right though it does represent an extension of the theory behind last year's Image-X; that analog systems could be as efficient as digital systems. Image Plus provides 6 dB improvement in luminance performance while color noise is reduced by up to 12 dB. Ringing, cross color errors, and group delay errors are also reduced. Initially the device will be marketed as a companion to the 2020 for an additional $7000 but should be available later as a standalone. In the demonstration significant improvement to a pre-recorded ¾ in. U type tape was quite apparent. The tape had been recorded by a TK-76 on a VO-3800 at night under street lamps. The light level seemed to be about 10 fc and the image without correction was clearly unusable. Chroma noise, moire, streaking and other impurities were removed to such a degree when the Image Plus was switched on that the resultant signal was clearly usable and the image was comparable to that produced by the new low light-level films.

CVS (Consolidated Video Systems) brought out a new PAL-M digital video signal processor which incorporates both time base correction and standards conversion. Designated the CVS-515, the new TBC accepts monochrome or color NTSC or PAL-M signals from any heterodyne VTR and produces stable, time base corrected PAL-M signals. With the standards converter used in the CVS-515, NTSC equipment can be used in PAL-M systems and programs can be easily interchanged between NTSC and PAL-M countries. Other features in the machine include sync generator with gen lock, correct color dropout compensator, line-by-line velocity compensator and a proc-amp. The CVS-515 correction window is 2 lines. Also new from CVS was a souped-up version of the 504B, called "Super B." The new model will pass VITS and VIRS and has a built-in remote control capability to allow users to remotely control video level, setup, hue and system phase. Also standard in the new version is a velocity corrector and a heterodyne phase corrector.

Frame synchronizers, like this TFS-121 from RCA, turned a lot of broadcasters on to the idea of special effects produced in the digital domain.



One of the memory boards from the new NEC FS-15. NEC has achieved a remarkable size reduction from their previous model.

Much of the activity in the CVS booth, however, centered around the CVS-520 which they'd introduced last year. With the increasing sophistication of the market, users are now hip to the import of the 4x subcarrier and 9 bit techniques employed in the 520. (In fact, the 4x subcarrier sampling rate is finding increasing acceptance across the line of digital equipment.) This bantam weight (25.1 lbs.) TBC has a number of features important to the user involved in ENG including Gyrocomp circuitry which is activated as soon as the correction window (3H) is exceeded. Instead of breakup, the special circuitry moves upward in one line steps giving the effect of a slight camera downward tilt. A plug-in option to expand the correction window an additional 30 times is also available.

The Sony BTV-1000 introduced at the show also includes gyroscopic circuitry, and uses a 3x subcarrier, 8 bit sampling approach. The Sony unit was specifically designed to be incorporated with the Sony 1-in. VTR system but handles highband and other helical type machines including the U-type cassette machines. With the BVH-1000 1-in. high band video recorder, the BVT-1000 provides locked recognizable picture from still-frame to seven times normal speed in color and greater than 30 times normal speed in monochrome. For U-matic playback, the BVT-1000 offers a 4H "floating window," heterodyne signal capacity and V-jitter correction. Incorporated into the features of the basic unit are velocity error correction, dropout compensation, proc-amp, advanced sync, color black output and an improved A/D converter that yields a higher than usual s/n ratio for an 8 bits system. S/N is rated 55 dB.

The DPS-1 TBC from TRI was also on display in the Digital Video Systems booth since DVS president, John Lowry, worked on its development. Lowry, of course, was one of the pioneers arguing for the 4x subcarrier sampling rate and must feel some pride at witnessing the growing number of devices using this approach. In addition to the features mentioned earlier, the DPS-1 has a full digital sync generator with gen lock derived subcarrier output from heterodyne VTRs; full NTSC advanced sync or vertical drive, automatic wrong field edit correction, digital velocity compensator; digital noise reduction and symmetry correction of the input burst prior to processing, and one line dropout compensation. There are a number of other features many of which are exclusive to the DSP-1 but perhaps the most outstanding feature apparent to the eye is the absence of knobs for signal control. Two-position switches accomplish all the necessary functions since the "fine tuning" is automatic through the microprocessor control interface. The basic unit should sell for between $14,000 and $14,500 though available options could add another $5000.

Another TBC that didn't make it into the cramped NAB exhibit floors came from Edutron which exhibited

continued on page 49

Arvin/Echo's EFS-1 Discassette® Recorder

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or a Name

or a Number

Arvin/Echo's framestor™ recorder has been remembering faces all over the globe, from the 1976 World Olympics to the Hollywood glitter of the Merv Griffin Show. It remembered faces at the Presidential Inauguration, The Kentucky Derby, The Indianapolis 500, The Barbara Walters/Harry Reasoner Show, and on and on and on. The EFS-1 is a regular on major networks in the United States and Canada . . . an accepted member of the broadcast elite.

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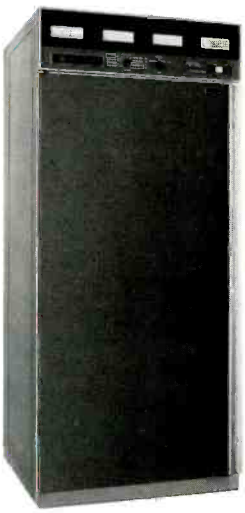

MW-1A, 100% solid-state one kilowatt transmitter

MW-50A, fifty kilowatt transmitter

MW-5A, five kilowatt transmitter

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the device in a suite at the Mayflower Hotel. Edutron's TBC-110A is an extraordinarily compact TBC using charge-storage analog memory and a 4x subcarrier sampling rate. This TBC will handle non-segmented helical scan VTRs and features direct or heterodyne color selection as well as mono. The correction window is greater than 17 microseconds and the full complement of features and controls available in higher priced models are available in this $4990 machine. The specs on the TBC-110A look quite good, including a s/n rating of greater than 55dB peak-to-peak video to RMS noise.

NEC displayed its NTC-5000 TBC with selectable correction window of 1, 2 and 4 horizontal lines (p-p). According to NEC, this new TBC is the only unit that will allow an observer to see a color-locked picture on the screen of a television monitor any time that the tape is in motion, either in re-wind or fast forward. Used in the editing system, this feature should provide the user with "moviola" style search capability. Included in the base price of $15,950 is dropout compensation and line-by-line type velocity compensation. The NTC-5000 is a PCM time base corrector designed for use with helical scan, direct and color under VTRs, including Quadraplex and U-type VTRs.

The Quantel DTC-300 from Micro Consultants was displayed. It is a modularly designed time base corrector for use with virtually all direct record VTRs. Options are available to permit the DTC-300 to work with heterodyne and small non-phased VTRs. A wide range of features and options are available and most can be added in the field through the use of additional boards. Some of the features are remote control, dropout compensator, look-ahead velocity compensation, sync generator driver and others.

Ampex displayed its TBC-1 which is the only TBC compatible with its VPR-1 ENG system. The TBC-1 features the "dynamic correction" system which combines "averaging" and line-by-line correction systems within the unit. The TBC-1 is also used as a studio companion to the Ampex ENG system to provide on-the-scene "live" capability of local news events.

Frame synchronizers change the way we see things

The process of digitizing the video signal begins to reach fruition in the form of frame synchronizers. The wide range of effects possible through the frame syncs plus the feature of handling non-synchronous signals promise

John Lowry, president, Digital Video Systems, demonstrates his DPS-1 which will be manufactured and distributed under license by TRI.

to give the broadcaster an entirely new way of approaching video production. Most of the frame syncs are outgrowths of the process begun with time base correction and in fact include time base correction as a necessary foundation when used to handle non-synchronous signals. The difference between a TBC and a frame synchronizer isn't really that great in theory but the size of the memory and the range of effects and applications dwarfs the capacity of a simple digital TBC.

As you will read later in this report, the advantages of frame synchronization have been applied to production switchers permitting not only the mix of non-synchronous signals with local signals but adding a range of special effects previously available only in film with optical effects. In theory, any of the frame synchronizers can be interfaced with the switchers and manufacturers of switchers indicated that most of them would be offering this package if demand should materialize.

One of the more dramatic offerings at NAB was the Grass Valley Group's use of an NEC FS-15 Frame Synchronizer and DVP-15, Digital Video Processor, interfaced through the DVE electronics to their Model 1600 7K production switcher. The range of effects possible drew constant crowds to GVG's booth. More on this later, but we mention it here to help set the stage for the unfolding of a scenario in which frame synchronizers begin to play an integral part in television production.

As standalone units, frame synchronizers continue to perform a number of useful tasks. NEC exhibited the FS-15, as a successor to the FS-10. The new unit will be distributed exclusively by The Grass Valley Group. The most apparent difference between the FS-10 and the new 15 is the drastic reduction in size. The FS-15 occupies only 8¾ ins. of vertical rack space and consumes approximately 250 VA. With the TBC option included the window of correction in fact becomes infinite since the FS-15 will read in two full fields at the input rate and clock out the signal from memory at the rate predetermined by the local reference.

The memory elements are 16K RAM chips of NEC's own design and are contained on six boards. Total memory capacity is 2.39 megabits, sufficient to store two fields. When used in conjunction with a freeze frame adapter (optional) the FS-15 becomes an effective alternative to disc type recorders for post production. In addition to post production applications and its usefulness in controlling non-synchronous signals from ENG operations or U-type recorders, the FS-15 also should be of value in satellite communication since it automatically corrects for doppler effects.

The problem in discussing some of these advances in digital TV technology is that in some cases we are dealing with "essentially small computers." Many of the effects, attributes, characteristics and functions of these machines are very similar from manufacturer to manufacturer. Though it is tempting to get into a discussion of which machines can do certain jobs it could be unintentionally misleading since much of what the various machines can do is determined more by the size of the memory used, the quality of the arithmetic and the intention of the software. Increasingly, we would expect manufacturers to tout the depth and breadth of their programming people back home as they try to sell the broadcaster. In fact, when we'd ask a manufacturer why his machine didn't do something that his competitor's did, the most frequent response was "we didn't set out to do that in our original program but if it's attractive to broadcasters, we'll change the program." Descriptions of systems on display in Washington follow but the thought to keep in mind is that beyond simple storage of single fields or frames, much depends on what additional memory and programming the various manufacturers chose to include in their machines either as standard or optional.

RCA, which introduced the TFS-121 Digital Video Synchronizer earlier, put on a sophisticated demonstration of its capabilities and effects. The TFS-121 digital video frame synchronizer is designed to produce a smooth intermix of remote and studio video, as are the other similar devices. The 4x subcarrier, 8-bit sampling techniques used in the TFS-121 provide a wide bandpass so that important picture elements are not skipped over.

The quality of the TFS-121 as a frame synchronizer is impressive but the full versatility of the device must

be accessed through a series of options. This is also true of the FS-15 from NEC which by itself is simply a frame synchronizer and requires the addition of numerous options for the user to get its full power. In the NEC device most of these options are related to the DVP-15 and will be discussed in conjunction with the GVG package demonstrated at NAB. The RCA options include picture compressor which enables the operator to shrink the fullsized picture to one-quarter size and position it in one of five positions in the raster. The positions are selected via a set of push buttons reminiscent of wipe pattern selector buttons on a production switcher. In addition, a joystick control is provided so that picture position can be varied continuously. With the joystick, the full-sized picture can be moved anywhere within the raster including completely out of the raster to be re-entered from any side. The joystick control, however, does leave something to be desired in the area of smoothness.

The picture freeze option allows the user to manually capture and retain a single picture for as long as desired. Should the input signal be lost, the TFS-121 retains the last picture until signal is restored and the machine resumes normal operation automatically. Numerous permutations of the basic functions of the freeze frames provide the user with a great number of possible effects and available techniques for producing interesting visuals. As one might expect, these options do not come cheap. RCA, which claims a better than competitive price for its system, attaches a price tag of $39,900 for its TFS-121 system with another $3,600 for the freeze frame option and $15,000 for the picture compression option. As is apparent from the price structure, once you have a frame synchronizer, freezing the picture is not that difficult but compression and its attendant effects are somewhat trickier.

As we got into this area of looking at the new digital devices it became clearer that some comparison to the computer field is justifiable. As one might expect most of these devices exist in a hierarchy similar to that in computers—all the way from microcomputers capable of solving relatively simple problems rapidly (i.e. the TBC) up to the full blown computer systems powerful enough to handle the most difficult and complex routines (digital effects and synchronization systems). Between these two extremes is a family of equipments in different stages of maturity and elaboration.

Digital Noise Reducer from Thomson-CSF provided remarkable improvement (9 or 12 dB) to noisy video.

Some companies demonstrated this hierarchy of digital equipment fairly clearly.

Micro Consultants and CVS fit into this category rather neatly. Each firm showed complete lines of digital video equipment all the way from A/D converters through elaborate digital video processing devices.

In addition to their TBC and A/D-D/A converters, Micro Consultants displayed a new DFS 1500 Digital Fieldstore Synchronizer which, in addition to its fieldstore capability, also serves as a high order time base corrector. It stores more than one and a half fields which is more than ample for handling VITS and VIRS. Just 7 ins. high and weighing only 50 lbs., the DFS 1500 dissipates only 250 VA. Ideally, according to Micro Consultants, the machine is best suited for installations where it is used in addition to the more powerful DFS 3000. The DFS 1500 is fine for the broadcaster that needs just synchronization and time base correction but for the special effects and full frame storage you have to move up.

The DFS 3000 has been around for awhile and has seen a lot of action in the field. Available options are remote time base correction features, frame or field freeze, video compression with the associated joystick positioner, and remote control. New this year is the Digital Production Control Option for the DFS 3000.

This new microprocessor controlled remote panel for use with later versions of DFS 3000 has a good retoire of special effects. These effects include frame of field freeze with facility for automatic update at operator selected intervals; video compressor with joystick plus five pre-selected positions on pushbuttons, automatic key so that the compressed image is measured from the center of the key area permitting the keyed image to track when the camera pans; variable transition time to enable the DFS 3000 to automatically wipe or move the compressed or full frame pictures with controlled, variable transition time, and an on-air compression/full frame switch which permits smooth cuts from the compressed to full frame picture. In a special invitation-only session in the Micro Consultants suite, a representative from Quantel demonstrated an even more powerful digital video devise, the DFS-5000. Since the device is not currently on the market, we will get back to it at the end of this section.

CVS (Consolidated Video Systems) also presented a complete line of digital devices. The broadcasters in attendance at the booth who showed considerable interest in the CVS-520 TBC also found cause to examine the CVS-620 full-frame synchronizer. The CVS-620 operates on a 9 bit 4 x subcarrier digital input derived from the CVS-520 and provides full frame freeze capability. Priced at $20,000, the CVS-620 is one of the least expensive digital frame synchronizers. For standalone operation, the 620 can be fed by a CVS-720 A/D converter priced at $5000.

The ultra compact CVS-620 uses just 3½ ins. of vertical rack space and is available with remote control of picture positioning. Up to four locations are selectable from the device's front panel. The 620 has diagnostic circuitry and internal test signal generator as well as two video inputs, one composite and the other selectable. A video compressor is optional.

As the power of these digital video processor/manipulators grows and further functions are articulated by the addition of memory and microprocessor control one can legitimately ask: "where is it all going?" The honest reply is that no one really knows but the limits of possibility keep receding. Representatives of Quantel, the British manufacturer, demonstrated a new machine for invited guests in the Micro Consultants' suite. The new machine, dubbed DFP 5000, is not yet on the market and the stated purpose of the demonstrations was to obtain from broadcasters some feedback on just how a machine of this magnitude might be employed. The device is a Digital Framestore Processor that features a synchronizer, time base correction, noise reduction, picture freeze, picture positioning, picture compression, picture squeezing (in both the horizontal and vertical directions) and picture expansion. Moreover, it does all this in just 8¾ ins. of vertical rack space.

The DFP 5000 is an outgrowth of the research done by Quantel in the field of standards conversion. Perhaps

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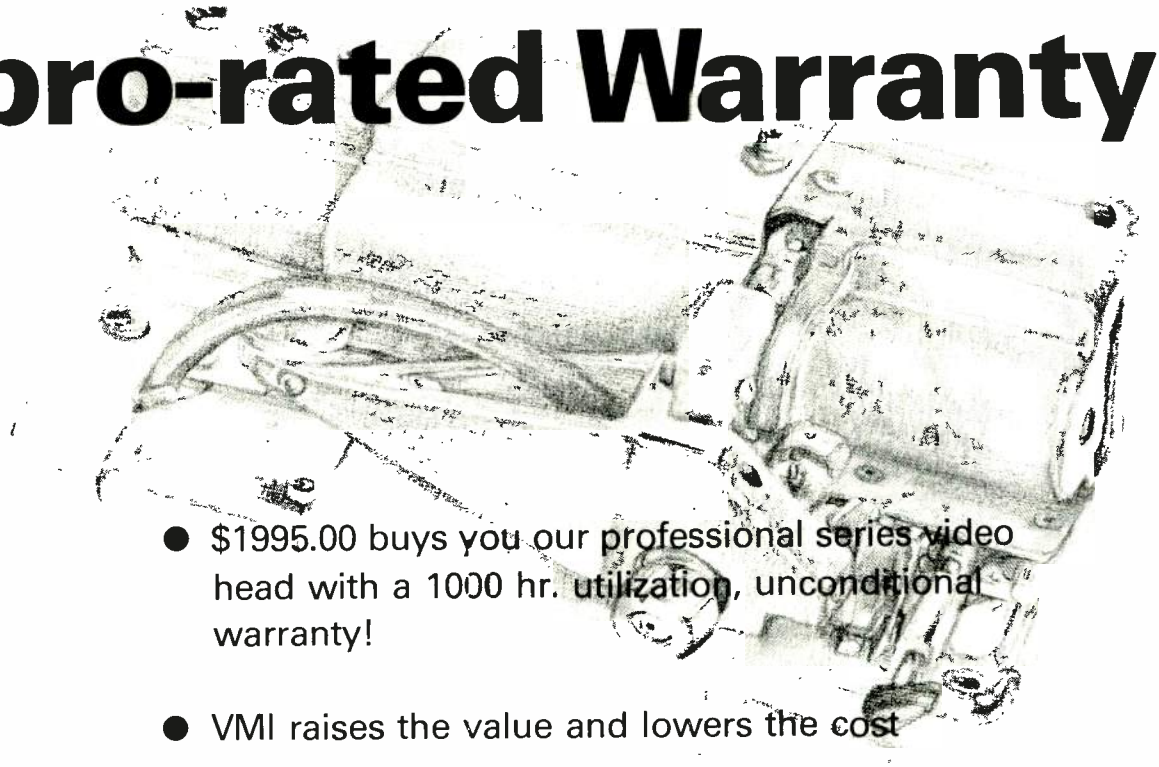

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chief among the benefits of that research was the necessity to "do arithmetic on every picture point" resulting in resolution of very high quality in every mode, especially in freeze frame.

The machine, when it is marketed will be expensive, probably well into the six figure bracket. Though the cost of components continues to drop across the board, much of the price of this machine is derived from the cost of research, development and programming.

Microprocessor control of the positioning faculties assures extremely smooth and precise movements. The machine does have a good, full frame synchronizer with all the attributes expected from such a machine and time base correction of considerable power to handle almost any signal source. The noise reduction feature provides noticeable improvement and in the demonstration completely eliminated any visible moire and other associated noise. Asked how many dB of improvement was being demonstrated, the operator declined a specific answer saying that the notion was inappropriate since too many variables were involved. Nevertheless, the improvement was dramatic.

Once the non-synchronous signal was synchronized, stabilized and the noise reduced, the machine was put through its paces. The picture freeze, as mentioned before, was very stable even when the image was frozen from motion. There was no flicker in luminance or chrominance and the resolution appeared excellent. Then the picture position control was brought into play.

The control panel is housed separately in a small box measuring only about 8 in. × 4 ins. × 4 ins. The controls are microprocessor controlled and the range of effects are established by a program. So far, some 20 or more possible programs have been designed. The so-called "smart" picture position control provides the facility to "pan and tilt" with camera-like smoothness. Because of the microprocessor control, the rate of pan and tilt is infinitely variable. The picture compression feature goes beyond the normal ¼ size picture compression. The compression is infinitely variable all the way down to zero and is quite smooth.

The picture can also be squeezed, both in the horizontal and vertical axis, allowing the aspect ratio to be varied infinitely. Picture expansion provides a zoom up capability that has any number of applications.

With all the functions, the range of special effects is remarkable. The picture can be compressed to zero so that it can appear or disappear in any part of the raster. Wrap-arounds, push-ons, push-offs, hall of mirrors,—any other number of effects can be produced by combining the functions. The 20 or more other programs mentioned before, could provide a sort of Chinese menu of effects for the broadcaster to choose from. New effects or special purpose effect could likely be programmed on order.

The DFS 5000 is not the end of the line by any means for digital television but it does represent the culmination of many efforts brought together inside a single box. Several large switcher manufacturers have been in touch with Quantel to explore the feasibility of employing the DFS 5000 as part of their switching systems. Given the probable cost of the device some lag between now and when it becomes available to broadcasters can be expected. Nevertheless, it provides some indication of the direction this field is headed.

Thomson-CSF's Digital Noise Reducer, which we predicted in March *BM/E* would cause some excitement at the show, did so. The results of the DNR demonstration were clearly visible. The device can remove up to 12 dB of noise from an NTSC signal. The applications are especially noticeable on portable ENG type camera output when operated under marginal light conditions. The DNR also gives beneficial effects to multi-generation videotapes, microwave transmissions, CATV transmissions, off-air reception, and grain reduction in telecine film. The heart of the system is a Digital Frame Store that functions as an adaptive filter. The characteristics of this filter are changed in response to the previous output signal so that random noise is rejected during a signal matching process. Also in the device is a Motion Detector that looks at each individual picture element to detect movement and makes some 358,000 decisions per TV frame to eliminate motion effects.

One probable application of this device will be its installation at the last stage of the signal path prior to transmission. It can be left in the chain to provide continual 9 dB noise reduction to the transmitted signal.

Special effects battle continues in production switchers

With the application of digital video techniques and microprocessor control adding fuel to the fire, switchers are becoming the focal point of production techniques from which video will take on the last vestiges of film effects superiority. Vital Industries and Grass Valley both introduced switchers interfaced with digital effects devices capable of a range of effects never before possible in video production. Vital, using the name Squeezeoom to tag its package had a disappointing time of it. Damage to the system in shipment to the show kept the demonstration inoperative for the first day. After some long sessions, technicians finally got the system working well enough to give visitors an idea of the machine's potential though during the four day exhibit the system never reach full operational status.

"Hall-of-mirrors," one of the dramatic digital effects of the GVG Digital Video Effects system.

The Grass Valley Group faired somewhat better and demonstrations of their system drew crowds throughout the show. The switcher used at the show was a GVG Model 1600 7K interfaced to the NEC DVP-15, which utilizes the FS-15 frame synchronizer. The interface is accomplished through a GVG designed assembly and provides complete operational control of the digital video effects (DVE) system from the switcher control panel. All fader levers and joystick positioners operate in a manner similar to their conventional function.

Some of the typical effects this system produces are continuous picture compression with positioning; tracking chroma key, wherein the keyed image stays centered on the key area even when the camera producing the foreground pans; hall-of-mirrors, which produces an infinite regression of the same image; a magnifying glass effect, which permits a single portion of the raster to be expanded while retaining normal proportions in the rest of the raster and a picture split which is similar to a wipe generated from the center of the picture rather than from the sides or corners. All of these effects can be generated with synchronous or non-synchronous sources since the frame synchronizer is an integral part of the system.

The interface electronics also contain a video switching bus for selecting

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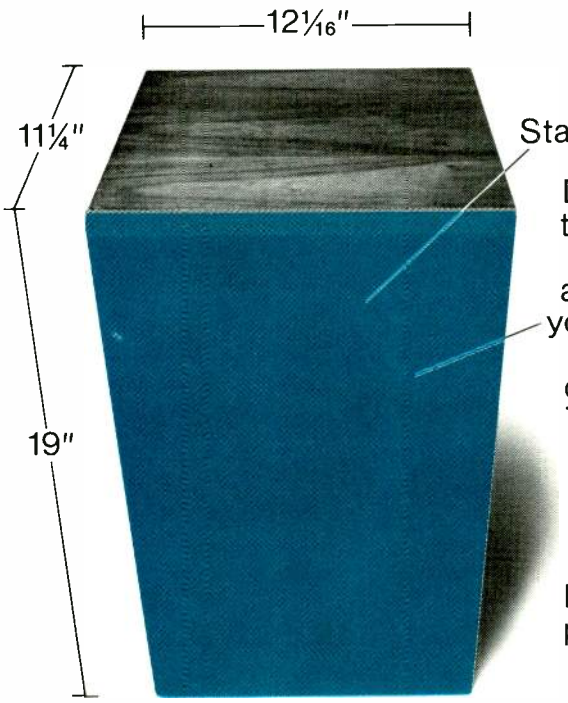

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input sources to the DVE system. The input selector is remotely controlled from the switcher panel. A DVE system can be retrofitted to most GVG 1600 series switching systems and a single DVE can be used with several switchers on a plug-in basis if the switchers have been equipped with an interface assembly.

Processing operations are accomplished in the digital domain and then converted to analog form. Most effects are under the control of a built-in microcomputer system. Inputs to the DVE system are selected by means of thumbwheel switches and the take button. The selection in use is indicated by an LED display. The DVE and Frame Sync buttons are interlocked and all effects are achieved in the DVE position. Selection of frame sync effectively bypasses the DVP-15. The DVE output appears as a primary input to the switcher and is thus available on all switching buses. Compression, expansion, and split are interlocked and occur when their respective controls are activated. Aspect ratio can also be manipulated, and has two controls, a fixed 4:3 function and a variable function. Push-ons, push-offs and other special effects are achieved by selecting a wipe pattern in the conventional way and then engaging the DVE system. As levers or other relevent controls are used, the selected digital effect is executed coincidentally.

The Vital system, under the name Squeezoom VMU-1, consists of a sophisticated frame store capable of synchronizing up to four non-synchronous or synchronous incoming signals. The full effects of the switcher can be applied to one or all four of the incoming signals either separately or simultaneously. Some of the digital effects that can be applied to one or all of the incoming signals include squeeze, zoom, (others have designated the effects as compression and expansion), repositioning, compress wipe, slide wipe and modulation of the patterns. All four signals can be integrated in quad display within the same raster. In all, over 45 Optical Effect Modes can be selected. Input video signals are processed to limit the bandwidth to 5.5 mHz and then converted to 8-bit parallel words, occurring at 4 x subcarrier rate. Luminance and chrominance are separated digitally and are applied to memory. A Write Address Generator assigns the codes to discreet memory locations and up to four complete pictures can be stored. The color Sync Generator derives the reference signals to precision time the Read Address Generator, D/A converter and video output processor. The interpolation is precise between lines and elements to avoid "step effects" on edges when squeezing or zooming.

Though the system was not fully operational the demonstration did show the four signal synchronization capability and a number of the other faculties. The pictures were quite noisy but this was attributed to damage suffered in transit.

Considering the amount of attention visitors gave to these digital effects systems other switcher manufacturers were asked about their intentions to offer similar packages. A spokesman for Duca-Richarson stated that they would have no trouble interfacing with the available frame store and effects devices and indicated that this was a distinct possibility. CDL made a similar statement and a reliable source indicated that some discussions had been held between CDL and Quantel. Other manufacturers of sophisticated production switchers such as ISI, Richmond Hill, Computer Image and American Data also expressed confidence that they could develop similar systems.

For more information on preceding products, circle **Reader Service Numbers:** TRI DPS-1, **250;** Microtime 1600, **251;** Image Plus, **252;** CVS 515, **253;** "Super B," **254;** 620, **255;** Sony BVT-1000, **256;** Edutron TBC-110A, **257;** NEC NTC-5000, **258;** FS-15, **259;** MCI DTC-300, **260;** DFS-1500, **261;** DPCO, **262;** Rutt 1080, **263;** Thomson-CSF DNR, **264;** RCA TFS-121, **265;** GVG DVE, **266;** Vital VMU-1, **267.**

TV cameras star again

Try as many manufacturers might to change the situation, TV cameras year in and year out remain the star attraction at NAB exhibits. The most spectacular new equipment might be digital video manipulators, as it was this year, or VTRs, as was the case in 1974 (when the AVR-2, the TR-600 and the IVC 9000 was unveiled), but cameras, nonetheless, tend to steal the show. It is, of course, camera manufacturers who stage the most elaborate shows. (Even when they want to call attention to *other* equipment they usually do so via their live camera demos.) This year, for example, camera manufacturer Philips Broadcast Equipment seemed to come out on top by winning the most outright audience applause.

In reality the applause was directed to the talents shown by mimes Rita Nachmann and Mike Hoit for their portrayal of Philips as the 'innovision company' and not to equipment per se. But the clever mimes did have good "material" with which to work since Philips was introducing a unique new camera line called the Video 80 family, a new transmitter and other goodies.

The Video 80 camera is a convertible camera which can quadruple as an ENG-, field production-, studio- or telecine unit. As a convertible, it exemplifies a trend at this year's NAB—the emergence of *flexible* cameras, and particularly the growing importance of *field/studio* cameras. In general, the basic component of these new cameras as shown by Philips and others, is a head module boasting an optical system/yoke assembly of sufficient quality to be the secret of a field camera but light and compact enough to be a true shoulder carried ENG portable.

There were, at NAB '77, several new *ENG only* cameras and new *studio only* cameras but we'll cover first those flexible types that were designed to play several roles.

ENG/field production/studio types

Fitting this category at NAB '77 right on the button would be the new CEI-300 modular camera system and the Video 80 already mentioned. Partially fitting the category would be the new RCA TK-760, the Bosch Fernseh KCN-92, the new Ikegami HL 51 Ultra Cam (which uses one-in. Plumbicons) and the new Hitachi high quality portable, the SK-90. The TK-760 is primarily a field/studio unit; the KCN-92 is somewhat of a hybrid. The Ikegami and Hitachi are multi-role cameras but not convertible as are the CEI and Philips systems. All of these cameras are (or can be assembled as) self-contained systems.

Although the CEI-300, the Video 80 system and the TK-760 camera were described extensively in *BM/E*, March, a brief recap of each will be included here so that this Show-In-Print report will be comprehensive.

"Field production will never be the same again" is the way CEI called attention to their new totally modular convertible camera that offers "uncompromised" video performance. Indeed, broadcasters who did examine the CEI-300 found the pictures produced extremely high quality. This camera can be quickly reconfigured to various modes of operation-shoulder-mounted portable, pedestal-mounted studio, etc. Modular options include a tiltable/rotatable 8-in. viewfinder, a wide choice of lenses and other support equipment. Prices fall in the $30,000-$40,000 range depending on options selected.

Although the CEI camera was designed for studio/field production applications, there is no reason why it could not become a quality ENG camera. The camera head is available with Saticon or Plumbicon pickup tubes, weighs only 6.5 lbs. not in-

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The viewfinder has a wide field of vision and can be tilted and the camera can be easily attached to a monitor system. Auto white and auto iris are built-in. A remote control box can operate the camera and can be located about 300 feet from the backpack.

The SK-90 by Hitachi is a new generation camera design with program production in mind. Although this camera is not available for sale at this time, it incorporates a feature that will certainly be of value—an automatic beam optimization circuit.

The beam optimization circuit newly developed by Hitachi prevents comet-tail effects due to the lack of an adequate beam while shooting highly illuminated objects. The automatic beam optimization circuit solves the problem of low beam.

The camera features easy operation and it contains automatic white balance and automatic iris determined by video level detection. Quick start circuits permit operation about 5 seconds after turn-on. The camera also has a tiltable CRT viewfinder. Price and delivery quotes are not yet being made.

Features of beam optimization in new Hitachi SK-90 being demonstrated.

New Ikegami HL-51 is demonstrated.

Previously announced cameras exhibited at NAB '77 that play multiple roles included the Hitachi SK-70 (battery operated) and the a-c powered portables: the IVC 7000 P and the RCA TKP-45. With both the old and new touted heavily, camera buyers had to assimilate a lot of information.

Still more ENG types

Although the new field portable units tended to steal the limelight at NAB '77, a number of new cameras designed specifically for ENG uses were introduced at Washington. They were all given close scrutiny since ENG cameras did head up the shopping list of most engineers and managers of TV stations attending the convention. It seems many stations that got their feet wet in ENG with a small Sony, JVC or Akai were ready to trade up. Both Sony and JVC were at NAB '77 vying to retain their original customers and to add others by showing upgraded cameras.

Sony's appeal to second-time-around broadcasters was a new BVP 200, a two-tube camera priced at $18,000. For cautious beginners it offered an improved DXC model, the DXC-1610, priced a little under $6000. JVC introduced a new three-tube CY-8800U model.

Competing in this same arena were Hitachi and GBC. Hitachi introduced a $16,300 FP-1020 camera. GBC was at the nearby Mayflower Hotel with its new, under $20,000, CTC-7X system. This is the successor camera to the Toshiba CK-38 which toured the U.S. briefly in 1976. These new cameras had to be compared, of course, with last year's star attractions which were all back: the Ampex (NEC) BCC-4, the Asaca 2000, the Hitachi SK-80, the Ikegami HL-77, the RCA TK-76 and the Thomson-CSF Microcam. Of this last year's harvest we will not comment further except to say that production versions of the Microcam were shown this year. Units are being built both in Connecticut (for the time being) and in Tokyo under a new contract agreement between Sony and Thomson-CSF. The Microcam is still in a class by itself regarding size. In performance the camera looked good, particularly so when it put out a clear picture with only 3 ft. candles of illumination.

But the brand new, very attractively priced under $20,000 cameras offered a real challenge to the would-be buyers in terms of performance vs price. Part of the job was sorting out the number of tubes each camera had and what it meant: there were three-tube Plumbicon types (JVC), three-tube Saticons (Hitachi), three-tube Chalmicons (GBC) and two-tube units (Sony).

Both of the Sony ENG cameras were interesting. The BVP-200 features one ⅔ in. Saticon for the luminance channel and one 1-in. Mixed Field (MF) Trinicon for chrominance channels. Sony says the combination offers a light weight low power consumption broadcast quality camera at an economy price—$18,000. Weight is 12 lbs. (without lens); power consumption is 20 watts. Signal to noise ratio is better than 50 dB but sensitivity is limited. Spec sheets say 50 ft. candles is desirable at f/1.4. The camera needs no registration adjustment and excellent stability is claimed. The Mixed Field Trinicon uses electrostatic deflection and electromagnetic focus. Since both fields are superimposed, a smaller focus coil is required. Result is good color purity, good edge focus performance and low power consumption.

The Sony DXC-1610 is a budget minded field production camera that will have strong appeal to non-broadcasters if not broadcasters themselves. In the 1610, a single one-inch Mixed Field Trinicon tube is used to pick up both chrominance and luminance.

The power consumption of the 1610 is low (11 Watts). minimum illumination is 20 ft. candles at f 2.1.

The new self-contained JVC CY-8800U ENG camera is a full three tube unit and was shown at NAB with Plumbicons installed. It will be available with Saticons. Priced at under $20,000 the camera offers much. It features an easy-to-use 1.5-inch CRT viewfinder that can be moved forward and back, up and down, and laterally.

The new camera has external synchronization capability (SC plus SYNC or composite video) and can be operated remote through an optional unit. It also features a built-in color bar generator and can be used as an encoder or color monitor for line checking. A circuit for indicating the waveform of the video signal is also built in for constant monitoring. Horizontal and vertical corrector circuits are provided for crisp pictures.

The CY-8800U provides high sensitivity and high resolution color registration as a result of combining the three-tube system with dichroic-mirror color-separating optics. It has a 49 dB signal-to-noise ratio at f/4.0 with 227 ft. candle illumination.

The C mount on the camera allows for a wide variety of lenses to be used.

The GBC TC-7X, as we said, is another self-contained ENG broadcast camera in the under $20,000 range. It uses three ⅔-in. Chalnicons tubes. Although Chalnicons are said to have

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more lag than Saticons, they do have good sensitivity. GBC claims useable pictures at 5 ft. candles using a 6 dB boost. Normally 50 ft. candles produces broadcast quality pictures. A beam split prism system means minimum shading as well as minimum light attentuation. Features of the camera are bias lights to minimize lag, horizontal contour correctors, automatic white balance, vertical interval color bars, and a 1½ in. CRT viewfinder.

To complete our rundown of ENG cameras, we should again mention the Ikegami HL-51 and the Hitachi SK-90. These cameras were designed for high-quality production applications and that certainly doesn't rule out news gathering! At the low-priced end, Hitachi also showed the FP 3030 and Panasonic its hand held. Neither of these cameras were new however.

Standard studio cameras

Since we began this section with the observation that studio camera demos dominate NAB exhibits, we cannot move on without mentioning some of the star attractions other than the field/studio combos already described. RCA highlighted the TK-46 and the TKP-45 along with the TK-760 field unit and the TK-76 ENG portable. RCA gave all of its cameras a thorough workout continually manuevering and zooming in, about and on the hundreds of objects in the most elaborate stage setting at the convention.

Philips declared the ultimate camera was its LDK-25 and it demonstrated anti-comet tail Plumbicon features and easy lineup. Philips showed the virtues of triax cable and digital control by setting up one camera across the Potomac and shooting back on the Washington scene. The picture was sent back via microwave but the camera was controlled from the exhibit booth via a pair of telephone wires.

The TK-76 ENG camera is rainproof!

Using this set, RCA demonstrated its full line of cameras. Camera shown is new TK-760.

Harris showed off three TC-80 triax-controlled cameras and a pair of multi-conductor-cable TC-50s. Triax digital systems also got a big play at the Ikegami exhibit. Top of the Ikegami line was the HK-312 using 1¼-in. Plumbicons. This is the camera that is equipped with a microcomputer—depress the pushbutton and it is automatically adjusted (registration, b/w balance, gamma correction). S/N ratio of 56 dB is claimed. Camera can operate independently of a system. Ikegami also showed a 1-in. Plumbicon studio camera, the HK-357, and a servo controlled announcer booth camera, the HK-309.

Bosch Fernseh's lead camera was the KCK (shown last year) which also has automatic line-up and offers either coax or triax options. Its unusual feature is the "WRB" system in which three pick-up tubes are combined with a four-channel separate luminance system in the CCU to achieve high sensitivity and no visible registration errors. At NAB '77, Bosch Fernseh premiered the KCK-R counterpart of the KCK for on-the-spot production. The KCK-R camera is divided into a head and a backpack. The head is lightened and has a tiltable (and removable) viewfinder. Separation between the head and backpack can extend to 2 miles with coax cable. The KCK-R uses the same CCU as the KCK. (The KCK-R head can also be combined with a KCN processor for a completely independent camera system—see earlier section on field/studio cameras.)

Thomson-CSF put on live demonstrations regularly emphasizing the qualities of the TTV-1515 (triax) color studio camera but the feature attraction was the Microcam. Marconi stressed the automatic features of the Mk VIIIB (of which over 400 are in use worldwide). Marconi says in the last three years, 25% of its sales are to U.S. customers.

Hitachi, as mentioned, put its main stress on ENG cameras and the multi-role camera, the SK-70. In the studio camera class it featured the new FP1010, which uses ⅔-in. Saticon (or Plumbicon) tubes, and the FP 1212B, built around 1-in. Plumbicons.

Both of these cameras are small and adapt themselves for field applications. The FP 1010 is a self-contained unit (built-in genlock) but does have a remote control option. Both cameras have 7-in. tiltable viewfinders.

Both Ampex and IVC showed studio cameras but no new models. Panasonic, on the other hand, showed a 1-in. Plumbicon self-contained studio camera, the AK-920. This is a full-quality camera incorporating a prism optical system, horizontal and vertical aperature correction, etc. In the low price range, Panasonic also showed the Newvicon equipped (two-tube) WV-2150. Because of the sensitivity of the Newvicon, 25 ft. candles at f/2.0 (with the 6 dB gain switch thrown) and the low price tag of $6500 (without lens), this camera drew considerable attention.

New camera tubes promoted

There was more stress given to camera tubes this year than at earlier NAB conventions for several reasons. Competition is wårming up. Hitachi emphasized that the Saticon has been improved. The H 8397A features less lag (almost half that of earlier tubes), high resolution and well balanced and uniform spectral response (no red, green or blue tube selection is necessary).

RCA made a big effort to tell everyone that it was now in the Saticon business (⅔-in. and 1-in. types). In listing the virtues of Saticons over lead oxide tubes, RCA stressed long life without degradation of performance and higher resolution. Because of their low lag and longer life, RCA said Saticons were logical for telecines.

Altogether RCA announced 16 new tubes. Succeeding the existing line, the new tubes carry the prefix BC indicat-

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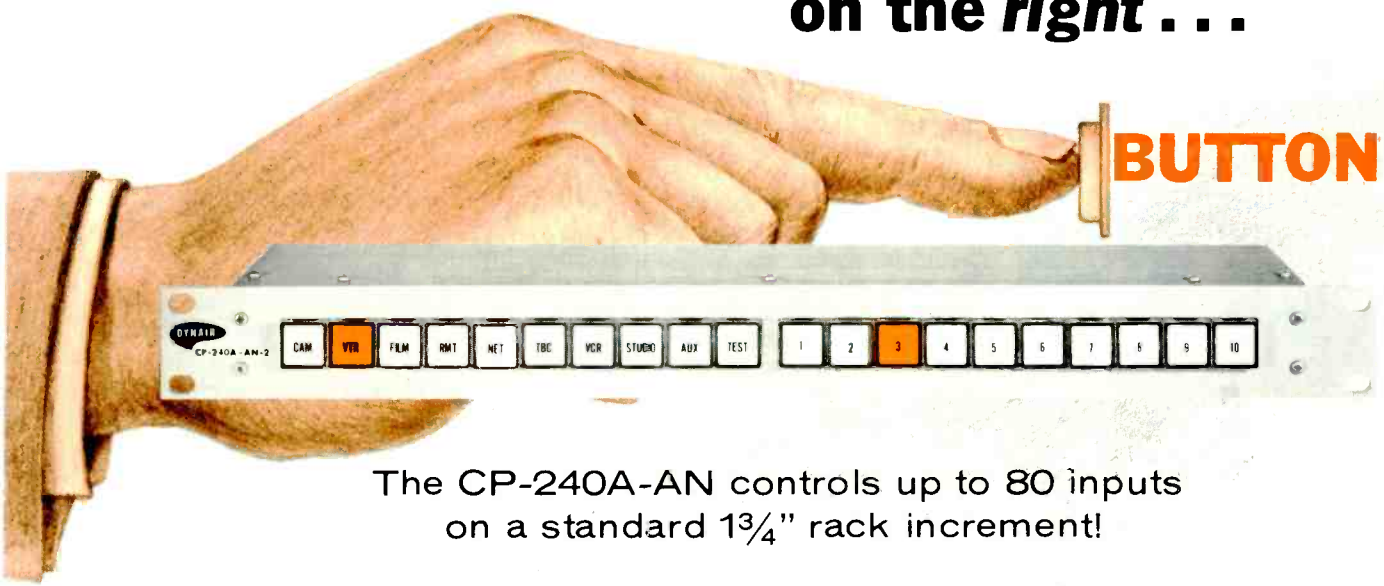
DYNAIR puts *your* finger on the *right* . . .



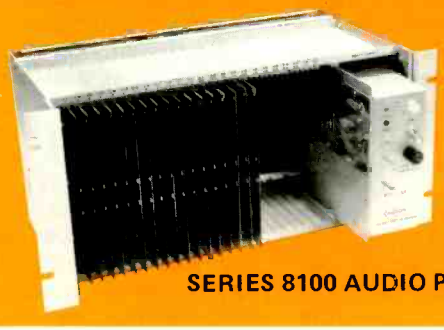
The CP-240A-AN controls up to 80 inputs on a standard 1¾" rack increment!

Here's how it works with DYNAIR's 1400 and/or 8100 Series switching equipment: select your source group from the left bank; FILM, VTR, NET . . . whatever. The group button flashes until you select one of ten specific sources in the group on the right bank. Both buttons take on a steady glow. You have just switched the system (audio, video, audio and video, or data) to the selected source.

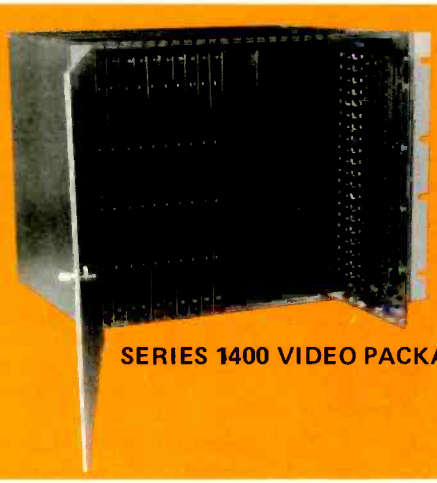
To make the next selection, repeat the process. If you change source groups the actual change will not occur until the specific source button has been depressed. For video systems, it's vertical-interval switching! The basic unit controls up to 40 internally programmable sources and includes plug-in expansion to 80 sources. Complicated controls and/or look-up tables are eliminated, saving operator time and confusion.

DYNAIR solid-state switching equipment meets or exceeds broadcast requirements and offers optional control systems not available elsewhere.

SPECIFY DYNAIR!



SERIES 8100 AUDIO PACKAGE



SERIES 1400 VIDEO PACKAGE

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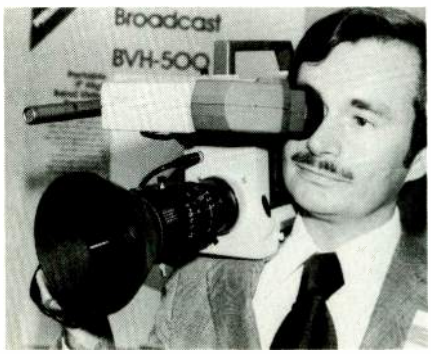
PHONE: (714) 263-7711; TWX: (910) 335-2040

DYNAIR

The new JVC CY-8800U ENG camera.



New Sony BVP-200 two-tube ENG camera.

ing the tubes have been tested and certified for broadcast use. The BC prefix applies to all RCA tubes: lead oxides, Vistacons, sulfide vidicons, silicon vidicons and Saticons.

English Electric Valve promoted heavily at the show their H.O.P. lead oxide tubes. H.O.P. stands for Highlight Overload Protection. EEV said a "revolutionary" new electron gun enables it to overcome comet-tailing (loss of highlight detail when bright objects are viewed). These tubes are available now in 1¼-in. and 1-in. versions. Production of the latter has just begun. EEV said several studio cameras at NAB '77 had H.O.P. tubes in them.

All of the above activity spelled one thing—some real alternatives to the Philips Plumbicon which has reigned supreme for so many years.

For more camera information circle no. on Reader Service Card: CEI-300, **268;** Philips Video 80, **269;** RCA TK-760, **270;** Bosch Fernseh KCN-92, **271;** KCK-R, **272;** Ikegami HL-51, **273;** Sony BVP 200, **274;** DXC 1610, **275;** GBC CTC-7X, **276;** JVC CY 8800U, **277;** Hitachi FP 1020, **278;** Panasonic WU-2150, **197.**

It's been a good year for lenses

As the number of TV cameras grows—ENG/EJ, field portables, field/studio, and studio only types—the number of lenses multiplies. Only with the new breed of field/studio convertible cameras is there anything like lens interchangeability possible.

To do all the jobs cameras are called on to do, a variety of lenses for *each* camera is needed. Hence the proliferation. There were some noticeable attempts at NAB '77 to break this runaway situation. Rank Precision, for one, showed the Varitol MultiRole Lens approach. The MRL gives the camera user a common set of optical lenses modules. Three lens fronts—wide, narrow and short—can be interchanged without re-registration or camera adjustment with the MRL approach. Thus the angle of viewing for any MRL system ranges from 52 degrees to 1 degree. Rank showed MRL lenses for most brands of standard cameras and the most popular ENG cameras.

Angenieux described what it calls a Total Zoom Lens System for ENG cameras. Again, one lens system can do many things. This system consists of the basic 9.5—142mm, f/1.8 zoom lens with a series of accessories offering, says Angenieux, "flexibility heretofore never achieved with a single lens." Rather than utilizing a zoom lens in combination with a series of fixed focal length lenses, several front mounted accessories as well as rear mounted units are quickly installed. The total package is still compact (approximately 7 in. long and only 2 lbs.). The 15 × 9.5 zoom lens provides a very wide angle of 54° at the minimum focal length with a long telephoto effect (4°) at the maximum focal length. The lens can focus down to 24 in. while still retaining zoom capability.

The retrozoom attachment, which bayonets to the front of the 15 × 9.5 lens, changes its focal length to a very wide 7mm, with a horizontal angle of 70° (while still capable of expanding to a 105mm focal length as well as retaining its maximum aperture of f/1.8 at the wide angle). On the other end, a 1/6x range extender increases the focal length to 15-225mm with a maximum geometric aperture of f/2.9. In addition to the rear mounted range extender, a front mounted tele-attachment can increase the maximum focal length to 240mm without affecting the geometric aperture. With the front mounted tele-attachment and two 1/6x range extenders mounted in tandem, it is possible to achieve a focal length of 615mm, resulting in a horizontal angle of only 1°.

Angenieux also introduced a *tele* 42x continuous zoom lens to complement the standard 42x continuous zoom lens introduced last year.

Canon's star lens was the PV25X20B f/1.8 zoom for 1-in. Plumbicon TV cameras. (A PV25X20B is available for 1½ in. Plumbicons.) This lens is particularly notable because of its light weight—about 49 lbs.

TeleCine showed several new lenses: a 30:1 field lens for 1¼ in. tubes and another for 1-in. tubes. It also had a 10x lens for ⅔-in. ENG tubes.

Fujinon showed a new field lens and a 14 × 10 f/1.9 lens for sports coverage. A 14 × 10 f/1.9 lens for an ENG camera had a built-in extender incorporated exemplifying the trend for more capability from a single lens.

Although it was not new, Dynasciences continued to draw attention to its inertially-stabilized Vibra Stop lens which compensates for picture shake and bounce.

For more lens info: Rank, **279;** Angeniuex, **280;** Canon, **281;** TeleCine, **282;** Fujinon, **283.**

New portable VTRs galore at NAB '77

The most welcome surprise VTR product of the NAB '77 convention was the super-light (14.3 lbs.) portable U-matic recorder from Sony, the BVU-50. Tie this recorder with an under-15 lb. ENG camera and you can now truly say we have entered the age of the one-man ENG crew.

There were other portable VTR surprises both in the ¾-in. format and the new full broadcast quality one-inch format. Panasonic, for example, thrust itself into the ¾-in. ENG market with an array of recorders which include a 25 lb. portable unit, NV-9400. Move over Sony and JVC.

In the one-inch format category, Sony again made news by showing a portable companion unit to the BVH-1000 quad-quality one-inch system. The portable unit is identified as the BVH-500. Although *BM/E* was able to announce this development last month in its report discussing the new one-inch machines, units were first available for inspection at NAB. The biggest surprise in the category of one-inch developments was the introduction of several NEC portable units including a cassette recorder model, the TTR-5.

Bosch-Fernseh, which came on extremely strong with an extended family of one-inch devices, demonstrated the reliability and ruggedness of the BCN 20 portable at NAB. Although the production line versions of the portable were shown earlier this year at the recent SMPTE meetings, Washington provided the opportunity for Fernseh to demonstrate the units at their best. This included flawless operation while undergoing a violent shake table test. Fernseh also gave visitors a glimpse of

continued on page 66

Introducing the Duca-Richardson Series 4000. Simply the most advanced production switcher ever created!

Circle 135 on Reader Service Card

Color Coding
Simplified operation and reduced chance of operator errors are realized through color continuity of all video paths.

15 Button Keyboards
Easier selection of patterns, transitions, key sources and quadrant presetting is possible through the use of keyboards on the function modules, downstream keyer and quadrant selector.

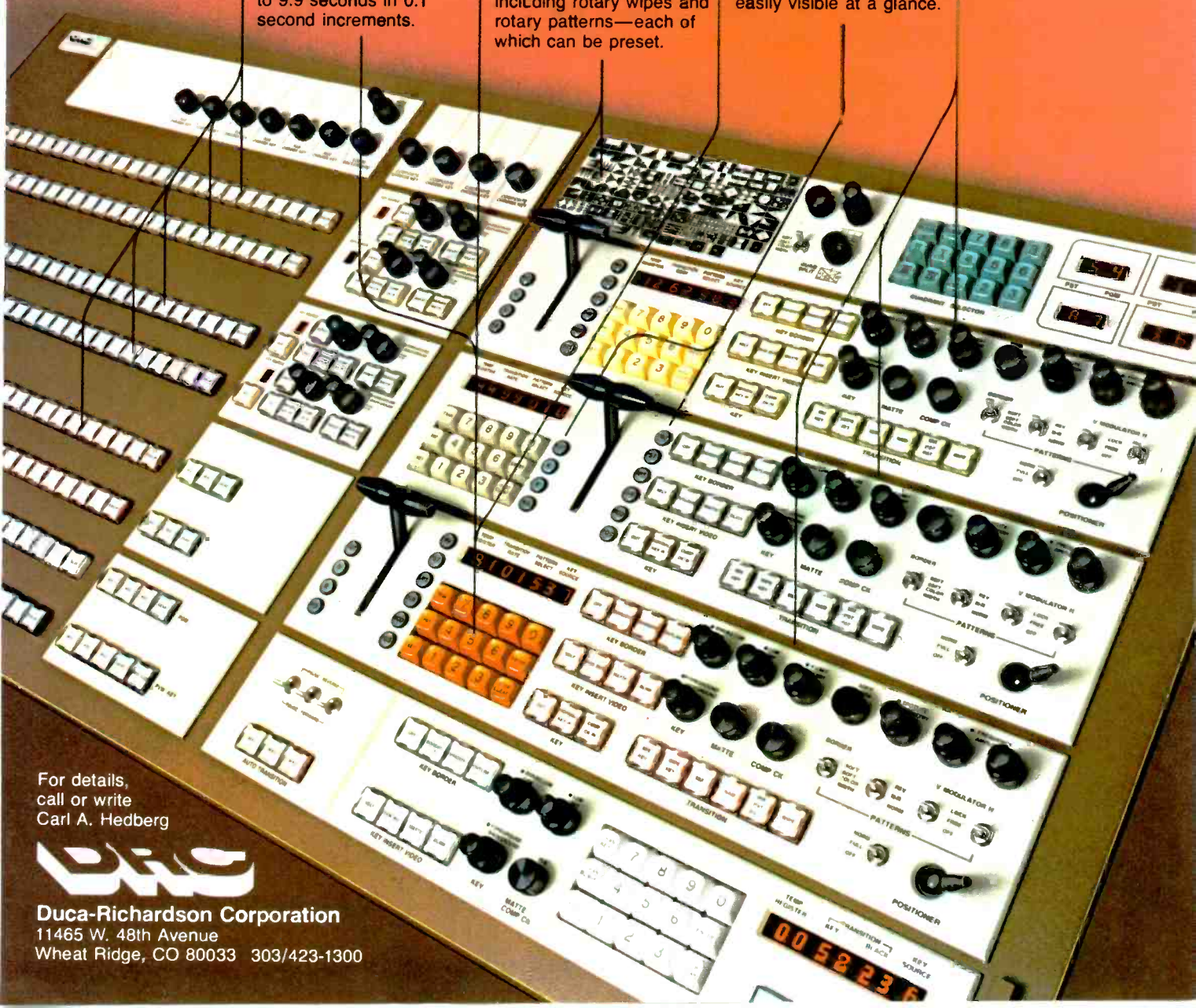
10 Key Sources
6 chroma keys, the B Bus, Preview Bus and 2 external keys are selectable as key sources, and any one can be used as a composite chroma key source.

Function Modules
All basic switcher functions are consolidated on the function modules for ease of operation.

99 Time Choices
Automatic transitions can be preset from 0.1 to 9.9 seconds in 0.1 second increments.

99 Pattern Choices
You get top creative flexibility from 99 patterns, including rotary wipes and rotary patterns—each of which can be preset.

Status Lights
Status indication of all switcher operations is easily visible at a glance.



For details, call or write Carl A. Hedberg

Duca-Richardson Corporation
11465 W. 48th Avenue
Wheat Ridge, CO 80033 303/423-1300


SONY
SONY
SONY
VIDEOCORDER
BVH-1000

The BVH-1000. Consider the advantages.

Last year, Sony Broadcast introduced the prototype of a new 1" high band video recorder. The BVH-1000.

The BVH-1000 produced picture quality difficult to believe. In fact, broadcasters didn't believe it. They had to see it for themselves. And they snapped up every prototype we could deliver.

Since then, we've made some changes. Added more features. Expanded the BVH concept to include a portable model, the BVH-500, for professional 1" production in the field.

And we've sold a lot of machines.

If you're considering the move to 1", consider the advantages of the BVH-1000.

1. The Advantage of Shared Sector Scanning. The Sony Broadcast BVH-1000 and BVH-500 both use an exclusive system of scanning that records video and sync (lines 1-17) with separate heads. Which means the entire vertical interval is captured and available for encoding any signal required in the future by the FCC.

Color banding is eliminated. And generation after generation, the BVH-1000 picture retains incredible clarity and precision.

2. The Advantage of BIDIREX. Film editing techniques, with a professional video recorder?

That's what you get with the BVH-1000. Not one, but two control modes are provided to give editors a true "film" feeling. In shuttle mode, the tape can be moved in either direction, from stop to 30 times normal speed. With a recognizable picture, so you can make fast editing decisions.

In jog mode, the BVH-1000 lets you move the tape as though you were positioning the reels by hand—while you monitor a fully locked picture.

3. The Advantage of Interchangeability. 1 dB down is the specification. Need we say more?

Sony's interchange is guaranteed by a gimmick-free devotion to precision mechanics and supported by the experience of building several hundred thousand video recorders.

4. The Advantage of Color Framing. Some high end production recorders don't offer color framing. Others make it available as an expensive option.

But both the BVH-1000 and BVH-500 provide color framing capability as standard equipment. Add that to a logic system ideally suited for computer assisted editing, and the Sony BVH-1000 is your best bet to produce that "word from our sponsor."

5. The Advantage of High Fidelity Audio. Not one, not two, but three isolated audio tracks with frequency response from 50 Hz to 15 kHz. With over 50 dB isolation between tracks.

Never before has any production recorder offered the level of audio quality found in these two new Sony Broadcast machines.

And a special wide band amplifier is automatically switched onto the cue track in search mode, to accommodate SMPTE code playback in high speed.

But it is impossible to describe all the advantages of the Sony BVH-1000 and BVH-500 high band recorders. You must see them to believe them.

Contact Sony Broadcast today, and ask for a demonstration. You'll see why networks and production companies alike are buying this remarkable new recorder.

Sony Broadcast

Sony Corporation of America, 9 West 57 Street, New York, New York 10019
New York: (212) 371-5800 Chicago: (312) 792-3600 Los Angeles: (213) 537-4300 Canada: (416) 252-3581

Circle 136 on Reader Service Card for literature
Circle 137 on Reader Service Card for a demonstration

the next portable in the family by showing a mock-up of a mini record-only unit, the BCN-5, which is expected to be able to handle cartridges.

We'll have more to say about the one-inch portables in the next section devoted to broadcast quality one-inch formats. In the remainder of this section, we'll talk about the ¾-in. formats.

The Sony BVU-50 record-only VTR is described as a sister machine to the BVU-100 portable introduced last year. It will handle a 20 minute cassette. Operating time, however, is up to three hours continuous using a NiCad battery. (Power consumption is 12 watts.)

The BVU-50 is described as "less sensitive" to rapid inertial change due to "stiff servo correction." The servo can be frame locked to an external signal. Direct code recording is possible with a time code accessory. The recorder includes a real time display (minutes and seconds) and has a number of warning indicators. Size is about 10 in. × 5 in. × 13 in.

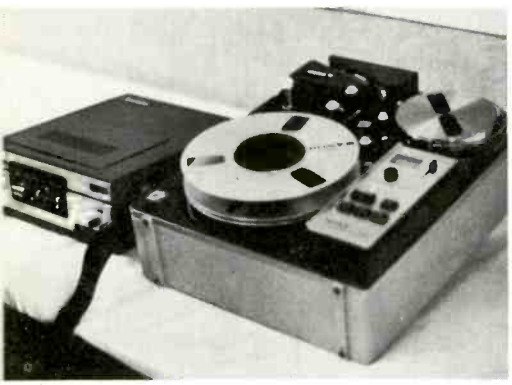
The Panasonic NV-9400 ¾ in. pneumatic is, as mentioned a part of a system consisting of a cassette editing recorder, NV-9500, an NV-9200 standard recorder and an NV-A950 editing controller. These recorders all feature a direct drive video head cylinder motor for high stability and low jitter and a capstan servo system to maintain precise head-to-tape speed. High quality second and third generation tapes was the boast as a result of the above features (actually fifth and sixth were being exhibited) and S/N ratio spec is better than 45 dB.

The NV-9400 portable has a built-in recording and playback circuit so no color adaptor is needed. Size is compact (13 in. × 5½ in. × 14 in.) and weight is 24.7 lbs. loaded with battery and tape. Consumption is 13.5 watts meaning 60 minutes of continuous operation is possible. Fast forward is less than 3 minutes; rewind, 2 minutes.

The NEC TTR-7 cartridge one-inch (battery) recorder weighs less than 30 lbs. TTR-5 A-C unit on shelf.

The IVC BCN 8020 VTR.

The Sony BVH-1000 VTR.



Sony portables: BVU-50, left; BVH-500, right.

Shape of future Bosch Fernseh BCN-5.

Quad vs the one-inch formats

It would be difficult to describe NAB '77 as having been taken over by one-inch VTRs even though they did produce a lot of interest. Certainly quads were more conspicuous. Quads dominated at the Ampex and RCA exhibits and were the recorders that videotape exhibitors such as 3-M and Memorex used to show off their quality—though Memorex did stress new tapes for the one-inch machines. Actually one-in. portables were also often demonstrated in these exhibits too, but in terms of size and quantity, it was still a quad show. Quads, along with ¾-in. cassettes were the chief recorders found in editing exhibits of CMX and Datatron.

Strong emphasis at both the Ampex and RCA exhibits was on editing capability or production "throughout." Since quads are likely to be the principal mastering machines for some time to come, these exhibits centered around quad. At Ampex, the AVR-3 was the "hot" machine tied in with the EDM-1 editor. A new AVR-2 model showing additional SMPTE time code edit capability was exhibited by Ampex.

Speaking of AVR-2s, Ampex had on display the 1000th such unit to come off its assembly line since the introduction of this remarkable machine three years ago. Quads won't just fade away.

RCA gave no indication that quads were not the supreme recorder. Although RCA had a one-inch BCN-50 in its exhibit area, Bosch Fernseh was making more reference to RCA's "commitment" to the BCN than was RCA itself. RCA placed its emphasis on the TR600A and two editing systems: the simplified microprocessor SE-1 editing system and the AE-600

time code editing system.

And strange as it might sound, there were more quad manufacturers at NAB '77 than ever before—if you count the rebuilders. This year it was A.F. Associates, Merlin Engineering Works and Recortec plus head refurbishers wuch as Videomax, Computer Magnetics, Video Magnetics (Washington Hilton suite), and Spin Physics (E-K).

But the one-inchers did make an impact at the show. The Bosch Fernseh exhibit alone couldn't help but set engineers and managers to thinking about what one-inch could offer. Bosch Fernseh went all out in emphasizing its commitment to one-inch as the future of tape machines. In conjunction with frame store devices, it showed the best of both possible worlds—the mechanical superiority of its rugged small-diameter scanning mechanism coupled with editing capability possible with picture freeze frame and jogging.

In sum, Bosch Fernseh's editing capability featured automatic search, fast search and jogging. Because of the control and frame store system developed in part for editing, Bosch Fernseh showed how a BCN recorder could be converted into a picture archive storage medium. Over 100,000 still slides can be stored and quickly retrieved.

Among the other new items shown by Bosch Fernseh was a BCN 50 playing a cartridge and a mock-up of a portable cartridge recorder, the BCN 5 (a sign of things to come) and a new play table for the BCN-20.

The BCN format did get strong boosts at two other exhibits—IVC and Philips. IVC was the first manufacturer aside from Fernseh to demonstrate that it was tooling up to produce this machine. In fact, IVC unveiled its version of a portable unit, the IVC 8020. This unit, as reported earlier in *BM/E*, does not stack the two reels one on top of the other.

The one-inch VTRs faced less competition in the Shoreham Americana exhibit area. At the Shoreham, Sony was the largest exhibitor and highlighted on its stage the BVH-1000 introduced last year. Sony asserted that the BVH-1000 now coming off the production line, represented the best technology around and predicted outstanding success for this system.

Also at the Shoreham was NEC with its line-up of one-inch machines. Although NEC confused the subject by introducing yet another format to visitors who opted for either an official SMPTE standardized format or a defacto standard as a result of a clear victory of one format over the other in the market place, the company's products got close examination. NEC's approach was impressive.

Pictures produced were good. Some of the same operating features touted by Sony were offered by NEC too. Further, NEC showed a cartridge recording unit. There is no doubt about it . . . any system that uses a cartridge or cassette is attractive.

Although Ampex did not showcase it as such, the VPR-1 one-inch console introduced by Ampex last year and the VPR-10 portable recorder (new this year) did manage to get its fair share of attention. The ability of this unit to produce slow motion pictures without a glitch gave it something of an edge over its competitors. There were those leaving the Ampex room who said the AVR-3 was the superior machine but others who became firm believers in one-inch and they were ready to predict the oust of quad. In view of the price differential, the ranks of the latter will surely grow.

We headed this section quad vs one-inch formats. One could have both at the same time at the Asaca booth. This company showed, as it did last year, the AVS 3200B and the APA-300B. This system used four heads scanning a one-inch width of tape. Thus in the one-inch category we have

transverse track recording (Asaca), segmented scan (BCN), and a variety of single scan approaches (Ampex, Sony, NEC and who knows who next).

Improved quality from old one-inchers. IVC one-inch VTR customers were intrigued to find at the IVC booth a method of upgrading their old helicals for about $10,000. The Chroma-Con mods eliminate visible moire, the video S/N is increased to 47 dB and two 50 dB audio channels are possible.

Quad-quality from cassettes?

Maybe you can't get the bandwidth out of a ¾-in. U-matic VTR that you can out of a quad but if it's color-realistic, low-noise signals that you want (at U-matic prices), you can have them. The solution is called Tri-Chroma-4 and it's all possible with a black box that was shown by TRI in a Sheraton Park suite. Instead of recording encoded NTSC signals, TRI records three separate R, G, B-derived signals. Luminance is recorded at the high end of the band; R-Y and B-Y are multiplexed at the lower end on an alternate line basis. (The missing color information—one line—is supplied from a semiconductor memory. (See *BM/E,* March, p. 128, for a more complete description.) When the outputs are mixed, the result is a perfect hue, noise-free (55 dB) picture. Multiple dubs can be made without deterioration. You don't need quad; you don't need one-inch recorders, says TRI.

Videotape and accessories

A broad selection of videotapes was shown by Ampex, Fuji, 3-M, Memorex and The Video Tape Co. 3-M showed new rugged U-matic cassettes, the MBU series. Memorex introduced several new tapes: the MRX-716 Quantum formulation (500 oersteds) specifically designed for the BCN family of recorders and a new tape, the MRX-714, specifically designed for the IVC-9900 running at its slower speeds. The latter is rated at 51 dB. Memorex also announced a new flame retardant shipper.

New video cassette tape evaluators were introduced by Recortec and Television Equipment Corp. The Recortec unit evaluates tape at high speed; the TEA (Magnatek) unit cleans as well as evaluates.

To rapidly erase video cassettes, Garner Industries showed a conveyor belt, Video Raser, which could do its job in less than 5 seconds.

For more information on latest VTR products: Sony BVU-50, **284;** BVH-500, **285;** Panasonic NV-9400, **286;** NV-9500, **287;** NEC TTR5-7, **288;** IVC 8020, **289;** Bosch Fernseh BCN 20, **290.**

Still stores and slo-mos 'on the move

Though there were no startling leaps forward in the area of still stores and slo-mo devices, the manufacturers showed steady improvement in the design and operation of their devices.

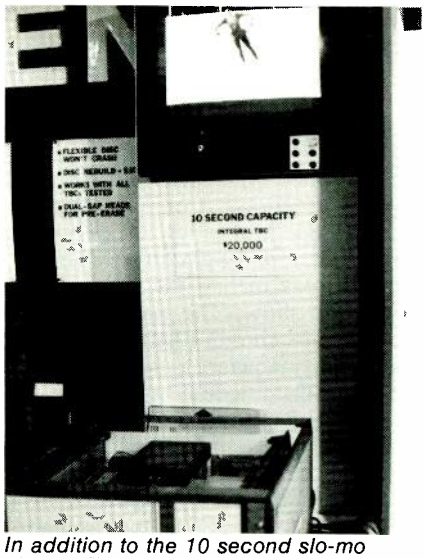
Ampex, which displayed its ESS system last year has made considerable progress in the interim. The model on display in their booth this year is fully operational and was scheduled to be delivered to CBS after the show. CBS has put the system through a year long shakedown cruise using it for election coverage last Fall and is now employing it regularly during its evening "Newsbreak" insert and for portions of the CBS Evening News with Walter Cronkite. ESS was jointly developed by Ampex and CBS with an eye towards reducing the cost of slide and graphic storage and increasing the efficiency of delivering such material to air.

ESS was the first commercial product for broadcasting to use digital recording techniques for video images. The system, in its basic configuration, can store up to 1500 video frames on-line for immediate random access. The basic capacity is expandable through the use of additional discs. ESS electronically converts the analog television signal into digital form and stores the information on magnetic disc packs. The access time to any on-line still is less than 100 milliseconds.

In addition to the record and reproduce modes of operation, ESS can rearrange selected stills in any sequence for inclusion in a program. Two independent video outputs permit preview, dissolve, mixed and special effects to be performed in the normal way at the studio switcher.

A new company, ADDA, has entered the field with a somewhat smaller version of the ESS machine. Unable to get exhibit space at NAB, ADDA took a suite to display their ESP-100 Electronic Still Processor. It may not be accurate to describe the ESP-100 as a "version" of ESS, but they bear some striking resemblance in physical appearance and in function. The ESP-100, however, is smaller and has less immediate storage capacity but the design and capacity of the machine, according to an ADDA spokesman, was largely determined by extensive market research involving the study of station needs and existing practices for handling stills and graphics.

The configuration of ESP-100 currently includes 1 disc drive (though there are plans to add a second) which has the capacity to store 200 slides on-line. (This will be expanded to 400.) Like ESS, ESP-100 uses flying heads so there is no contact to either damage heads or stored material. It is possible to edit or assemble up to 50 still sequences so long as the total number of slides does not exceed 400. Any one of the individually stored slides can be accessed and displayed within a half second. Two channels permit the display of one still while another is being called up. The ESP-100 system will sell for about $50,000.



In addition to the 10 second slo-mo above, Eigen brought out a new 20 second capacity version.

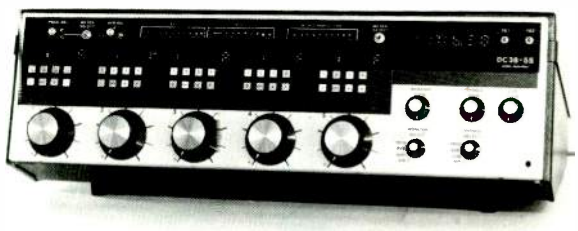
Arvin/Echo introduced a number of new products at the show which significantly expanded the capability of their ES-1 Discassette® Recorder. BESS-1 (Basic Expandable Storage System) can provide access to 400 or more slides on line at one time. The BESS uses two EFS-1 units and an expandable programmable terminal. The terminal has a programmable memory that permits up to a 400 slide sequence to be assembled and played. The system cost, with two EFS-1 units, is estimated to be under $50,000. Each Discassette stores up to 400 stills and costs $75. Library expansion costs, therefore, are relatively low. Another new addition to the EFS-1 system is the RC-100 Remote Control unit which can be situated up to 125 feet from the EFS-1 and can randomly access any of 100 on-line slides. The machine can step to an adjacent track in as little as 8 milleseconds, and step 200 tracks (the full disc) in 2 seconds. Though RC-100 has been around awhile, this was its first appearance at NAB. Both the RC-100 and BESS-1 are compatible with most automated station equipment. Also available is the RCV-100 which is a remote control interface with the Vidifont Character Generator. The interface permits a still from EFS-1 and corresponding type from the Vidifont storage to be acces-

continued on page 70

Ramko stole the show

with the most advanced trouble-free broadcast consoles in history!

DC-12



DC-38

FEATURES OF NEW DC-12 SERIES CONSOLES

- Remote controlled rack mount audio electronics. All solid state audio routing and attenuation. Completely DC controlled
- Dual channel.
- Plug in mixer/switching modules allow up to 12 channels on standard models
- Up to 20 channels with extender electronics
- 2 inputs per mixer
- Quiet, lighted push buttons
- Tone generator built in
- Duo-Q. Two points of cue initiation. The standard full off mixer position and the lighted push on/push off switch located just below each mixer. Thus the mixing pot may be left in the mixing position and still cue via the switch below
- Minimum 5 million operations on mixer controls
- Minimum 5 million operations on input and output select switches
- Talk back thru cue system
- Solid state balanced in and balanced out
- Zero tracking error on stereo consoles via Ramko's exclusive time shared attenuators
- All plug in electronics.
- Patch panel programmable cue and monitor mute
- AC line filtering built in
- Lightning fast interior access
- Patch panel gain select on all inputs. All inputs may be made to accept anything from mic thru high level
- Interchangeable, colored push button caps.
- 4 year warranty on all consoles
- 2 week free trail on all standard models
- Simulcast output and metering on all stereo models

Pricing from

3600^{00} TO 4400^{00}

(12 channel mono) (12 channel stereo)

Will be lower if fewer channels are desired.

FEATURES OF NEW DC-38 SERIES CONSOLES

- Dual Channel
- 5, 8, & 10 mixer versions
- 4 inputs per mixer
- Alpha numeric readouts above each mixer
- Solid state meters
  - (a) 3 meters for stereo. Left, right and mono mix (simulcast). The left & right meters are switchable to Audition or Program. The mono mix meter is switchable to a special circuit for phase checks
- Duo-Q
  - (a) 2 points of cue initiation are provided. The standard full counter clockwise position on the channel mixer & right above on the output switching group. Thus the mixing pot may be left in the mixing position and still cue via the switch above
- Up to 20 million operation mixer controls
- Up to 20 million operation push button switches
- Talk back thru cue system
- Completely DC controlled. All solid state audio routing and attenuation
- Exclusive time shared attenuators provide *ZERO* tracking error on stereo consoles
- Solid state balanced in and balanced out
- Plug in electronics
- Patch panel programmable cue and mute
- Patch panel programmable cue and live mic flashing indicators on each channel
- AC line filtering built in. Suppresses both line transients and RF
- Lightning fast interior access. Total access in less than 15 seconds
- Patch panel gain select on all inputs. Each input may be made to accept any input from mic thru high level
- Interchangeable snap in legends on input and output select switches
- Interchangeable back lighted alpha/numeric status indicators
- Optional digital clock and production timer
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Arvin/Echo got a lot of action with its new BESS-1 option for its EFS-1 system. Up to 400 stills are on line in the new version.

Spindler & Sauppe has applied microprocessor technology to the slide telecine system, Producer 32.

sed for simultaneous display under the control of the Vidifont keyboard.

Arvin/Echo had hoped to display a new slo-mo device but the system was not quite ready by show time. Shortly, however, the machine should be ready for introduction and promises to be compact, light, and economical—under $50,000.

Eigen Video introduced, for the first time at the NAB, a 20 second slo-mo disc recorder for $30,000. This unit is an addition to their line which includes a 10 second version. Integrated with the slo-mo disc recorder is a digital time base corrector which enhances the flexible disc machine. The device operates with a 3600 rpm disc recorder and uses flexible Mylar disc. The machine is completely immune to catastophic head crashes. The integration of the digital TBC to this unit and to the 10 second version makes the machine ready for air without further expense. A 10 second "continuous loop" version also with TBC was shown and is priced at $20,000. The unit is compact (only 14 inches high and weighs 75 lbs.) and uses two heads so that slides can be changed on-air as a vertical interval switch. In playback, the operator has the option of playing single fields or using the two heads to play a full frame. When used for slides, the operator still has the slo-mo capability as a backup or to isolate another camera.

Reader Service Numbers: Ampex ESS, **297**; ADDA ESP 100, **298**; Arvin/Echo BESS-1, **299**; RC-100, **300**; Eigen Video, **125**.

Film, film cameras, telecines

New from Eastman Kodak was high speed news film 7250 (Tungsten) and Eastman Ektachome VN print film. There were no new film cameras but familiar products could be seen at Cinema Products, Camera Mart and Cine 60.

Biggest news in telecine chains was the LDK-65 single cabinet unit from Philips. RCA stressed that their new one-in. Saticon tube could be used in TK-28s to reduce lag. The TCF-3000 introduced several years ago by TeleMation was on prominent display and Thomson-CSF was promoting the Cohu system. Spindler and Sauppe showed the microprocessor controlled Producer 32 Slectroslide Projector for pre-programmed slide presentations. BEI showed telecine automatic light control systems including one for small image film chain cameras. L&W was on hand to demonstrate familiar Athena projectors.

A film inspection cleaning machine with preview editing features designed especially for TV use was shown by Lipsner-Smith.

Character Generators multiply and increase power

What started not all that long ago as an electronic method of adding titles and other font typed messages to the television raster, has grown now to a remarkable stage of development. So much development has gone on, and gone on so steadily, that "evolution" understates the case and "revolution" doesn't seem to connote the constant progress being made in the field. A number of manufacturers have dropped the term "character generator" from their product name since it doesn't convey all the things these systems do.

TeleMation's Compositor I Graphics System is one such device that keeps getting more powerful. The system now has a 1000 page memory that allows display of any list of pages in any order with the press of one button. In dual configuration, Compositor I will preview one page while the other is on-air. Or the dual system can be operated in such a way that one unit is used for display while the other is used for composition. Automatic Formatting is another feature that permits a format to be established (font, edge and color image) so that even if the words are later changed, only the new copy need be entered. Because the Compositor I system is software based, new fonts and programs (i.e. election reporting) can be added to the system without hardware changes.

Many of the character generators, or graphics systems if you will, offer numerous other features such as multiple fonts, colorizing, edging, flashing, crawl, color background and much, much more. Most of these type features are being offered in good quality character generators. Where the field is separating is around machine control, size of memory, degree of automation and flexibility. The highly sophisticated systems are still coming mainly from Chyron, TeleMation and Vidifont (Thomson-CSF), but some new entries are also getting pretty sophisticated. System Concepts brought out its Quantafont IV and VI Television Production Titlers and should soon be ready to deliver the Quantafont X. These machines are all very sophisticated with just about the same features that a few years ago seemed extraordinary in a machine de-

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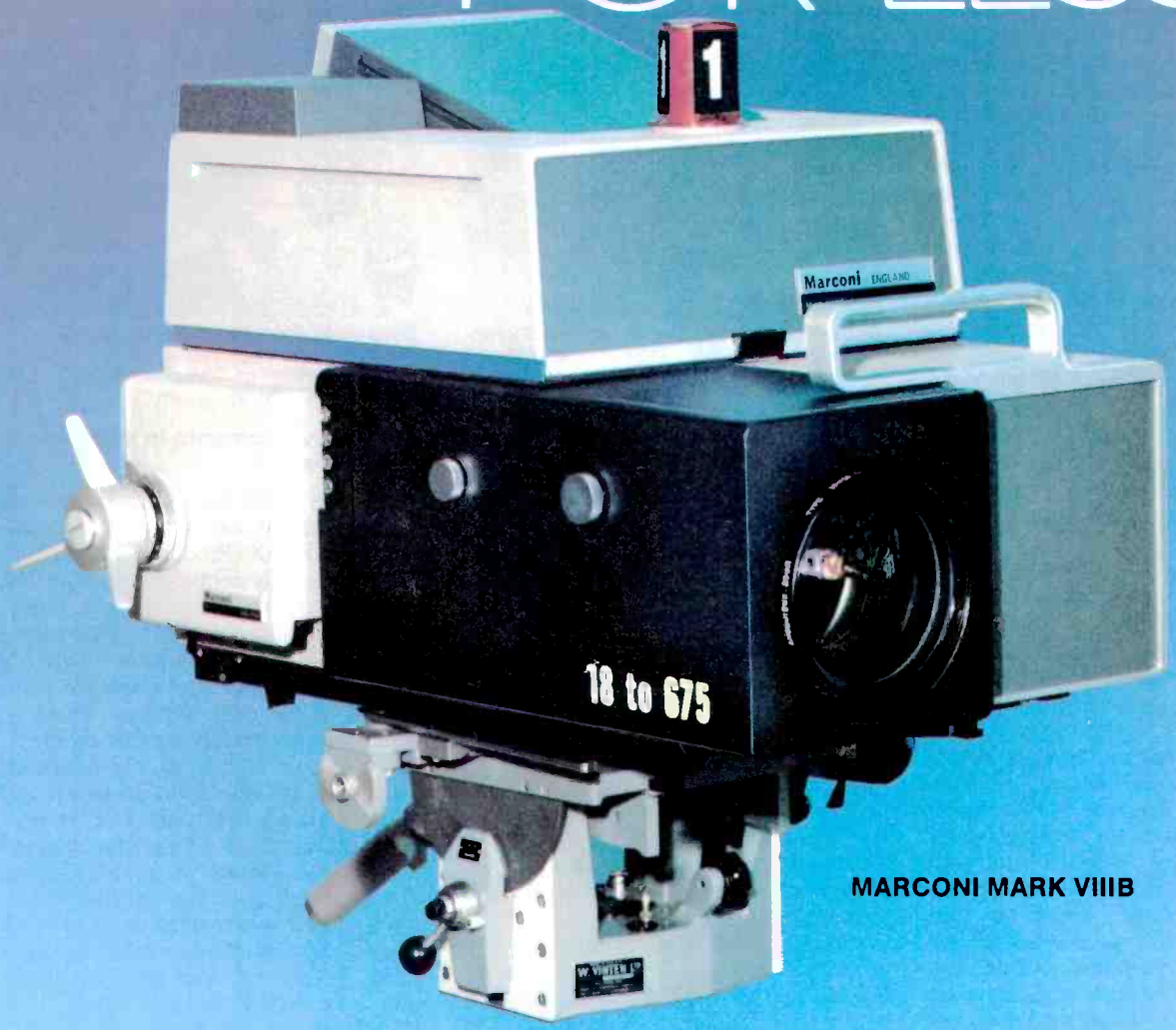

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signed for under $20,000.

Chyron has not been sitting still, however, and continues to expand the capacity of their system. The Chyron II Font Library now contains nine type fonts. With the Chyron's 27 nsec resolution, all the fonts are free of stair-step distortion. In their booth, Chyron got quite a bit of attention with the dynamic features they have added to the system. Using frame store techniques, the Chyron system was used to "animate" graphics such as weather fronts moving across map and numerous other such displays.

3M's Mincom Division is also rapidly expanding their efforts in the character generator field. New in their exhibit this year was the Model D-8000 Character Generator using dual microprocessor technology for an expanded repertoire of capabilities. Operating in conjunction with the D-8000 is a model 5110 Color Insert Keyer and a Model 5120 Outliner. The range of effects, fonts, and functions of the D-8000 can be expanded and updated through software modification. 3M is one of the comers in this field.

Vidifont, from Thomson-CSF, used the show to demonstrate the advantages of its Multiframe System. This system expands the Vidifont Mark IV capability by instantaneously capturing up to four full-color graphic displays into independent frame stores. Each captured frame retains its original font style and height, color flash, and auto spacing. The built-in 4×2 digital switcher will display, in any combination or order, any two of the four captured frames. The frames can also be continuously previewed on four separate monochrome outputs. Real-time display dynamics are another function of multiframe and includes effects such as roll, crawls, diagonal slew or 360 deg. rotation, nine edging effects and selectable flash rates.

Knox, Ltd. had a booth full of character generators in all manner of configurations. Knox had fairly simple character generators suitable to CATV systems and large, powerful systems suitable to most any broadcast need. Knox had one of the widest selections of character generators at the show.

Laird Telemedia showed two models of character generators, the Model 1200 and the Model 3600A. These are relatively economical machines but still contain a wide array of features. The Model 3600A has a basic 4 page memory which is expandable, has adjustable font width and edging, multiple flag functions, roll and crawl and non-additive mix. The 1200V is a much simpler version

3M has greatly expanded its line of graphics and character generator systems and used microprocessors to increase power.

System Concepts, as promised last year, jumped into the high end of character generator competition with its new line of broadcast quality machines.

The possibilities for dynamic use of graphics was explored in the demonstrations of Compositor I at TeleMation's booth.

but is intended to offer only a single line, 25 character format, though that can be expanded to 15 additional lines with a plug-in module. The basic 3600A goes for under $3000 depending on options, and the basic 1200 starts at under $2000.

Beston Electronics also displayed character generators. If they looked familiar to visitors, that's because in years past they were manufactured by KSN (Kansas State Network). Beston bought the line and is now manufacturing and selling them under the BEI label. The Model CG-410 is also economy minded but offers a fairly full line of features. The basic model has 8 pages of memory expandable with options to 40 pages.

International Communications & Control had a T-1000 character generator that looked fairly complete and has a full array of features. The system is very similar to the Shintron character generators we've seen before. ICC also had a more sophisticated model, the CGT-2500B Character Generator and Titling System. The console includes its own display terminal.

The engineering sessions held on character generators and graphic systems produced a consensus that with the addition of computer and microprocessor technology, big advances in TV graphics are on the way. Chyron, TeleMation, and Vidifont, and now 3M all seem to be breaking new territory.

Reader Service Numbers: Telemation Compositor I, **301**; System Concepts, **302**; Chyron, **303**; 3M D-8000, **304**; Thomson-CSF Vidifont, **305**.

Other developments in production switchers

Though Vital had its troubles with Squeezoom, it had considerable success with PSAS (Production Switching Automation System). Faced with the ever growing number of effects, transitions, and buses available in modern production switchers, some operators have been complaining about the complexity of the control panel. PSAS is one approach to solving this problem. PSAS memorizes manually executed switching and transition decisions and stores them for playback. The "store" function can recall all switcher settings and precise values of handlebar and position settings. This device effectively eliminates retakes demanded by missed cues or other switcher operator flubs. When they can program talent this way, you'll have it made. The PSAS can run the 3 mix/effects unit, plus the 6 associated switching buses. PSAS will also be able to control the "Squeezoom" unit. The basic unit can control up to 20 events and optional memory expands this capacity to 10,000 events. PSAS will probably be most useful in post production where even the talent variable is controllable.

Duca-Richardson was able to get more exposure this year. Last year the company was unable to get booth space but this year they were right in the thick of it. For many broadcasters, this was their first chance to get a look at the Duca-Richardson Series 4000 production switchers.

The basic switcher, DRC 4000-H, consists of 24 composite/noncomposite inputs plus color black and color

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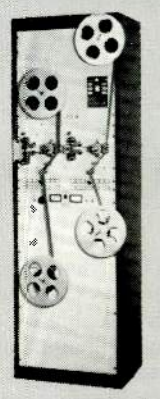
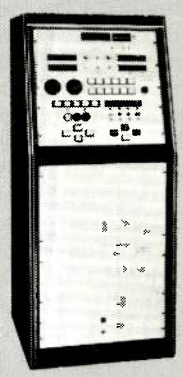
MAGNA-TECH ELECTRONIC

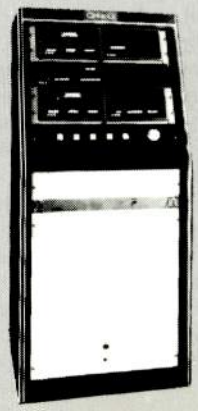


High-Speed Reproducers



EL Console

Prism Projectors



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This was the first year broadcasters at NAB got an opportunity to put the Duca Richardson DRC-4000H Series switcher through its paces.

background (26 total). Eight output buses are provided for mix/effects, preview/key, and program. Three function modules consisting of keyboard source selector, mix/effects, colorizer, independent pattern generator with 44 standard patterns (expandable to 99), positioner, dual axis modulator and preset limits, chroma key switcher (up to 6 inputs and 3 M/E amplifiers) with slaved insert sources, color black/color background generator, genlock timing system, and control panel are also in the basic system. The full series is filled out with 8 options including keying in a number of configurations including a downstream and an Automatic Transition Generator for timing transitions anywhere from 0.1 to 9.9 seconds. Also available are quad split functions and a quadrant selector to preset the split. The switcher appears to be well thought out for ease of operation. All video paths are color coded on buses and the additional patterns are available by doubling the function of the selector keys rather than by an explosion of additional keys. Status lights and pre set capabilities help to keep down the complexity of the switchers operation. The switcher Duca-Richardson had on exhibit was sold at the show to Versatile Video in Sunnyvale, California.

Grass Valley introduced a number of new options for their 1600 series production switchers in addition to the DVE package. GVG has added an analog border option that allows black or white borders to be added to a keyed caption either symetrically or asymetrically for a drop shadow effect. Also new is a shadow chroma key option. The shadows produced by this technique are natural. Though blue is normally used as the keying hue, this system will operate on any color. The shadow chroma key option is used to improve keying with translucent objects by restoring lost texture and can provide some unusual effects such as filling a keyed-out area with a combined matte and shadow signal for instance. Other uses of the shadow key option will be discovered with experience. The system consists of a shadow chroma keyer module, a shadow key/chroma key switching matrix and a remote control panel. Input signal requirements are uncoded, R, B and G video from the keying camera. The system will not use composite video signals. Another option for the 1600-1A and 1600-1L video switchers is a new AFV system. With 15 inputs, 10 audio-follow-video, and 5 audio only, two modes of operation are accessible that permit either regular AFV in which audio crosspoints are switched to follow video selections, or AFV Off, in which audio is handled separately. The "take" switch and mixing levers on the video switcher control both video and audio transitions when AFV mode is used.

Central Dynamics did not introduce any truly new switchers but like most of the other manufacturers, showed off improvements to earlier systems. The CD 480 production switcher on display in CDL's booth was destined for WGBH in Boston after the show. The CD 480, introduced last year, is now fully operational and in production. In addition to the CD 480 in the booth, where visitors got the chance for hands-on experience manipulating 7 camera feeds, CDL proudly exhibited photos of the first CD 480 installation at KSD-TV in St. Louis. CDL also exhibited two of its smaller switchers, the VS-14 and VS-10. Perhaps the highlight of the CDL exhibit was its System 200 Technical Automation system, which will be discussed later.

The American Data booth at the Sheraton presented the visitor with a phalanx of production switchers ranging from the big 558-3 down through the 558-1 suitable for remote vans. The 558-1 and 558-2 use the same four channel parallel video processing concept as the 558-3. This concept permits multiple mix, wipe, and key functions to be performed on a single M/E amplifier. American Data also showed a new line of 2100 series production switchers in the economy class with price tags under $10,000. Rounding out the American Data exhibit were four different routing switcher packages utilizing modular design and several types of remote control configurations.

Richmond Hill Laboratories, Ltd. had good crowds moving through their booth. RHL, which prides itself on a philosophy of modular design that allows all RHL customers to update as developments become available rather than be faced with obselescence by a whole new line of switchers, had a new add-on to their RHL VPM 3000 Series Video Production Switchers. The new device is an Auxiliary Transition Unit, ATU-1, and is a complete Mix-Key—Split system with sync-non-sync fade to black capability. When used on the output of a mixer, the program bus feeds input 'A'. Input 'B' could be the Preview output or any other timed source. Three external Key inputs are provided. The device will generate split keys, mix keys, key, mix, and splits (horizontal wipes). Linear keying circuitry is employed. RHL had designed the unit not only for its VPM 3000 series but also as a stand-alone which will interface with any existing production switcher.

Industrial Sciences, Inc., ISI, brought out a new model production switcher, the Model 1201. The 1201 is a somewhat smaller and simplified version of the 1205 but offers nearly as many features for a smaller price. ISI provides individual power supplies for each sub-system of its switchers so that catastrophic failures cannot cripple the entire system. This design criterion is continued in the 1201 and it appears that the only reduction in the 1201 is a matter of scale rather than scope. In the 1201, the number of buses has been reduced from 5 to 4 and a single 32 pattern 1250 mix/effects system is used instead of 2. Certain electronic characteristics have also been eliminated, such as clamped inputs and encoding for computer control, but the result is a full function production switcher in the $12,000 to $14,000 range rather than the $27,000 1205 package. One feature that makes the 1201 attractive is an automatic preview function in which the machine looks through the logic of the switcher and determines the next event for automatic display prior to execution.

At the Computer Image booth, visitors were invited to compare "apples and apples"—CI's way of saying that in terms of cost to performance ratio, their production switchers perform favorably. It seems that at the bottom of CI's "comparison" is the fact that their SL5000 switcher, priced under $30,000 and using 4 M/E assigned buses, delivers about the same flexibility as a 7 bus system. While other systems with 6 M/E assigned buses can

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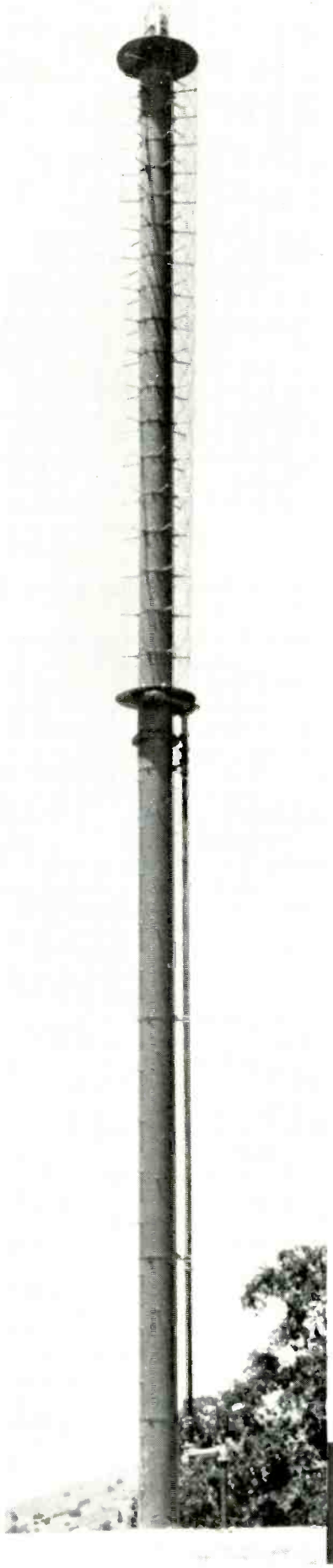

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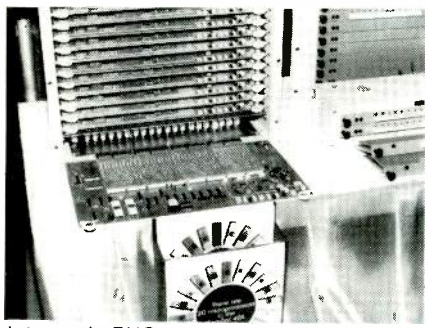

Interest in ENG assignment switchers was high. Above is the ComTec ENG switcher.

This Shintron switcher was one of many new small production switchers for vans and small studio operations.

offer a third level keying capability and the CI switcher has just a second level capability, CI wonders if that third level is worth the cost of an additional 2 buses. CI also demonstrated an interface with the MCI/Quantel device for obtaining image compression in combination with other effects.

Computer Image Corporation's Video Controller Operation which manufactures the switchers, announced just prior to the show that it had been taken over by Dytek Industries, Inc. Dytek's president, Donald Maly, indicated that the move would result in a broader product line with such new products as microprocessing, technical automation and a special purpose video controller line to be introduced later this year.

Small production switchers get better

The ENG/EFP boom has not left the world of switching untouched. More small production switchers suitable to mobile van operation were present at NAB this year than ever before. Not all the production switchers that fit in this category come from the full-line manufacturers already mentioned. Some companies, like Shintron, specialize in the small switcher and most have incorporated some sophisticated capabilities.

Shintron has incorporated downstream keying, variable automatic dissolve and wipe rates and some other fairly sophisticated techniques into its series of small switchers. The 370 Mark IV, for instance, contains the three features mentioned above and yet has a price tag of just $4980. Part of the low price of these switchers is attributable, according to a company spokesman, to the fact that there are "no options." Essentially, the buyer gets the features built in to the switcher and customizing is kept to a minimum. Also on display in the booth was a Model 375, switcher that could handle up to 12 inputs. Its price tag was $8500.

ComTec introduced a Model 3300 Production Switcher that packed a lot for its $8295 ticket. The 3300 is a 5 bus, 11 input all VI switcher and remote controllable. Eighteen patterns with vertical interval selection allows "on-air" pattern changes. Hard and soft wipes are included along with color black, colorizer, joystick positioner, two mixer keyers, blink key, modulator patterns, border generators and cutbar. With options such as a linear RGB keyer, key edger, square effects generator and audio follow video option, the cost of a 3300 could rise to about $12,000. ComTec also had on display a small switcher, Model 3100. Its features are nearly as prolific as the 3300 and quite remarkable at $4225. The most interesting thing about this switcher is its use of pressure sensitive "plates" rather than buttons. To activate a switch, only normal pressure is applied to the colored designated area on the panel. There is, per se, no "button"—just a colored square, like those used for elevators that you touch and they light up. In fact all of the switches are of this type, including the pattern selector switches, so that the panel of the machine is completely flush with the exception of the levers and joystick.

Dynasciences similarly presented a couple of small switchers including its Model 7400. The switcher uses digital logic control for simplified cabling and, as small as it is, the 7400 is computer compatable for post production applications. The switcher will handle 12 inputs on 4 buses, with tally switching on 11 inputs. There are 12 pattern selections in addition to soft wipe, mask key, and spot lite functions. Joystick positioning is also included.

Panasonic included in its extensive exhibit a small AS-6000 which will handle 6 inputs and provides what are now common special effects—14 patterns, two external keys, repositioning, etc. etc. The power of these small switchers continues to grow impressively. Options for the AS-6000 include the AS-2000 chroma keyer and the AS-1000 color sync generator which uses a crystal oscillator to produce EIA RS-170 sync.

An additional switcher from ComTec that does not fit easily into any of these general groups that we have been discussing is what ComTec has dubbed the ENG Switcher. Essentially, the ENG switcher uses 3 control panels designed to provide assignments to 3 VTRs, 3 time base correctors and 3 time code generators. Nine different sources, 3 of which are "VTR Play" modes, can be selected to interface with the TBCs and time code generators for purposes of dubbing, editing, monitoring or airing. Microprocessor control locks out any illegal equipment combinations and indicates the status with a flashing light. Busy signals are generated if the operator should select machines already in use.

In addition to new switchers, there was also a new company, Beaveronics at NAB. Beaveronics initiated its NAB debut with a display of its Models 154 and 156 production switchers. Beaveronics also had on hand other video switching gear and terminal equipment.

Master control switching has grown reliable

Master control switchers are the reliable tools they ought to be. To say that there is nothing "new" is accurate in so far as there have been no 'startling' developments in the field. Master control switchers should be able to keep you on the air with a minimum of difficulty and most manufacturers have concentrated on reliability. Richmond Hill, Grass Valley, CDL, Vital, ISI, American Data and some of the other better known firms know this so well that some didn't even bring master control switchers to the show. Those that did were not so much telling broadcasters that their switchers were 'new' as they were seeking to demonstrate the reliability of their engineering. Richmond Hill, Industrial Sciences, GVG and Vital brought their machines to the show and broadcasters got a chance to put them to the test.

Grass Valley and ISI had the only new introductions in this area as far as we know. ISI brought out its Model 821 Master Control Switcher. The principle design consideration was to provide maximum utility in master control with a minimum of controls. One way ISI has reduced the number of controls is to use an "initiate" bar, similar in function to a take bar. With two buses, one a program bus and the other a preset, or preview bus, the operator presets the next event, is able to preview it and at the appropriate moment, pushes the "initiate" bar. Other features include selectable rates for the audio-follow-video transitions, a preroll counter which is triggered by the logic state of the preset bus and initiate bar and provides a bus transfer

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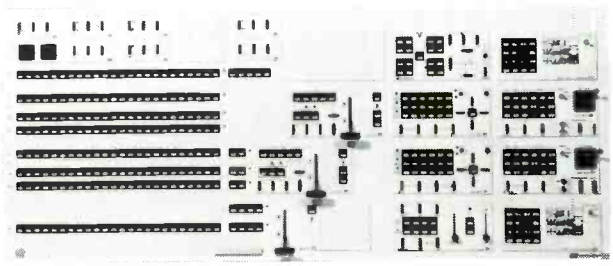
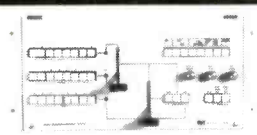
Video switchers.

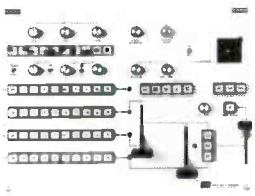


New, Super Powerful CD 480 The Smart Switcher
Revolutionary modular switchers with unprecedented production power. They outperform the largest conventional switchers, yet are extremely simple to operate. Their power and ease of operation are due to CDL's new Sequential Effects (SFX) Amplifier, which can cut, mix or wipe between two Background Sources and two separate Key Sources either individually or in any combination. Models with one or two SFX Amplifiers provide all the standard and optional features you need, including Rotary & Random wipes, RGB Shadow keys, Hard and Soft Color Border wipes, Color Border keys, Quad with Color Borders, Encoded Chroma keying, Key Mask generator, and 16, 24 or 32 inputs. A variety of modular accessories will continue to keep your switcher smarter than the rest as new technology develops.

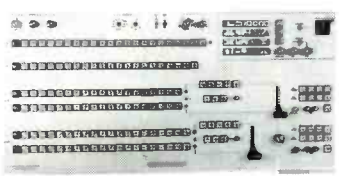
The CD-480 is now being shipped.



VS-10
An inexpensive broadcast quality 8-input switcher that features flexibility and ease of operation. Self-contained electronics for rapid installation in ENG and other small mobiles.



VS-14
Sophisticated enough for large studio production, yet compact and inexpensive enough for small mobiles. Soft wipes and keys—even a Downstream keyer—are standard. Self-contained and remote versions available.



VSP-1260S
An amazing value
Now the smallest station can afford a conventional 20-input mix/effects switcher of the highest quality and reliability.
All features, including an Encoded Chroma keyer and Bordered keys are standard (not optional, as is often the case). And the price is astonishingly affordable.

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Computer controlled automation system for Technical Operations that communicates directly with a Business Computer System. Stores and retrieves the schedule with entry error checking, makes automatic time corrections, performs complicated audio/video switching sequences (including dissolves, fades, wipes and keys), assigns machines, verifies material, and prints the "As-Aired" log.

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Video Tape Editor
A computer editing System with easily operated control panel and CRT display for rapid and precise control of VTR's & Switcher CDL's unique Self Learning Cueing Software Program is a new feature.

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Video Tape Editor
A two machine Time Code microprocessor Editor that interfaces to Quad or Helical VTR's.

Also a complete line of production and TV terminal equipment, including:
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pulse to cut to the program bus. In addition, the full retinue of features one expects in a master control switcher are present in the 821.

Reader Service Numbers: Vital PSAS, **306;** Duca-Richardson DRC-4000H, **307;** GVG AFV, **308;** M200, **309;** CDL 480, **310;** System 200, **311;** American Data, **312;** Richmond Hill ATU, **313;** ISI 1201, **314;** 821, **315;** Computer Image, **316;** Shintron, **317;** ComTec 3300, **318;** ENG, **319;** Dynasciences 7400, **320;** Panasonic AS-6000, **321;** Beaveronics, **322.**

Technical automation for TV interfaced with business

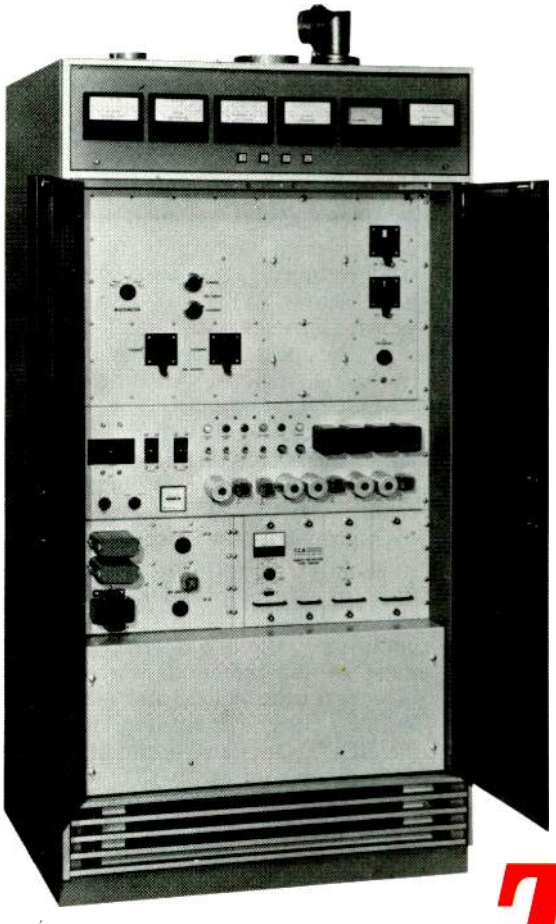
We will report on the business systems separately but for now the discussion will be restricted to the exhibits that feature an existing technical interface. BIAS, from Data Control Corporation, was connected to Vital and CDL. Currently, BIAS leads the field in business automation for TV but because the BIAS system depends on a host computer in Memphis to provide uts considerable computer power, it has had some difficulty dealing with the problem of technical interface. The problem is not related to conceptual deficiencies but to some minor disputes with switcher manufacturers over whose machines will do which tasks. BIAS has had established protocols with switcher manufacturers for some time. In years past, BIAS as well as other business automation systems, demonstrated the ability to interface with technical automation systems at trade shows. What was different this year for BIAS was the "real" interface of its business system with operating television stations. At Boston, its a BIAS/CDL system.

The CDL booth was the center of the business/technical interface action. CDL has had a chain of interface successes with the BCS system selected by Metromedia for its stations. Added to the WTCN interface, which was the first of the BCS/CDL interfaces, WBZ, WNEW and KYW have been completed. The two interfaces that got most of the attention at the booth, however, were WTTG and WNAC. At WTTG, CDL is again interfaced with the BCS system and in the booth, the CRT readout of the WTTG computer along with the off-air programming of the station provided visitors with a "live" demonstration of the system's capacity. As the CRT readout displayed the schedule of upcoming events, visitors could watch the actual on-air execution. The WTTG system is a CDL 200 interfaced with BCS.

The other display of technical automation at CDL's booth was a BIAS/

continued on page 81

Why this tube worked for WFPG-FM for 55,586 hours and can still do the job.



This Eimac 3CX10,000A7 tube operated for 55,586 hours at WFPG-FM, Atlantic City, N.J., located on marshlands surrounded by salt water — in a CCA FM20,000D transmitter. We tested the tube on a new CCA transmitter and it can still make rated power.

CCA transmitters are renowned for their long tube life and low operating cost. In a recent survey CCA final tube operating time averaged over 29,000 hours. The prime reason for their long life and low operating cost is the inherent reliability of the conservative CCA designs. Our 1,300 users have proved it for themselves.

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CDL System 100 interface. The software and schedule being used was derived from the WNAC, Boston, system that went on-air in February. The booth display used a floppy disc bulk memory to store the event schedule. It accepted daily schedules from the business system, printed the library "pull" sheets, the "as-aired" log and returned data to the BIAS system. The BIAS system was also on-line to the Vital Industries' technical automation system demonstrating the viability of that interface.

The Grass Valley Group introduced its M200 Series TV Automation Systems. At their booth, GVG conducted mini-seminars to explain this new approach. Essentially, GVG with the M200, has taken a modular approach to TV automation that will allow the station to build towards total automation at its own pace. GVG hopes that this approach will appeal to the small and medium sized market stations that have been discouraged in the past by the high initial cost of TV automation.

The M200 system provides a spectrum of control ranging from manual operation of the 1600-4S Audio/Video Switcher to complete automatic control of the switching system and machine sources including event scheduling from a traffic computer system.

The building block approach GVG takes with the M200 starts with the 1600-4S switcher with the interface included for the next step up. Next, a 1 event intelligent preroll and machine interface is added; then, 20 event storage and a CRT display with special keyboard for data entry. The system is then expanded to 200 event storage with event duration or time-of-day control, event editing with alphanumeric keyboard, log printing, cassette video tape interface (optional), and source assignment system (optional). The next step is an expansion of the event storage to 11,000 events via a dual floppy disc system. Interface with the traffic system is the next stage and finally, a data base search and printout system for providing special printouts such as telecine or videotape schedules.

This building block system is made possible by the extensive use of microcomputers, RAMS, PROMS, and LSI technology, effectively replacing the mini-computer approach. By building towards the system using these devices no new step up obsoletes or bypasses previous steps. The initial step, the 1600-4S with M201 configuration costs $24,900, and begins building from there. Eventually the fill exceeds $60,000.

Ampex, which introduced the ACR-25 automatic cassette system and thereby opened the way to further station automation, has added something new to the ACR-25 system. Ampex has developed the ASD-1 for ACR-25s equipped with ADA and IDA (Automatic Data Accessory and Identification Data Accessory). The ASD-1 functions as a tool for automatically programming the playback sequence of ACR-25 cassettes. The device consists of a DEC PDP-11/03 minicomputer with Ampex designed software, a non-volatile core memory unit and a Teletype™ LT keyboard/printer with tape punch and reader. The ASD-1 increases the memory capacity of ADA and IDA to 750 events. ASD-1 permits the operator to automatically schedule, reschedule and update the play list.

Grass Valley conducted mini-seminars on its M200 Technical Automation System. The modular approach should help the spread of automation into smaller market stations.

Lentronix Ltd. displayed this PB-1000 Logic Analyzer for the ACR-25. Used with a monitor, it provides readout of ACR-25 logic status for testing and monitoring.

Videotape editors—still improving

RCA demonstrated a new, simplified built-in editing device for their TR-600A quadruplex VTRs. The editor, called the SE-1, provides previewable editing capability and is suited to simple local editing requirements such as commercial "tags," station promos, sports highlights, and art-card animations. The new system uses microprocessor and programmable ROMs which are contained in modules mounted inside the TR-600A. Operational controls are mounted on the main control panel. This system counts control track pulses on the videotape to provide in and out edit point selection. Three preview modes are included: in and out, in only, and out only.

Other features include automatic re-cue, variable preroll times, programmable relay closure, an out-transfer mode, and a record safety interlock. Edit points may be shifted over a range of ±99 frames in single frame increments. The SE-1 can also record cue marks at the in and out points for future re-editing requirements.

RCA also demonstrated their AE-600 system editing which can control one record VTR and up to eight playback VTRs. Local or remote control is provided. A super highband pilot used in this system virtually eliminates banding.

Ampex had its EDM-1 videotape editing system on display and demonstrated its considerable capacity. EDM-1 features a computer-controlled switcher with special effects and a floppy disc memory that can store as many as 3,200 edited scenes. It can interface with up to eight on-line or off-line video, audio, or disc recorders. The EDM-1 system has an exclusive computer filing system that permits individual scenes to be identified by both time code and real language. This feature permits the operator to call up a scene using its real language tag rather than having to cross reference it with a set of numbers. Edited scenes can also be manipulated so that if the change in one scene affects the timing of other parts of the sequence, the EDM-1 automatically calculates the change and "ripples" (modifies) them accordingly.

An option to the EDM-1 system is an Autolearn accessory which permits the editor to practice numerous transition while the machine "learns" all cross points and operational controls

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YOU NEVER HAD IT SO EASY.

The things you're asked to do! Now that people have discovered how valuable and flexible video can be, there's no limit to the things they want you to do with it. Which creates some terrific opportunities...and more than a few production problems as well. At Cine 60, we're specialists in designing new products to help you get more of the former. With less of the latter.

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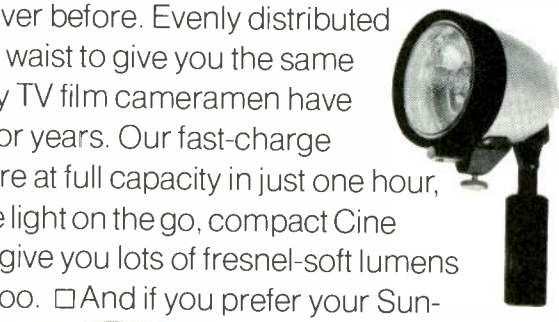

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and stores this information. When the operator is satisfied, the Autolearn is put into the execute mode and repeats the sequence of transitions or keys.

To improve the editing capacity of its 1-in. BCN format, Bosch-Fernseh has developed a "jogging mode" which utilizes a frame store device. Single pictures can be selected and viewed according to SMPTE time code or the jogger can be used to search in forward or reverse at a two picture per second rate. It is also possible to achieve a faster search mode ratio, such as 1:3 or 1:7 etc. The digital frame store device also has fast motion and archieval applications.

The new editor from TRI is the EA-6 Edit Automator. When the EA-3 was introduced, TRI promised a plug-in module that would extend the capability of the EA-3 from a simple control track editor all the way to a machine capable of editing in any time code standard. With micro-computer control, the EA-6, is that up-date module. The EA-6 has numerous features to permit the entry of edit points on the fly, in still—frame, or through the integral keyboard using time code designations. In, out, and insert durations are automatically timed and executed on re-call. The machine's capabilities are expandable through the addition of modules to multiformat editor control.

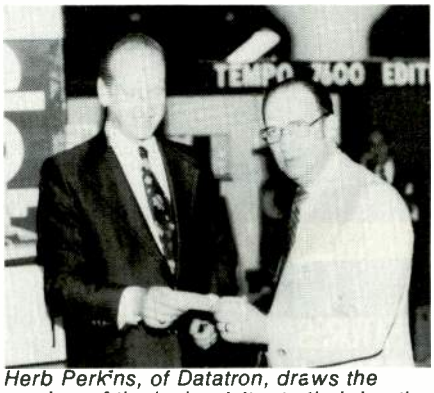
Convergence Corporation continued to expand the capabilities of their ECS-1B system. Added to the PC-3 program controller and tape timer systems introduced earlier, Convergence has now added two new functions. The first, called "Liplock" uses microprocessor technology to provide intelligible audio during fast forward or slow search modes. For faster editing, Convergence now provides a switch which cuts the edit cycle time in half. Pre-roll and cueing are reduced for those times when the speed of editing is all important.

The march of microprocessor technology is continued in the CMX 340X editing system. This machine has been on the market for awhile and units are now operating in facilities from New York to Los Angeles, and from Cuyahoga Falls to Florida. Central to the 340X is the use of the $(I^2)^{TM}$, Intelligent Interface, which uses separate microprocessors to interface each machine plugged into the system. The result is that 340X will interface with anything from quads to cassette recorders to sound effects consoles. The use of microprocessors also frees up the central processor to perform additional functions.

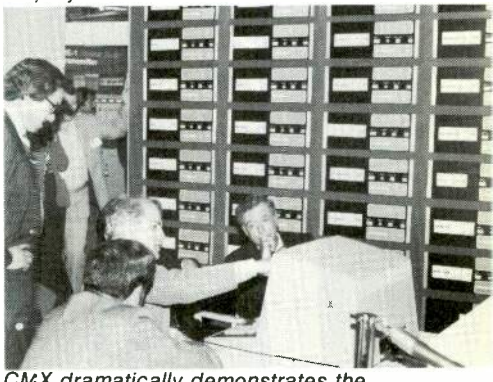
One of the other multiplexed editors

For simpler local editing tasks, RCA brought out its new SE-1 Editor.

EDM-1, from Ampex, was one of the more powerful videotape editing systems on display.



Herb Perkins, of Datatron, draws the number of the lucky visitor to their booth who won a Datatron Tempo '76 editor.



CMX dramatically demonstrates the power of their 340X system.

at NAB was the Datatron, Tempo '76 system. Datatron put on a knock-out demonstration of the flexibility of their machine by having its control a potpourri of VTRs right there in the booth. Quads, 1-in. helicals and cassette VTRs were all plugged into the Datatron controller to show the flexibility of this time code or pulse counting editor.

Panasonic introduced to broadcasters their NV-A950 editing controller. This controller works with the NV-9500 cassette editor but for economy of operation the feed deck can be an NV-9200 recorder rather than another editor. Slow and fast search modes are a feature of the system as well as rehearsal mode and memory of entry and exit points for inserts up to five minutes.

Sony Broadcast has added the BVG-1000 Vertical Interval Time Code Generator/Reader to its Omega 1 in., VTR editing system. The device generates not only standard SMPTE time code but adds time code into the vertical interval of the video signal being processed by the BVG-1000. With this approach, time code can be viewed from still-frame to 128 times normal play speed, in forward or reverse.

Recortec presented its Auto-Edit Controller, a remote control editor for quad VTRs equipped with R-MOD. The Auto-Edit Controller has preview and edit controls and two sets of remote VTR controls for play, stop, and shuttle. The shuttle control upgrades the VTR to provide variable speed wind in either direction with a single control knob.

Reader Service Numbers: RCA SE-1, **323**, AE-600, **324**; Ampex EDM-1, **325**; Bosch-Fernseh Jogger, **326**; TRI EA-6, **327**; Convergence LipLock, **328**; Panasonic NV-A950, **329**; Sony BVG-1000, **330**; Recortec Auto Edit, **331**; CMX 340X, **332**.

Picture monitors get more sophistication

Tektronix had a new group of high quality color picture monitors in the 670A Series. The 670A features variable aperture correction, precise color tracking, precision decoding (usable for adjusting system encoding quadrature with options), expanded V in pulse cross and V delay modes; and rapid retrace to display entire active picture area in underscan. CEI showed a new 17 in. professional broadcast color monitor that features shadow mask CRT for precise colormetry, 500 line resolution and solid state circuitry. The CEI-17C has switchable underscan mode and inputs for composite and noncomposite video as well as RGB signals with separate composite sync.

Bosch-Fernseh has a new monitor in the MC 37 BA with R-Y- and B-Y output for vectorscope connection.

The new monitor is one of 17 new models in three new performance classes. Rodhe & Schwarz displayed their line of Barco monitors including a high resolution model of 1000 lines.

World Video seems to be getting its message across that its monitors may use the Sony Trinitron tube and some circuitry but that by the time they are finished with it completely new circuitry has been installed for professional tasks and all automatic circuits that Sony installs for automatic operation of the monitor (some 11 circuits) have been bypassed. The CR6220 from World Video is a 12 in. color monitor that is equipped with pulse-cross, pre-set controls, underscan, keyed back porch clamp, and other professional features.

Conrac, of course, was there with the most impressive display of picture monitors. Conrac had some 10 different models on display. Color monitor series that were there included the 5700 Series High resolution 13 in. monitors, the 5300/ Series, 19 in. shadow mask CRT with colormatch available in any broadcast standard, the 6000 series with 19V Colormatch CRT and the 5200 Series of 19 in. and 25 in., color monitors for industrial and educational applications.

Barco monitors on display at NAB in the Rohde & Schwarz booth.

Sony, Panasonic, and Hitachi have all expanded their lines of professional monitors. Sony, in particular, made quite a point out of their entirely new line. Vidtek, though it had no booth, had Vidtek monitors all over the place on free loan to numerous exhibitors. Another manufacturer showed up in the Shintron booth where they were using a EV (Electric Visuals Limited) $4010 TV waveform monitor. This small waveform monitor has a 10cm × 8cm display and can be used for monitoring in small mobile van type consoles.

For more information: Tektronix 670A, **291**; CEI-17C, **292**; Bosch Fernseh MC37BA, **293**; Rohde & Schwarz (Barco), **294**; World Video CR6220, **295**; Conrac, **296**.

Pedestal, dollies and other camera accessories

Pedestal/dolly manufacturers found keen interest in camera supports for both ENG and studio types. The introduction of new lightweight studio/field cameras will certainly increase interest in intermediate sized systems that offer smooth control. Listec, for example, found RCA borrowing its Vinten Portaped No. 64—which is foldable, and crabs and tracks—to show off the TK-760. Listec had a series of Portapeds that could be folded to travel with a camera.

ITE showed off its ITD-P9 ENG tripod for similar purposes. This unit, incidentally, can handle a camera load of 100 lbs. ITE neatly organized its entire line of heads, tripods, dollies and pedestals according to camera weight. The range: 5 to 250 lbs. Quick-Set offered a similar complete line. A hit at Quick-Set was a foldable

continued on page 86

OUR LIPLOCK™ DOES FOR AUDIO WHAT OUR JOYSTICK DID FOR VIDEO

Editing Means Audio as Well as Video

Most videotape editing systems overlook audio. They solve only half your editing problem. The Convergence ECS-1B Joystick Editing System with Liplock™ solves both, and sets a new world standard for speed and precision in selecting audio edit points on ¾" videocassettes.

Now that you've selected your edit points in record time, set another speed record for getting that edit on tape with our new switchable Half-Time edit cycle.

Half-Time cuts cue, pre-roll, post-roll and recue times by 50% and saves crucial time when you need it the most.

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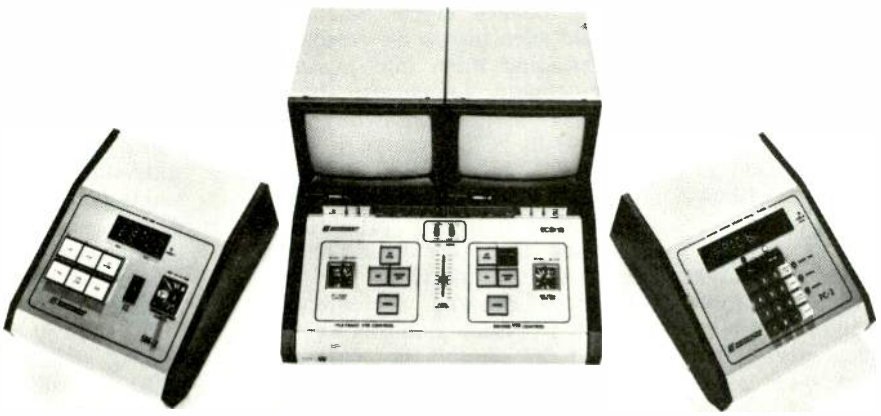

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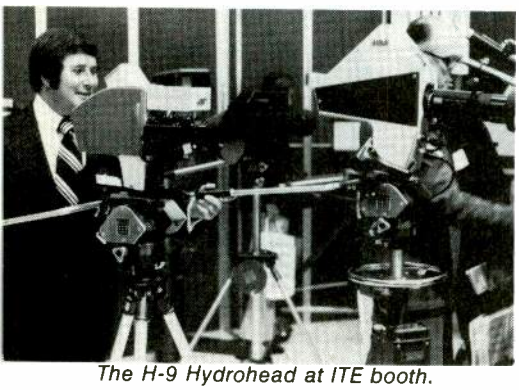


The H-9 Hydrohead at ITE booth.

Kestral crane at Listec exhibit.

cart for ENG use manufactured by Gruber products.

Heads and tripods were the feature attractions at O'Connor's booth (plus a manual fluid zoom control for lens that offered smooth operation). A feature of the Cinema Products exhibit was the camera stabilizer, the Steadicam—a hit last year at NAB.

Boston Insulated Wire showed off connectors and cables for every known camera. Kings, which specialized in triax connectors, showed a new latch lock connector for one-hand quick connect-disconnect coupling. (Useful to connect to an ENG microwave antenna while holding onto a ladder, said Kings.)

A whole line of accessories was shown by Cine 60 (including T-shirts) and Camera Mart. Cine 60, of course, stressed ENG battery packs. Christie stressed a 20 minute charger for NiCad batteries. In a Sheraton suite, Anton/Bauer showed a belt that allowed batteries to be used sequentially. Cells could be replaced without power interruption. Camera Mart showed Frezzi-Belts.™

New products introduced by Porta-Pattern included, among other things, a monitor grey scale matching unit and a new color flesh tone reference chart manufactured under the supervision of the BBC.

Miscellaneous 'input' devices

Prompting devices were shown by Q-TV (Telesync) and Telescript. Both exhibited above and below lens counterbalanced mounts using a single beam splitting mirror.

There were two schemes for incorporating background scenes with foreground cameras. Olesen showed a straight forward scenic projector for front or rear projection. Power Optics introduced Scene Sync as a solution to the problem of panning a camera during chroma key. The way it works is to mount the background scene on a motor controlled easel in front of a second background camera. The easel (and picture) moves in accordance to pan and tilt signals transmitted by the foreground camera. Everything stays in "sync."

For those broadcasters considering weather systems, TSC Development Laboratories exhibited its WRS C-Band Color Weather Radar System for showing the real weather. As a cute gimmick, NTI showed a digital weather mark signal generator that could introduce appropriate graphic symbols (clouds, umbrella, etc.) along with a colored time code. Interand showed its light-pen marker system for adding graphics to a TV picture.

Other video processing tools

Leitch Video Ltd., the Canadian manufacturer, displayed a video synchronizing system it had developed for the Canadian Broadcasting Corp. The system utilizes a Leitch VSS-160N Video Source Synchronizer and a CSC-165N Color Sync Comparator. With these units, Leitch was able to synchronize 20 remote video feeds reaching master control at the CBC Olympic center. The system phase compared the remote video signals to the reference signals and an encoded phasing control signal was fed by standard telco line to the remote location bringing them into phase with master control. Leitch also showed a color sync assignment switcher (CAS series 410), NTSC source sync pulse generator, video proc amps and an Automatic Changeover unit, the ACO-101, designed primarily for switching the color black reference signal though individual pulses. A subcarrier can be accommodated. Richmond Hill Laboratories also showed an Automatic Changeover Unit, the AC 23.

Digital techniques are being applied to an ever growing number of applications. Colorado Video, Inc. (CVI) showed a Video Quantizer (Model 606) which can be used for image tone reduction or as a PCM stimulator, equal brightness contour generator, video keying source, image enhancer and a variety of other tasks including electronic art and color synthesis. Also from CVI were a Video Compressor and Video Expander for achieving bandwidth reduction in the transmission of TV signals over telco lines and subsequent restoration.

Micro Consultants had a wide range of digital devices including the Digital Video Lab Units for experimental and developmental laboratories. Also on hand were several D/A and A/D converters.

Lenco, Inc. was present with its wide variety of video processing and distribution equipment. Dynasciences had four models of distribution amplifiers in its booth for video, pulse, sync, and subcarrier. American Data displayed all silicon transistor video distribution amplifiers.

Video Aids of Colorado displayed its line of test generators and other devices. New from VAC was an ENG/EFP Color Sync Generator. Keyers were on display at a number of booths. Dynasciences showed its model 7200 Downstream Keyer and Ross had a brand new downstream keyer with bordered keys and master fade. The Ross keyer is included in their RVS 16-41 switcher but is available as a standalone so that titles can be colored independently of the switcher background generator using the matte generator with hue and saturation and luminance controls on the keyer.

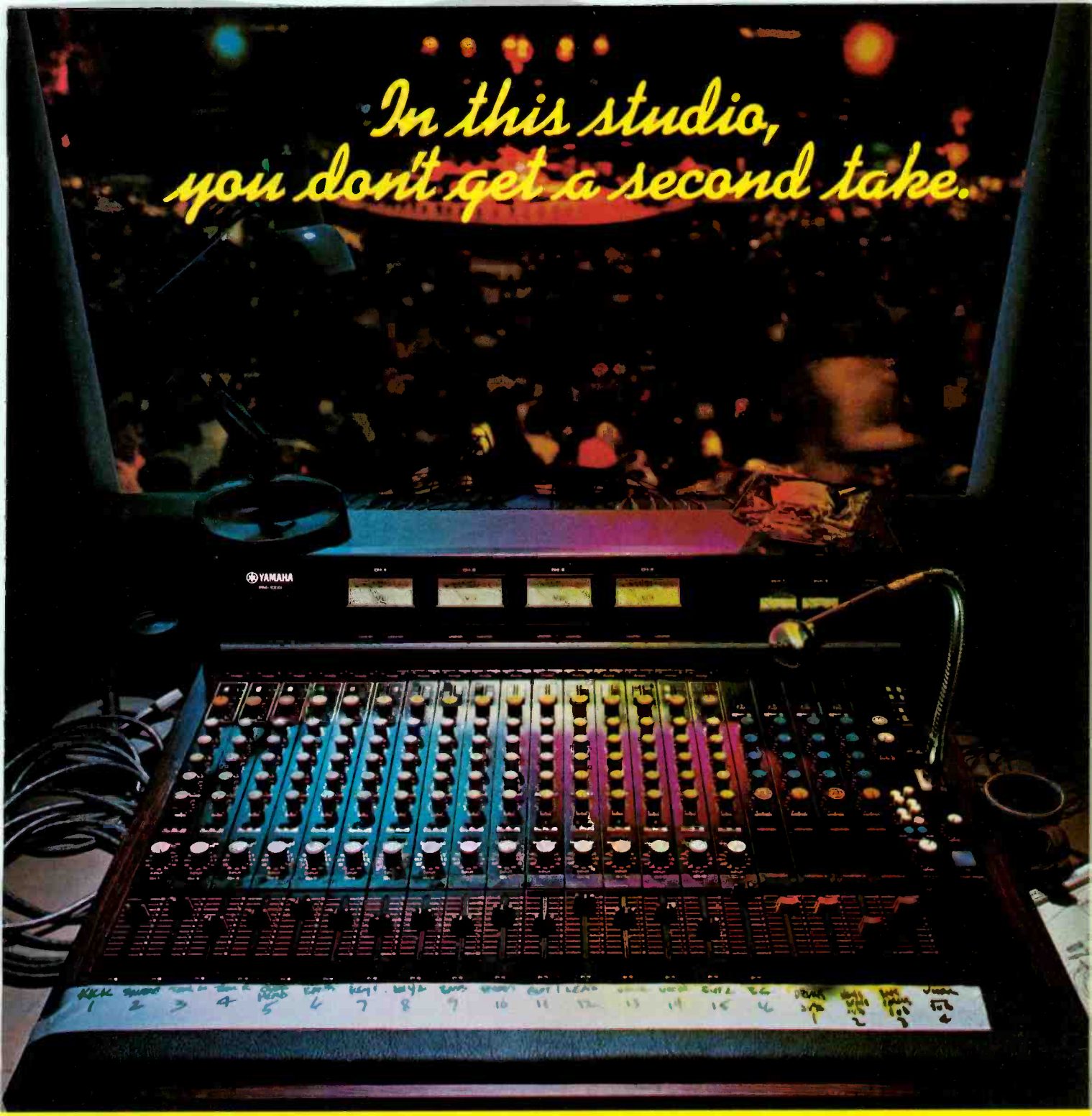
For more information on products on this page: Listec Portapeds, **333;** ITE hydrohead, **334;** King Latchlock, **335;** Anton Bauer, **336;** TSC weather radar, **337;** Leitch Video Synchronizer, **338;** CVI Quantizer, **339;** compressor/expander, **340;** VAC ENG/EFP color sync gen, **341;** Ross keyer, **342.**

Routing and distribution systems

TeleMation had a fairly sophisticated Video/Audio Distribution Switching system on display. The TVS/TAS-1000 has up to 1000 crosspoints per 8¾ in. chassis. No splitters, combiners of DAs are required for this system regardless of the degree to which it is expanded. The device is all solid-state with VI switching and has single coax "Party-Line" control. Automatic testing of all circuits through all possible paths is incorporated and hard copy results are supplied.

ISI showed its 1100 Series of AFV routing switching systems which are BCD controlled and therefore computer adaptable. ComTec had a wide array of routing switchers. The 8X Series from ComTec is all solid-state with 4 or 8 inputs and unlimited outputs. The 15X Series accom-

continued on page 89



When you perform in front of a live audience, you put everything on the line.

That's why you're so careful in selecting sound reinforcement equipment. Because once the music starts, you can't afford to have it stop.

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That's why we designed our PM-1000 Series mixing consoles to the highest standard of quality and reliability. Professional.

Whether it's our 16-, 24-, or 32-channel model, the PM-1000 Series is capable of surviving the kind of punishment and abuse that only "the road" can dish out.

Tough isn't enough. Realizing that every job has different sound requirements, Yamaha also designed the PM-1000 Series for maximum flexibility. With features like an exclusive 4x4 matrix with level controls that allows four independent mono mixes.

There's also the complete complement of controls you'd expect to find on the most sophisticated consoles. Transformer isolated inputs and outputs. Dual echo send busses. An input level attenuator that takes the +4dB line level to −60dB mike level in 11 steps. Plus 5-frequency equalization. To give you plenty of headroom for clean, undistorted sound, the PM-1000 can drive a 600 ohm load to +22½dBm.

Get your band on the wagon. All around the world—night after night, gig after gig—you'll find Yamaha mixing consoles the choice of more and more professionals. People who don't regard professional quality as a luxury, but as a necessity. Your Yamaha pro sound dealer can give you all the reasons why you should join them.

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modates up to 15 inputs per frame and features a choice of remote control configurations. The modular design of the 15X is field expandable. Also from ComTec was an AX series of audio routing switchers and the RX Series of AFV routing switchers.

Lighting gets more control and goes portable

Berkey Colortran displayed some 575 watt HMI lights such as the Sunspot and Sunbroad with electronic ballast. In the area of lighting control, Berkey introduced a new low cost memory system, the Memory II. Also on display were some new lightweight portable lighting kits. Lightweight location lighting kits were also shown by Cine 60 and Cinema Products. GTE Sylvania showed new lamps both in tungsten halogen and incandescent types. Also at GTE were some new studio lighting fixtures. Featured at the Kliegl booth were memory lighting systems. Kliegl showed its Performance® control models which take a modular approach to allow expansion of the system to accommodate additional memory and channels. The Kliegpac-9 portable lighting control system with its two scene preset capability and other features, got some attention from broadcasters trying to improve complex EFP production.

Mole-Richardson was also in on the action with its HMI Mole Solar-Arcs and won the competition for most interesting product name with the "Molequartz Teenie-Weenie Molekit." Strand-Century was another full-line lighting company on board in Washington with complete lighting control systems in all sizes and lighting systems for studio and location.

For more information: Berkey HMI, **343;** Memory II, **344;** Cine 60 lights, **345;** Cinema Products lights, **346;** Kliegl Performance, **347;** Kliegpac-9, **348;** Mole Richardson HMI, **349;** Strand Century, **350.**

New microwave ENG products extends news coverage

Never was there more new microwave gear shown for ENG applications than at NAB '77! Hottest new items this year were transmitters and antennas in the 2 GHz band. Some of the new compact long range transmitters now make it possible to beam news to the studio directly from distant camera locations without the necessity of having a microwave-equipped van.

All three major ENG microwave transmitter supply companies, Farinon, Microwave Associates and TerraCom, showed hand-carried 2 GHz systems. Microwave Associates boasted the most power (2 watts) and the greatest number of channel possibilities (up to 21). TerraCom had the most compact equipment. Farinon stressed the convenience of continuous tuning across each band and easy set up. (Compact equipment of both Farinon and TerraCom could be operated on all three popular ENG bands, 2, 7 and 13 GHz).

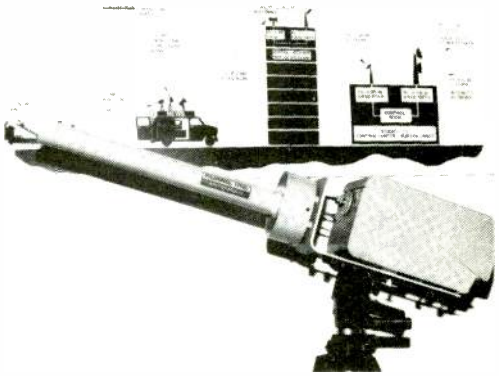
Coupled to small antennas such as the new Nurad 2 GHz Golden-Micro Rod™ mobile antenna (with switchable polarization), these new systems truly expand opportunities for direct news coverage. In smaller cities, it's very likely that a suitable microwave path can be established directly from the camera site. The tiny Micro-Rod doesn't have the gain of a parabolic or horn antenna but 2 GHz signals are less subject to scattering than are 13 GHz signals and, if one has a 2 watt transmitter (or booster amp), the signal is likely to get through. In cities with several tall buildings, a relay link can invariably be found assuring blanket coverage. In metro areas congested with lots of tall buildings that might block transmissions, it's a simple matter to tote the new portable microwave gear to the nearest roof top and do better than could be expected from a microwave equipped vehicle featuring parabolic dishes, extension masts, etc.

In essence this new equipment means a microwave-equipped van may never be necessary. Some broadcasters envision each and every news car becoming a transmitting vehicle—a Golden Micro-Rod antenna clamped to the car door and cabled to a microwave transmitter sitting on the front seat does the job. The antenna is simply aimed like a spotlight towards the receiver and one is ready to transmit—live or via a VTR. With selectable polarization or offset channels several newsmen can be broadcast simultaneously without interference.

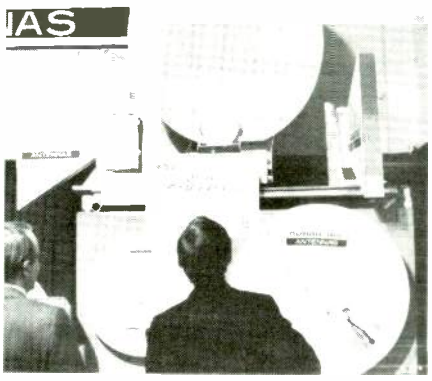
Antennas such as the Golden Micro Rod have a gain of 13 dB. The beam width is wide making it easy to relay to

Microwave Associates 2 watt 2 GHz ENG transmitter.

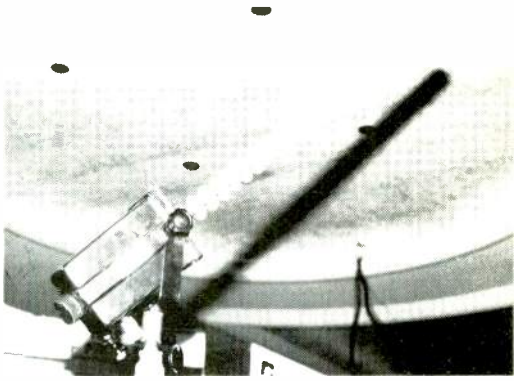
TerraCom's mini 13 GHz ENG transmitter.



The Farinon portable with 2 GHz Golden Rod antenna.



Superquad CSC² shaped Nurad system. Nurad also showed a Golden Micro Rod.



Bogner multipolared end-fire ENG antenna with extendable disc rods.

a helicopter, for example, but range is obviously limited. NAB '77 offered many higher gain alternatives: Nurad itself has Golden Minis (16 dB) and dual minis (19 dB) and standard Golden Rods (19 dB, single). Andrews offered helix antennas at various gains and so did Bognar. The Bognar was adjustable—gain is increased by adding additional sections.

Receiving antenna advances too. There were significant advances in ENG receiving antennas at NAB also. Nurad unveiled its Superquad high gain which featured a narrow beamwidth to cut interference such as multipath ghosting or smear. The secret of high performance is the CSC² elevation beam shaping feature which gives good coverage without tilting. Antenna needs to be panned only which is accomplished through its built-in rotating pedestal. Microwave Associates introduced a multi-frequency rotatable system which could obviate the need for four quad (N,S,E,W) fixed antennas.

First installations of the new Microwave Associates antennas system were scheduled for mid-March at KFMB-TV, San Diego and WTMJ-TV, Milwaukee.

Designated the RMFA-24, the new antenna is designed to operate across the entire TV assigned microwave spectrum (1.90 to 13.25 GHz) but is optimized for the 2, 7 and 13 GHz broadcast bands for maximum ENG capability.

Sharp response of SAW filter shown by EMCEE.

New Harris transmitter has new visual exciter/modulator.

Capable of rotating 360 degrees, the RMFA-24 can zero in on a signal from camera crews operating from any remote location. The antenna "locks" onto the exact azimuth of the incoming signal. This means the signal is as strong as it could possibly be and camera crews can operate at much greater distances from their home base.

Microwave Associates claims the new system will allow camera crews to cover on-the-spot news from distances 25 to 75% further, with similar or sharper picture quality.

A local control unit connected by cable (up to 2000 ft.) is used to operate the RMFA-24. An optional remote control unit is available. The antenna may be rotated by ENG crews from mobile vehicles by two-way radio or from the studio via telephone lines.

The antenna and rotor assembly is completely enclosed in a white radome requiring 3-8 psi pressurization by either dry air or nitrogen.

Lubrication is required only once a year and the system can operate in temperature extremes from −40°C to +70°C and up to altitudes of 15,000 feet. The radome/antenna/and rotor assembly weigh approximately 65 pounds and the unit is 27 inches in diameter by 30 inches high.

Details on those compact transmitters. Bantam-sized mini-links is the way Farinon refers to its portable microwave systems for ENG applications. Model FV-2MP covers 2 GHz and FV 11-13 MP the 11 to 13 GHz band. A Farinon feature is dial tuning across the authorized portions of each band. RF channel frequency is phase-locked to any of 12 pre-determined crystal controlled reference frequencies within each of the bands. Transmission of either 525 or 625 line video is possible along with a single 15 kHz FM program channel. (The radio receiver also provides a secondary 70 MHz out for IF interconnection into other microwave relay systems.) Power out at 2 GHz is 500 milliwatts. Size of the units is 14 in. × 7¼ in. × 7¼ in. Weight of the transmitter is 19 lbs. Dc power requirement is 26 watts. Units operate from a −24v battery pack (17 lbs.) or ac.

TerraCom's competitive features are a really compact size: dimensions are 4 in. × 4½ in. × 8 in. Weight of transmitter is less than 8 lbs. (plus 10 lbs. for 24v battery pack). Power output at 2 GHz is 500 milliwatts. Power drain is small; unit will run 8 hours without recharging. TerraCom uses PC boards extensively. The transmitter is set to any desired frequency with the VCO range controlled by a plug-in fixed crystal reference. A digital AFC control circuit keeps the VCO locked on frequency. Operation on another frequency is accomplished by means of a Built-in Test Equipment feature which allows changing frequencies in the field.

Microwave Associates came to NAB with two approaches to 2 GHz mini portable equipment—a 2 watt MA2CP system weighing under 20 lbs. and a MA2EP dual unit that would boost the output to 8 watts. With this power, broadcasters are virtually assured that they can transmit directly to the central ENG receive site from any line of sight position. An option is seven or 21 channel operation (achieved through some phase-shifted offset frequencies). Such frequency selection virtually assures a station of finding a clear channel even in multi-station markets. M-A has also settled on 12v as the source of primary power so that standard ENG batteries can be used.

While the MA2CP was designed to operate directly from court rooms, office buildings or roof tops, it can be used in a mobile news wagon with a 10 watt PA210L booster. It's designed to work with standard quad antenna systems of M-A's new RMFA rotating parabola.

M-A also introduced at NAB '77 a new frequency agile central receive 2 GHz terminal. The unit can take any of the 21 signals from the MA2CP "direct-shot" man-carried transmitters operated alone or in conjunction with higher power options (the MA2EP high power dual unit or mobile rigs).

In our emphasis on 2 GHz systems, we have not been able to mention until now the very neat 13 GHz "one-man-show" system, the International Microwave Corp EJ-1013FM package. The EJ-1013 package includes battery and power supply chargers, transmitter RF head and control, circular polarized horn antennas, receiver RF head and control and a program audio channel all in one carrying case. In setting up the system, one merely orients the transmitter and receiver until the AGC test meter (built-in) is maximum. Unit operates for 6 hours from rechargeable batteries supplies. Data sheet says transmitter weight is 31 lbs. and the receiver 27, so elements are not as compact and light as some of the other systems mentioned.

An alternative to microwave links for ENG coverage, the Optical Video Link, was shown by Motorola. The optical link uses infra red for short hops—up to ½ mile. The system consists of two small pieces that sell for under $5000. Both broadcast quality

continued on page 92

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NAB SHOW-IN-PRINT

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For more information: Microwave Associates MA2CP, **351;** Farinon FV-2MP, **352;** TerraCom 2 GHz, **353;** Nurad Superquad, **354;** Nurad Micro Rod, **355;** Andrew 2 GHz helix, **356;** Bogner Endfire, **357;** Microwave Associates RMFA-24 antenna, **358.**

TV transmitter competition warms up

Broadcasters looking at new TV transmitters had to go further than the Harris and RCA exhibits this year. Philips came on strong in the transmitter arena claiming its new line of VHF and UHF transmitters incorporating a one watt exciter/IF modulator were unique. CCA put a TV transmitter smack in front of its exhibit. The "new CCA" says it's serious about TV transmitters. Townsend Associates promoted heavily its products in the UHF band. And although no transmitters were exhibited, NEC said it planned to demonstrate its transmitter expertise in the U.S. this year.

There's a lot of interest in transmitters right now. With the move to the World Trade Center in New York now a sure thing, big decisions have to be made in the Big Apple. The FCC approval of the use of CP television antennas means many stations are considering that possibility. If a station is going to add a vertical polarization component to its radiated signal, it needs an additional transmitter. With ATS authorization imminent, broadcasters could stand to save some money by going that route. But who's to buy?

As we have said, Philips thinks its PYE TVT transmitter is unique. Harris said that the new low band BT-25L2 that is exhibited at NAB '77 is the industry's most advanced transmitter. Harris used a Transversal Side Band Filter in its exciter. New performance standards are possible because of advances in Surface Acoustical Wave filters. Selectivity can be increased. Group delay distortion becomes no problem, for example. EMCEE incorporated S.A.W. filters in its translators and transmitters. What follows are expanded descriptions of these new ideas.

The new Philips PYE transmitter goes beyond offering a new solid state exciter IF modulator which permits filtering and pre-correction at low power levels. The transmitter is very compact physically using very little floor space. There is complete access from the front permitting installation against a wall. Cables and cooling air enter top or bottom eliminating the need for side or rear access. Air cooled blowers are mounted externally (beneath the unit or in another room).

Used with a paralleling diplexer to provide uninterrupted service if one transmitter falls, the new system offers automatic phasing of visual and aural drives as well as individual automatic selection of standby oscillators and aural modulator if the preferred exciter fails. The unit is designed for unattended operation with automatic or remote control. One 17.5 kW transmitter unit can operate singly in parallel or in an alternate/main combination.

Highband PYE units are available now; low band units will be delivered in the fourth quarter of 1977. The VHF models are new. Philips also has UHF transmitters.

Harris's claim for its new visual exciter/modulator in the BT-25L2 is greater reliability, stability, excellent frequency response and truest color quality.

The new BT-25L2 is simple in design and frequency adjustment, power output control and amplifier tuning is straightforward. It is designed specifically for remote control unattended operation.

Townsend said its solid state IF modulated exciter for UHF stations drew lots of attention at the Convention. All existing Klystron transmitters can be modernized using this new exciter. Acrodyne stressed that two TT447 units could be combined to achieve 12 kW output—an ideal standby transmitter.

As a result of surface acoustic wave technology, EMCEE showed NAB visitors how filters requiring no further tuning or alignment can be made. Since the wave is acoustic rather than electromagnetic, the frequency response of the filter will be the Fourier transform of the time response. By shaping the etched pattern to conform with a computer derived time response, both time and frequency characteristics of the signal can be controlled. This results in extremely accurate and selective frequency response characteristics and nearly zero time delay distortion. In translators this means one can now use adjacent channels, according to EMCEE.

More transmitter advances. A production unit of RCA's power saving mod anode pulser system (see *BM/E,* Oct., 1976, for more details) for UHF transmitter was on display in the RCA booth. Comark Industries showed some new directional coupler attachments (series 7300) that made it possible to sample either the incident or reflected wave in a transmission line without rotating the coupler. To attach the coupler, one simply drills a 2 in. hole in the outer conductor at the de-

sired monitoring point and then attaches the coupler with a hose clasp.

Some recent tubes. The Eimac Div. of Varian showed some recent tubes of the radial beam power tetrode type for VHF linear amplifier service (TV and FM), a high mu UHF transmitting triode and a high power CW Klystron amplifier.

The ceramic/metal power tetrode, the 4 CX20,000A, has a high RF operating efficiency and low RF losses. The UHF transmitting triode, the 3 CX600U, designed with a beam-forming cathode and control grid for use above 200 MHz was rated at over 600 watts (with forced air cooling). VA-953H and 954H Klystrons are five-cavity vapor cooled tubes for use as finals in both visual and aural sections of UHF-TV transmitters. They cover 470 to 698 MHz and offer improved linearity and high operating efficiency by providing either lower d-c power or higher transmitter output for the same power rating.

Philips PYE VHF, **359**; Harris BT-2562, **360**; Townsend exciter, **361**; EMCEE, **362**; Comark, **363**; Eimac tetrode, **364**; Klystron, **365**.

Circularly polarized antennas actively promoted

As might be expected in view of the 1977 FCC authorization permitting circularly-polarized TV antennas, such designs were prominently displayed. RCA showed two—a tower top-mounted Tetra Coil type for channels 7 through 23 and the Quatrefoil, a panel type for VHF stations.

The Tetra Coil type is made up of three layers of radiating elements, each consisting of four conductors. The conductors are wound around a supporting pole and base to achieve a circularly-polarized pattern. The Quatrefoil converts between horizontal and circular polarization by a simple electrical field adjustment. RCA also showed its Fan-Vee type which is made up of horizontal and vertical components.

Jampro showed designs suitable for both VHF and UHF applications including a section of the spiral antenna tested so extensively at KLOC-TV, Ch.19, Modesto, Calif. Harris was backing the Cavity Backed Radiator in the CP arena. Harris claims extremely wide bandwidth permitting multiplexing of two or more stations in the VHF high band.

The Harris CP antenna handles up to 100 kW power ratings for single station operation, or up to 150 kW input for dual station operations.

The vertical pattern of the Harris CP antenna may be contoured to introduce

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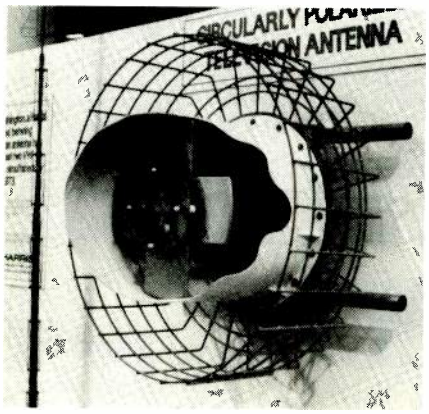
Alford's Tri-Z approach to CP for TV.



Harris cavity backed radiator for CP.

beam tilt and null fill by means of standard phase distribution techniques.

Alford Manufacturing showed Twin-Z and Tri-Z type antennas for circularly polarized transmission. The Twin-Z antenna element consists of two identical parts which clamp around a supporting mast. Each half of the element is supplied with power by a separate transmission line. The currents in the two lines are in the same relative phases. A Tri-Z element consists of three identical parts clamped around a mast. This element, which is intended for use on masts of larger diameters, is fed by three feeders. The power gain of these element antennas, when used alone, is approximately 0.9 in each polarization.

The measured horizontal plane radiation patterns in both polarizations are nearly circular. The measured vertical plane radiation pattern of the Twin-Z or Tri-Z antenna is a figure of eight with nulls in the upward and downward directions in both polarizations.

The Bogner approach to CP antennas was displayed by CCA. Bogner achieves circular polarization (or any polarization in between horizontal and circular) by simultaneously adding vertical dipoles to its slot type radiator used for horizontally polarized patterns. A pattern controlling director achieves the desired horizontal pattern and "phase center" location for creating the circularly polarized radiation.

Other TV antennas besides CP types. RCA introduced a new lightweight aluminum pylon antenna for side mounting on a tower. Bogner showed a new UHF emergency antenna. It consists of a single row of 4 slots on a steel pipe.

Towers and flashing beacons. All those CP antennas might add more wind load than desirable to existing antennas. Utility Tower reported a brisk business in discussing CP additions and new tower construction in general.

For those concerned about equipping their towers with flashing obstruction lights, Flash Technology was on hand with a new FTB Electro Flash Beacon. This unit combines the optical design of a standard 300mm flashing code beacon with modern Xenon flash technology. When lighted according to FCC specs, a Flash Technology equipped structure would need no additional markings.

Two digital standards converters are shown

The problem of converting PAL and SECAM 625/50 standards to NTSC 525/60 is rapidly moving into the digital domain. Interestingly, both of the standards converters shown at NAB were from British manufacturers. Quantel exhibited its DSC 4000 at MCI's booth. This machine takes the PAL or SECAM signal and feeds it to its appropriate decoder (either PAL or SECAM). The R, G and B outputs of the decoder in use are fed to an analog matrix circuit which produces outputs of Y, I and Q from the RGB inputs. These Y, I and Q outputs pass through appropriate filters and clamping amplifiers to their own A/D convertors. An important stage is line interpolation where the actual conversion to 525/60 is executed. Further processing and line interpretation is accomplished before the YIQ signals are reconverted to RGB. The 525/60 RGB is finally passed into the appropriate NTSC M encoder. The DSC 4000 also works in the opposite direction to convert 525/60 to 625/50.

Marconi Electronics introduced to the U.S. the DICE (Digital International Conversion Equipment). The first DICE in the U.S. was recently sold to J.D. Ivey Corp., in Orlando, FL. The DICE that Ivey will get converts both PAL and SECAM to NTSC. Marconi employs a movement interpolation system as well as line interpolation. The movement interpolation helps to overcome the subjective effect of jumps created by the difference in field rates. The line interpolation is to overcome the difference in the number of lines in the various standards. To do this DICE employs five-line interpolation in which information content on any one line is obtained from proportions of information contained on five adjacent lines.

TV and radio business systems continue growth

Participation in the NAB exhibition by business automation systems continues to progress. Since these systems require a thorough understanding of just "how the business of broadcast is conducted," most of the changes in the better known systems are based on the further understanding and usurpation of broadcast business techniques by the ubiquitous computer. Essentially, we are watching a highly sophisticated group of firms, most staffed with ex-broadcasters, learn, describe and finally imitate daily practices of broadcast business. But all this is more than "imitation." The systems are bent on improving the efficiency of broadcasting business by providing more data, more current information, and more ways of viewing the dynamics of the business practices in this industry with cost efficient computer techniques.

BIAS, from Data Communications Corp, BCS from Kaman Sciences, Jefferson Data, PSI and Cox Data Systems, were among the purveyors of broadcast automation systems exhibiting at NAB. As implied before, we did not see "more of the same" but rather extensions of previous trends.

BIAS continues to grow with an ever increasing number of clients participating in its time sharing computer system. Besides its interface with Vital and CDL to demonstrate full integration of automation systems, BIAS was happy to see its first actual station interface with technical automation systems exhibited. A new installation of the BIAS system began during the convention at WOOS-TV, Cleveland.

BCS with its distributive system that utilizes a host computer in Colorado Springs, and some minicomputer power at the local station, continued to enjoy its lead over competitive systems in the area of technical interface. Though BCS does not equal the number of clients participating in the BIAS system, it continues to grow. Cox Data Systems, a division of Cox Broadcasting, is also growing. Cox is now interfaced with a couple of technical systems, including a Viamax and a GE system.

Jefferson Data may have won the contest for the most innovative presentation. Using the theme that Jefferson will "custom blend" its services, the company set up in its booth space a coffee shop which provided a couple of blend selections for each visitor. This reporter must confess that the poor service at the convention hotels

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put the Jefferson Data exhibit on his daily list. In line with the point of the Jefferson exhibit, they wanted broadcasters to be aware of the degree to which they "customize" their distributive data processing system to meet individual station needs.

Though most of the companies offer radio systems, NAB hosted two new firms this year whose systems are exclusively radio. Trace, Inc. has been doing business in the radio area for some time but this was the first year it had an exhibit. Trace offers a complete package of business programs for radio management which is expandable and profit oriented. The system can be interfaced with technical automation systems. The hardware used is centered around an IBM System 32.

The other new firm didn't get a booth at the show but did do a good job of getting people into its suite to discuss the new system. Automation Electronics, Inc. offers the Autotron system for radio management. This system is based around minicomputers and a complete software package. The range and power of the various Autotron systems is quite broad, and a station can get a basic Autotron I for about $30,000. As hardware configurations grow and more software is added the system cost rises. Interface with technical operation is also possible with the Autotron. Both of these new firms are based in Lafayette, Indiana, though Trace has an additional office in Washington, D.C.

Chief among the attractions at the PSI booth was interest in the new BAT 1750 and the BAT 1400 systems. Where the BAT 1400 has been around awhile, the 1750 is relatively new. PSI, which has been mostly involved with business automation systems for radio, feels that the 1750 is suitable for most television stations as well as sophisticated radio stations. PSI recommends the use of the more powerful Datapoint 5548 processor with this system as different from the 2226, though the system will operate with this smaller processor.

New class of broadcasting equipment: satellite systems

The growing importance of satellites to broadcasters was made clear at a number of exhibits. Prototype small antenna satellite systems for radio broadcasting were shown by Western Union's Westar Broadcast Group and RCA American Communications.

The Westar system used small aperature antennas and terminals designed for 5 kHz to 15 kHz audio channels. Dish antenna demonstrated was ten-foot only (RCA showed a 6 ft. dish). The low noise amplifier, a most critical component, shown by Westar, has a mean time between failure of 50,000 hours. Peak program signal to noise ratio is typically greater than 54 dB. Thus radio broadcasters having such a receiving terminal could pick up any program (one or several) available on a satellite regardless of where they are located. During the convention, Mutual Broadcasting described its new facilities and indicated its intention of putting regular news feeds on satellites.

Satellite receive stations for TV broadcasters were discussed by Scientific-Atlanta and they reported keen interest. S-A signed up a number of engineers for a technical seminar to be held in Atlanta in June. Models of antennas were shown by S-A and Andrew Corp. Andrew stressed the suitability of 4.5 meter earth station antenna for reception. TerraCom showed a receiver with an "outstanding" threshold characteristic.

RADIO AT NAB

AM stereo: everybody wants it so the problems will be solved

The attention to AM stereo at the convention generated one overall conclusion: its coming is just about certain. In the report by John Dimling of NAB on the "Future of Radio" study, and in the AM stereo workshop referred to here already, the experts all agreed that the AM broadcaster will get an option for stereo. But the timing is still open; and a number of troublesome problems got attention in the workshop presentations and questions from the floor.

Timing. Harold Kassens, chairman of the National AM Stereo Committee (NASC) of the EIA, which is testing a number of systems as described in *BM/E* in April, clarified the time schedule somewhat at the workshop. He said NASC would start testing in May and take about two months, with final report to the FCC before Labor Day. The FCC would then take the NASC results, and any other information available, and decide what system, if any, to authorize. The Kahn system had not been submitted to NASC at press time for this issue, but it is before the FCC and will be considered there along with the others.

As to how long the FCC would take, there was naturally no consensus; a guesstimate put out by several speak-

ers was "before the next NAB."

Besides Kassens, the speakers at the AM stereo session were Norman Parker of Motorola, Arno Meyer of Belar, Leonard Kahn of Kahn Communications, Mike Davis of Thomson-CSF, and Al Kelch of Magnavox. Each first spoke for five minutes on one aspect of AM stereo in general, and each then described in about the same time the particular system he was representing. Chris Payne of NAB was moderator.

AM stereo in general

Some interesting general points made: AM stereo is more difficult technically than FM stereo because AM lacks the ample bandwidth. Every one of the AM stereo systems uses the very fortunate redundancy of the two sidebands by imposing two simultaneous, differentiated modulations on the carrier. These two modulations must include straight AM for the L+R signal, for compatibility with mono receivers. The L−R can be applied through angle, or phase modulation; each of the systems does this but with variations. (See *BM/E*, April).

Leonard Kahn pointed out that we are lucky in another way: the phase modulation must get through the transmitter and most modern AM transmitters are already capable of this because the low-Q coupling between stages has the necessary wide bandwidth. Arno Meyer, discussing the monitoring problem, said that the angle or phase modulation for the L−R signal must be kept within certain limits of deviation to avoid non-linearity; this requires a phase or quadrature detector calibrated to the established peak deviation.

Mike Davis, on the audio limiting problem, pointed out that it cannot be done simply on the L+R signal as AM broadcasters are set up now. He proposed that the L+R and the L−R be separately limited, with the largest control signal used for overall control.

Receivers. Al Kelch of Magnavox reported that his company believes the effect on American receiver markets will be dramatic; the AM stereo receiver will help offset foreign competition. He said that an AM stereo receiver must have, at a minimum, as Magnavox sees it, a stereo indicator light (essential for marketing); an interstation muting circuit; and selectable bandwidth, with an "open" position flat to at least 12 kHz for high signal areas, and a heavily restricted position for high noise conditions. He predicted that AM transmitters, when such AM receivers were in the hands of the public, would be raised to near FM fidelity standards—the technology is all ready for this. He said that Magnavox was ready and eager to produce AM stereo receivers in quantity and saw set-up time, after a system is chosen, as no more than about six months.

Selective fading, coverage area, etc. At the end of the presentations, a flood of questions from the floor showed intense interest and a wide awareness of problems still to be solved. What about the effect on fringe coverage? The best guess of the panel was that a 150-mile ground-wave coverage, for example, might come down to 120-130 for stereo, but with no reduction for mono reception of the stereo signal. What about a skewed antenna impedance? Leonard Kahn said he didn't think it was a big problem; others on the panel pointed out that NASC tests will investigate that problem specifically. What about selective fading? Again, the NASC tests will go into that in detail, with sky-wave signals from WBZ in Boston followed in Washington.

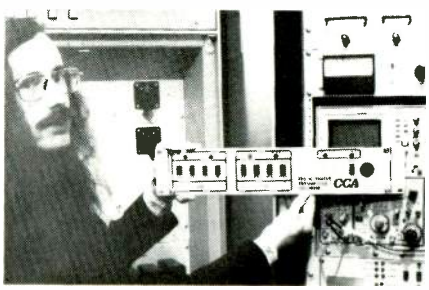
The biggest interest, however, attached to the problem of compatibility with the hordes of low-grade AM mono receivers now in the hands of the public. With a heavy roll-off at 3 kHz or 5 kHz very common in such receivers, several questioners pointed out that pre-emphasis looked attractive but would be hard to standardize. The panel could report no definite plan to handle this situation but it was clear that both NASC and the FCC would have it very much in mind.

Tapes of AM stereo reception. The demonstration tapes of reception of the experimental AM stereo broadcasts by WKDC showed a well separated, low distortion, wide range signal, certainly coming up on first hearing to what we might hope good AM stereo transmission and reception would produce. Frank Blotter, president of WKDC, described the experiment (see earlier story in *BM/E*, April). The tests were made with the Motorola system, with cooperation from that company.

The WKDC tests confirm again the fact that AM stereo *works* and increase the credibility of the general feeling that all the proposed systems work at least reasonably well. The Kahn system, as described in *BM/E*'s earlier stories, has had very extensive field testing over a number of years, with similar positive results.

Sansui demonstration. On the exhibit floor, Sansui gave a demonstration of the AM stereo system they have developed, (*BM/E*, February 1976), with turntable, transmitter, receiver, all in line. The system also included the Sansui QS matrix system for four channels, so that an AM transmitter was being used for quadraphonics. However, a spokesman reported that a slightly different AM stereo system is under rapid development by Sansui in Japan, which they hope to submit to NASC at an early date.

Automatic Transmission System of QEI, one of few ready systems on the floor.



CCA shows Automatic Transmitter Operator, ATS made by the Widget Works, Inc.

ATS: starting small, sure to grow big

A new technique that over the long run will be comparable in importance to AM stereo, automatic transmission systems or ATS, was on display at the show in only a limited way. The FCC authorized ATS for FM stations and AM stations with non-directional arrays just this past January (authorizations for TV and for AM with directional antennas are coming later this year, an FCC spokesman told *BM/E*). As a result, very few manufacturers were ready with complete hardware for ATS, although firms specializing in remote control are obviously in an excellent position to move into ATS.

Two firms did have ready ATS hardware and each could point to a station now on the air with its system. QEI, of Kresson, NJ, showed their model 7775 Automatic Transmission System, which is priced around $3000 complete. The first station on the air with the QEI system is WWTR-FM in Bethany Beach, Delaware (see separate story on the turn-on ceremony there). CCA Electronics is marketing the Automatic Transmitter Operator, made by the Widget Works of Medina, Ohio. Station WDBN, in Medina, an FM station using three CCA 25-kW transmitters tied together for 75 kW, has the Widget Works system on the air. These seem to be the first two stations certified by the FCC for ATS.

The technology is all here. Discussions with established makers of

continued on page 100

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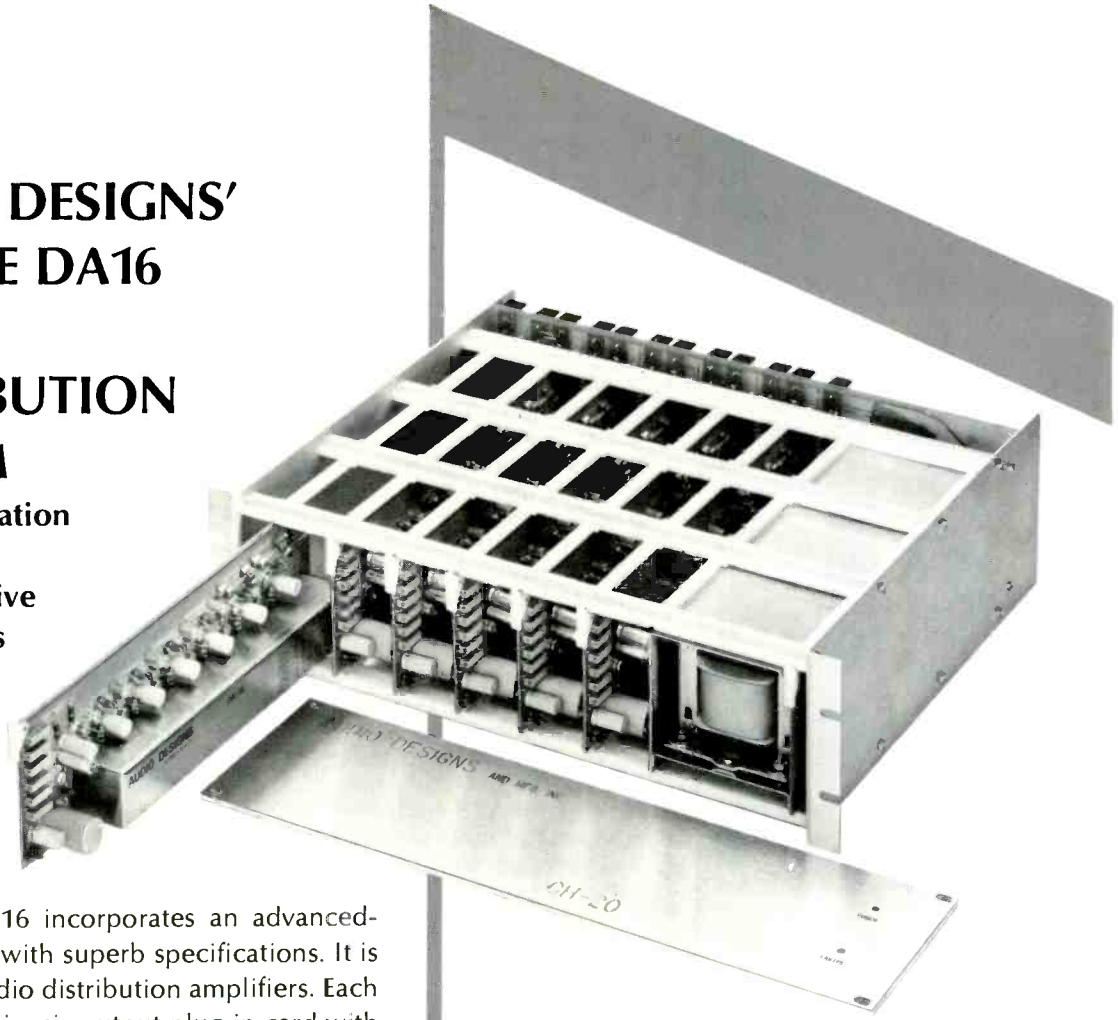

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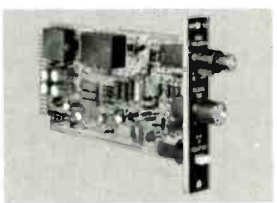

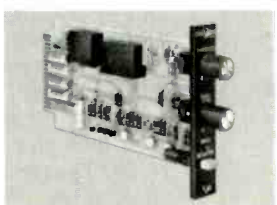

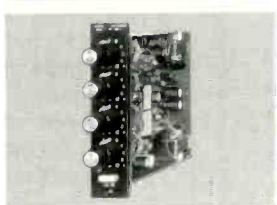

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NAB SHOW-IN-PRINT

remote-control equipment on the exhibit floor made it clear that the technology for ATS is fully available; all are well advanced in plans for the equipment. The most elaborate prototype display was that of the Harris Corporation, which had a 1 kW Harris transmitter set up with ATS equipment attached, all driven through a simulated day of typical operation by a magnetic tape recording that ran for five minutes. The program showed actual control of the transmitter by the ATS in accordance with the FCC rules for low or high power, loss of power, modulation depth, loss of modulation, status of tower lights. The system shown is somewhat more elaborate than those noted in the foregoing, with a microcomputer controller, a keyboard for data entry to the computer and a CRT screen read-out to show status of the system at all times. A Harris spokesman told *BM/E* that the system would reach the market in a few months.

Plenty of ATS equipment coming. A number of other manufacturers said they were in the final stages of development of ATS hardware: the next NAB will see a well-stocked ATS shelf, with most makers ready long before that. Moseley, showing new remote control systems (see description in the following section), called several "ATS ready," and said they would soon be prepared to retrofit their control systems in the field for ATS. Belar said their new AMM-4 digital AM frequency monitor is designed specifically for ATS. Marti said their digital remote control systems (see below) are "ATS compatible." Time and Frequency Technology, introducing their TFT 7600, totally digital modular remote control system for AM, FM and TV, pointed out that provision for adding ATS is built in.

A firm not previously seen at the NAB, Telcomex of Montreal, Canada, showed an "Automatic Transmission Site Control System," Model ACS-1000, which can be programmed to change radiating patterns in real time, or by manual control, or by a command from alarm circuitry. Similar control is provided for transmitter power functions, for switch from regular to stand-by transmitter, following an RF or power failure, or a clock or manual command. If a change of power or transmitter not allowable is ordered, says Telcomex, the system will ignore the order; the limits and requirements are programmed in to the control card in advance. This obviously covers some of the main functions of an ATS, and Telcomex said complete ATS versions were under development.

Telcomex, of Montreal, had new automatic transmission site controller.

ATS designed for TV, AM with antenna arrays shown in prototype by Eric Small to engineers Craig, WDCA, (middle) and Pietrafesa, WPFW (right).

Delta Electronics, introducing a new kind of modulation control function in their Model AMC-1, offered an ATS option that would extend the operation of the unit to meet the FCC requirements on modulation control fully. The same offer was made for Delta's new APC-1 Automatic Power Controller; see description of both units that follows.

Eric Small and Associates had advance information on an elaborate system for ATS with a television station, their Model ATC-100. The FCC's go-ahead is expected this fall; the ATC-100 is slated to be ready then, built around a DEC PDP-11 processor, providing up to 256 control elements, highly sophisticated programmable action. The system is adaptable, too, to multi-transmitter radio installations and those with directional antenna arrays.

To sum up on ATS: the hardware industry has the technology fully in hand; the development of ready hardware appears to be on a schedule that will satisfy rapidly growing demand from broadcasters whose interest in ATS is definite but not yet pressured by immediate need.

For more information on ATS: QEI, **366;** CCA-Widget Works, **367;** Harris ATS, **368;** Telcomex, **369;** Eric Small, **370.**

continued on page 102

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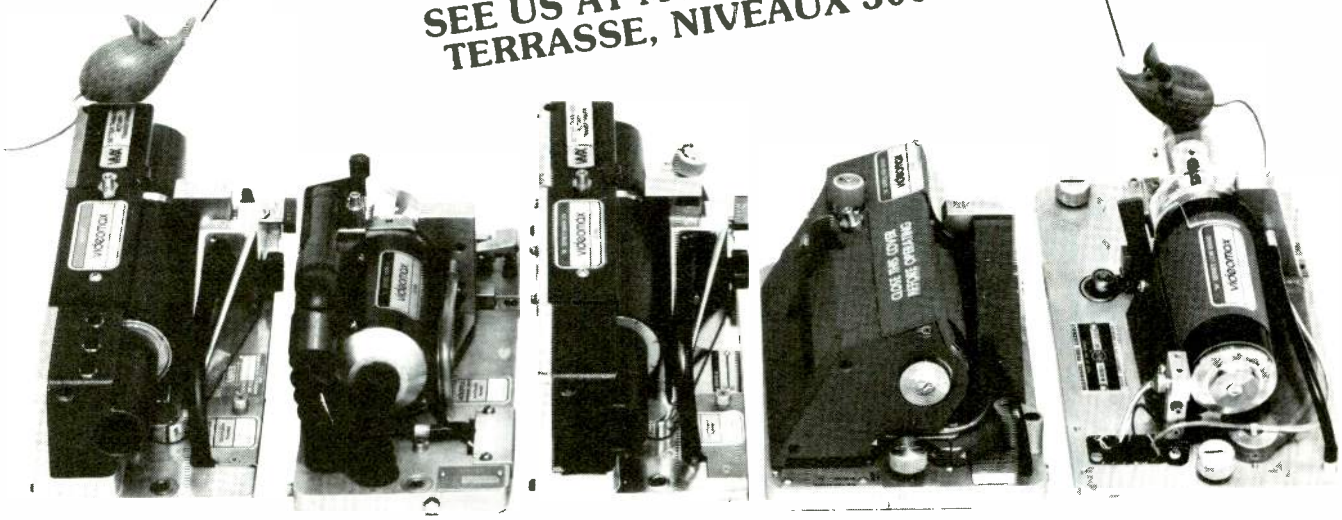

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Marti digital remote control shown is ATS compatible.

Remote and automatic control: more sophistication

No doubt stimulated by the approach of ATS (under discussion by the FCC for several years), established makers of remote and automatic control equipment in most cases brought new, expanded, more versatile systems to the NAB this year. Moseley introduced their new Model TCS-1 Telecontrol System, which has eight individual command and eight independent status channels for control of remotely-located equipment. Each command channel functions independently of all other channels. It works over a single telco circuit or by radio. Two TCS-1 systems can operate simultaneously over a single 3 kHz telco line, for 16 different dedicated command channels and 16 status channels. A single system takes only 1¾ in. of standard rack space.

Moseley also introduced the DCS-2A, digital remote control system, which has a considerably wider range of control and monitoring functions, has a computer option for highly automated operation. Both Moseley systems, as noted, are quickly adaptable to ATS.

Time and Frequency Technology brought their all-digital TFT 7600, designed for AM, FM and TV remote control. It is a modular, field-expandable design, using pulse code modulation, providing 10 to 70 channels of raise-lower and telemetry, up to 30 channels for on/off, up to 30 of status and alarm monitoring. It provides digital display of up to 40 parameters simultaneously. Accuracy and greatly reduced operator errors, says TFT, result from the use of digital data filtering; each control command is sent twice and the two compared at the control point bit by bit. They must match before action starts. Automatic logging of meter readings is an option. Obviously the system is more than capable of "fronting" for ATS.

Delta Electronics, as noted above, brought in a new kind of AM modulation controller, the AMC-1 which reads modulation level *at the transmitter output* and introduces automatic correction at the audio input if modulation is too high or too low. Delta emphasizes that the AMC-1 is not a substitute for the usual audio-line limiter-compressor functions which increase modulation density; it is intended to *supplement* them; with its closed loop around the whole transmitter from output to input. Delta claims that the AMC-1 typically produces at least 1 to 2 dB of increased modulation level without any increased distortion, over and above the level achieved by the regular audio processing. The desired modulation limits are switch selectable and the system uses a digital logic system to keep the level correct.

For more information on remote control: Moseley, **371**; Time and Frequency, **372**; Delta, **373.**

Delta also introduced their APC-1 automatic power controller which continuously measures the operating power of an AM station and keeps it within preset limits. Separate modes for day, night and pre-sunrise can be set up for unattended change at the proper time. Out of tolerance readings

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Not just another pretty interface

So okay. On the surface a reproducer is a reproducer is a reproducer. We all look pretty good in your rack.

But our beauty's more than centimeters deep. Because you're into automated broadcast you need something that's going to hang in there long after the warranty's gathered dust.

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The head cover slips off for easy access. There's protective TTL logic so you can't spill tape. And all the electronics are right behind the pull off front panel. (Like we said, simple.)

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There are other features, too. Like 5 to 10½ inch reel switching, ¼-½ or full track head configuration, front knob level controls. You can order it for NAB or IEC equalization. In 110/220V, 50 or 60 Hz. With a 25 Hz cue stop tone. Even with 600 ohm balanced output transformers.

Those are just a few of the highlights. A letter gets you all the specs. In detail. Ask for the Scully 255 at $1200.

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can set off alarms.

Marti showed their RMC-20 digital remote control system, introduced at the last NAB, which provides up to 20 channels of command, telemetry, status alarm. Also shown was their 1-channel RMC-2AX system.

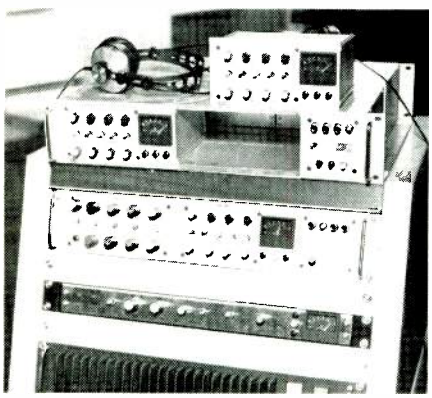
Superior audio processing is here

As *BM/E* has noted in earlier stories, the audio processing function in radio stations is getting an intense re-examination and upgrading, under pressure in the industry to combine better on-air signal quality with maximum coverage, two objectives that have clashed in the past.

This revisionist activity in audio processing was strongly evident in a standing-room-only engineering panel session on the subject, as well as in new processing hardware on the exhibit floor. The engineering session was moderated by Emil Torick of CBS Technology Center, with the following panel: John Bailie of WMAQ, Chicago; Jim Loupas, consultant, of Loupas Associates; Hans Schmid, ABC; Dick Schumeyer, Capital Cities Communications; Eric Small, of Eric Small Associates; and Jack Williams of Pacific Recorders and Engineering.

Processing is not magic. Bailie pointed out that audio processors are not magic black boxes that will "fix up" poor signal quality. The performance of every function in the station has to be evaluated and maximized for quality, right through from microphone and recording input to antenna. Once the station is "clean," processing can add its advantages.

Harris MSP-100 FM audio processor was put through paces in demo.



Orange County showed several combination processor units.

New eight-band audio processor of Inovonics gets tryout.

Jim Loupas noted that processing has recently become more than ever an arena for program directors and other non-technical personnel. He said the engineer needs clear ideas about what the processing is for in his station and what it can and cannot do. Then he can guide management and cooperate sensibly with it.

Hans Schmid emphasized the need to clean up the signal quality throughout the plant. He said that processing was too often used like "rubber gloves for leaky fountain pens."

Dick Schumeyer said that management must know specifically what it wants from processing, taking into account the competitive situation in the market, the audience the station is aiming for, the format chosen. On the subject of distortion, he said that lack of headroom in the audio line was the most common cause of poor audio quality.

Digital processing is coming. Eric Small predicted that before too long we would have the all-digital audio processor (video processing is already largely digital). This would allow very sophisticated handling of audio signals.

Jack Williams pulled into view what we might call the skeleton in the AM closet: the many millions of subquality AM receivers in American homes and cars. (This topic made a similar appearance in the AM stereo session, as noted above.) He showed some response curves he had taken on typical AM receivers, with severe roll-offs, often starting as low as 3 kHz. He said we need large scale research to find ways of improving the general level of AM performance.

Why any processing? The questions soon got to the one that always comes up in sessions on processing: why not send out the best account of the program we can without any processing at all? The panel gave the answer that is always supplied: radio broadcasting is so competitive in many markets today that a station must have the higher coverage of higher modulation density. The management demands that the signal be at least as loud as the one from the guy across the street.

In defense of processing, Bailie said again that processing is much less harmful to signal quality than lack of headroom—clipping is the great destroyer of signal quality. Dick Schumeyer supported that by saying that processing doesn't have to produce hard clipping.

How do you set up a processor? A significant question: why don't the makers of processing equipment tell us specifically how to set up their units for best quality? Williams and Loupas answered in essentially the same way. The engineer has to teach himself to do it by listening carefully as he makes adjustments. This is especially true because the engineer, as part of the station management, knows what sound is wanted—the manufacturer of the unit does not. After absorbing the instructions thoroughly, the engineer must listen to what each control does with program material from the station's format. This advice seemed particularly relevant with respect to the Harris system, described in the following.

The processing hardware: new generation. On the exhibit floor, the "new" audio processing put in an impressive appearance. On hand from last year's NAB were the Orban FM-Optimod and the Thomson-CSF Volumax, both after highly successful entries onto the market place. It seems fair to say that these two units were among the most important factors in the grand swing to the new processing.

CCA Electronics announced at the show that they would market a "CCA Optimod," their own packaging of the Orban Optimod.

(At their exhibit, Orban announced that an AM Optimod was in active development and could be expected soon.)

New on the floor was a most elaborate system introduced by the Harris Corporation, the MSP-100 for FM (the MSP-100A, a closely similar system for AM, was said to be in development). The MSP-100 is designed to make every important parameter easily adjustable by the user. The AGC section splits the spectrum into three bands, with seven different band crossovers switch selectable. Attack time in each band is selectable from .01 ms to 100 ms; recovery from 0.4 to 6 seconds, compression ratio from 12:4 to 12:0.5. Following the AGC section, the three bands are recombined and sent to a limiter. Attack and recovery times of the limiter can be automatic, based on analysis of the program material; or they can be

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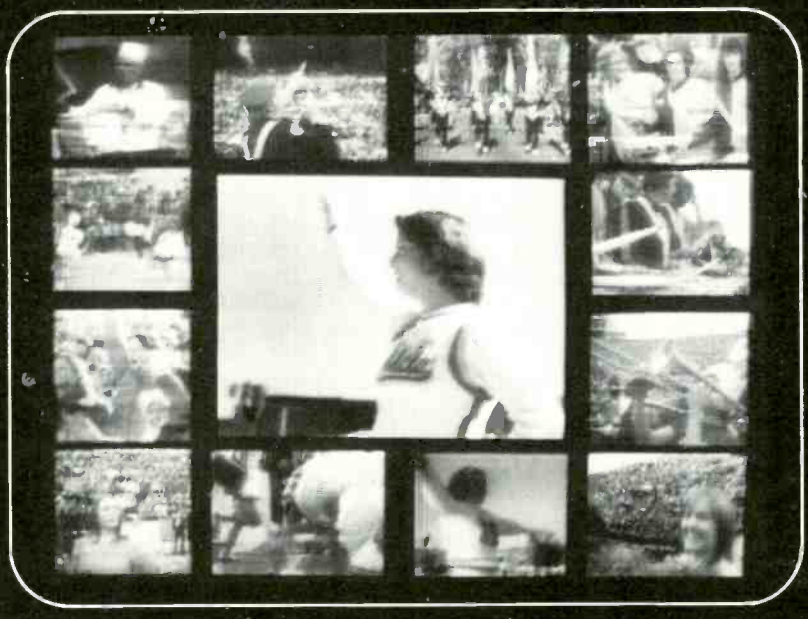

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manually adjusted.

The unit has gated expansion with adjustable threshold; LED indicators for all important functions, which show at a glance how the parameters are set and what the unit is doing with the signal. Intermodulation and harmonic distortion are rated at 0.25% each.

In a "live" demonstration of the unit that ran nearly 15 minutes, it became clear that Harris has intended to make an audio processor for FM that will do anything, match any requirement, with any kind of program material. Price of the unit in stereo is $5995.00.

Inovonics brought their new Model 230 with eight-band AGC section. The eight bands are fixed at about octave width each. Attack and release times are pre-set for each band "consistent with low distortion and rapid operation."

As in the Harris, the compressor section is followed by a peak limiter covering the whole spectrum. It has variable threshold, an attack time under 1 microsecond for any degree of limiting. There is also a gated expansion function in the compressor section, with variable threshold. The unit is intended for both AM and FM and includes (defeatable) peak symmetry and phase follower, to allow 125%-100% modulation on AM; and a defeatable frequency-selective function in the limiter for FM.

A third unit of the new generation that appeared was the Multimax of Pacific Recorders and Engineering. It is, again, a three-band gated compressor, but does not include a limiter: Pacific Recorders says it will work "superbly" with their own Multilimiter (also on display) or with "other modern-day broadcast limiters." Control signals for the AGC amplifiers are derived by rectifying and integrating the total audio signal in each band. There are two discrete gain control circuits on each amplifier, one with fixed long time constant, for the long-term signal envelope, the other fixed to respond to short term signal energy. Control signals are derived ahead of the control element for open-loop control, for no overshoot and dynamic range over 25 dB. Distortion is given as less than 0.2% THD, s/n ratio better than 72 dB below +4 dBm output.

Other high-grade processors, on the market earlier and making an appearance at the show, included the Moseley Model TFL-280 (unveiled at the NRBA in San Francisco in December); the Durrough "Discriminate Audio Processor" seen in the Collins booth, another three-band AGC system with elaborate variable controls, on the market for several years and warmly regarded by many broadcasters, but seldom if ever visible in a trade show or in the trade press; Broadcast Electronic's two units, the AM-400 for AM; the FM-601 for FM; the CCA PL-1 AM peak limiter; Neve's 2253 limiter and 2254 limiter-compressor; and Orange County's limiter-compressor-expander line, with two new versions, the VS-2, for AM and the VS-3, for FM, with simplified controls, offered as "ATS compatible."

All these are rated for extremely low distortion and provide varying degrees of flexibility to the operator. The broadcaster looking for the "new" audio processing should ideally investigate every unit listed in this report and measure the capabilities it supplies against his own requirements.

Equalizers, special effects, etc. Revox added to the available equalizers by becoming importers for the Klark graphic equalizers from England. Shure showed the automatic equalizer and analyzer system introduced at other shows late last year, a two unit system with generator, microphone, octave-band equalizer

continued on page 108

TerraCom has closed the loop for Electronic News Gathering

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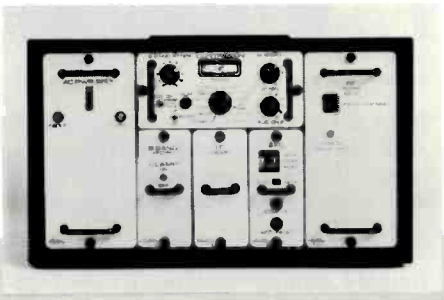

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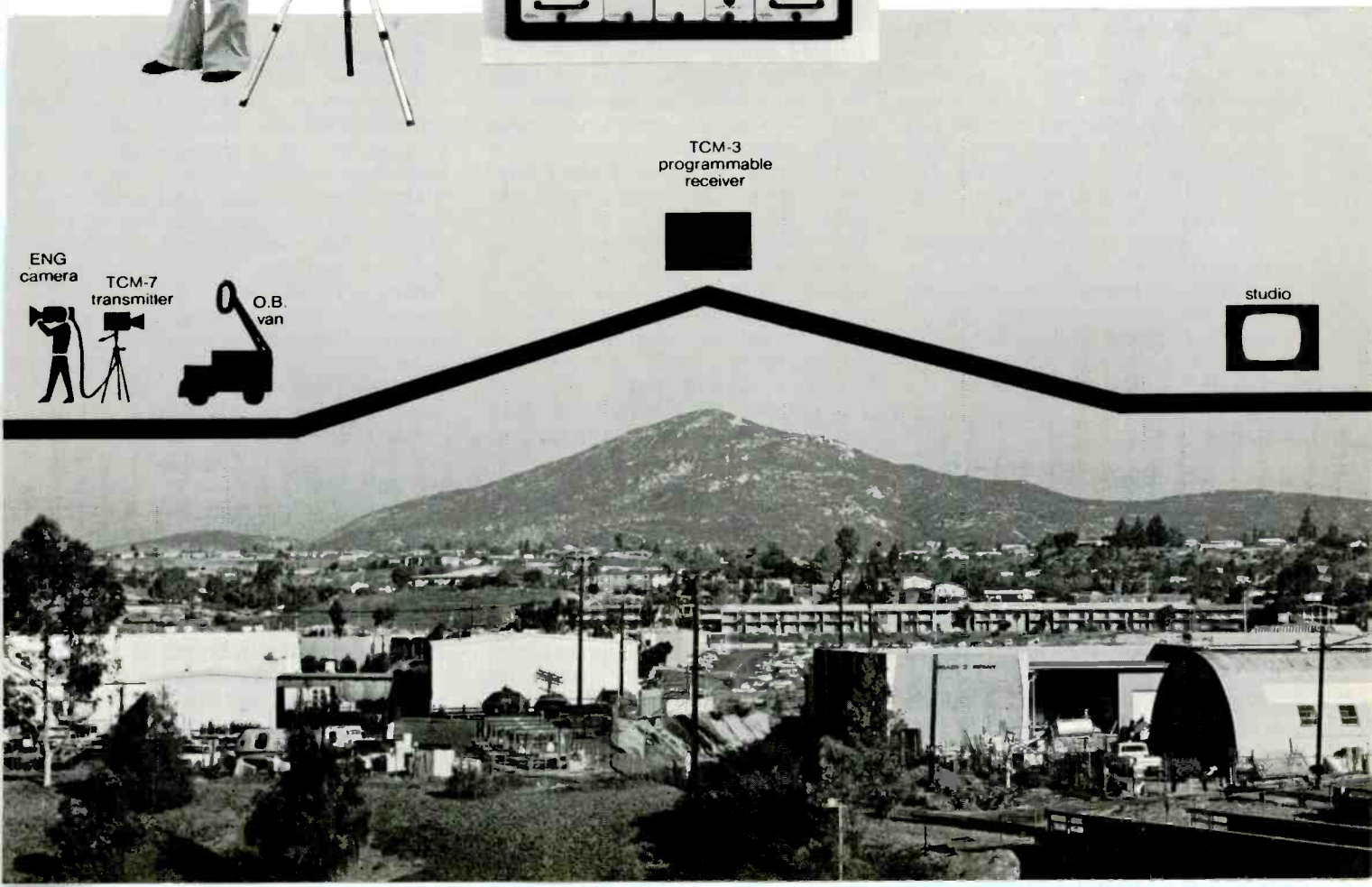


and analyser. MICMIX showed their "Time Warp," delay line and special effects generator, similarly introduced at other shows late last year.

A device classifiable in several groups was the "Monomax" of Ampro. This uses a matrixing system to assure synchronization between the two stereo channels for mono broadcasting.

For more information on audio processors: Harris, **374**; Inovonics, **375**; Pacific Recorders, **376**; Moseley, **377**; CCA, **378**; Revox, **379**; Micmix, **380**; Ampro, **381**.

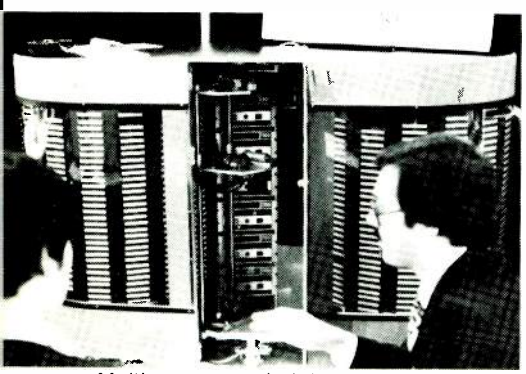
Automation: the new day of unlimited carts

Multiply by 10 or more the number of carts automation systems have handled in the past, bringing the total to 1000 or more, and you get something different from a highly versatile on-air system: you get total storage of all currently usable carts directly in the automation system. With a whole large cart library on instant tap, quite a bit more of the operating load in the station can be shifted to the machine. Nobody has to go through a library periodically and pull out carts to put them in the system. They are already in.

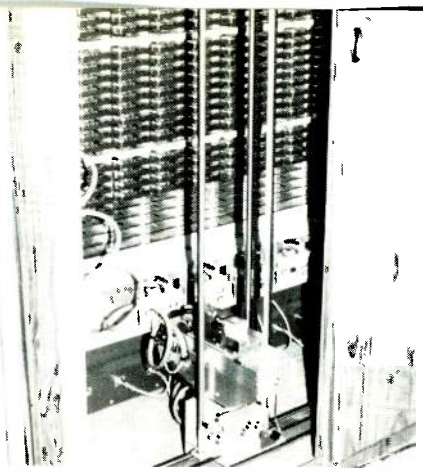
Changes have to be made only when a particular cart becomes obsolete or a new one must be entered.

"Magna Carta" from IGM. First of the three such systems shown was the "Magna Carta" of IGM. It holds up to 1000 carts. There are eight playing tables and the automatic elevator can move a cart to any one of them. That supplies back to back scheduling, because any table can be made ready while another one is on the air.

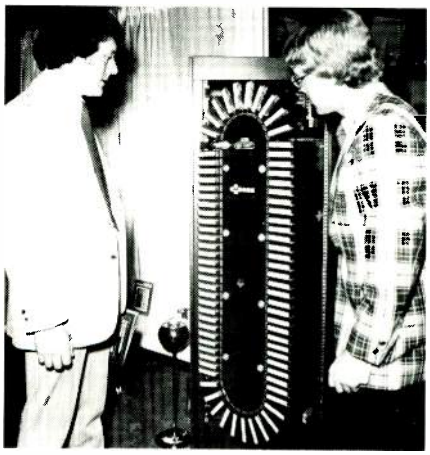
The system is under microprocessor control; instructions can be entered for up to eight sequential events and there is a visual readout showing the sequence set up at any time. The system can be interfaced to almost any modern automation system to add memory for large numbers of events. It can operate with several tables removed for servicing: the microprocessor will know which ones are still available and route carts to them.



Multicart player, holding up to 1024 carts, shown by ITC (story).



Rear of Cuerac, 500-cart machine, with elevator that moves carts.



IGM "Go-Cart" holding 78 carts gets a tryout for visitor.

"Cuerac": 500 carts per unit. A roughly similar system, Cuerac, arrived from Australia, where it is made by Consolidated Electronic Industries, Ltd. The domestic service and make-ready agent is Pacific Recorders and Engineering, in whose booth Cuerac was shown. The basic Cuerac unit holds 500 carts, has a visual display unit (VDU) for entry of programming instructions and display of status at all times. A computer is part of the system with non-volatile memory of 4K for program, 4K for control. Interface can be straight to VDU, teletype, tape reader, etc., with serial or parallel ASCII code. The display is up to 19 lines of alpha-numeric characters, showing actual time, elapsed time, event number, next 10 events, new data entries, system alarms, etc. The audio switcher can switch not only Cuerac but also outside single sources, under computer control.

From 4 to 7 replay units can be assembled in the system. Up to five complete Cuerac systems can be joined into a system under single control, for a maximum of 2500 carts! That would seem to be as many carts as *any* broadcast station would have active at any one time; most stations have far fewer.

Another system with the new grand capacity was shown in prototype form by International Tapetronics Corp. The firm has no immediate marketing plans, but was seeking reactions of potential users to the features of the system in a series of lecture-demonstrations. It holds 1024 NAB carts in two large cylinders. Playing position is in the center between the two; the cylinders revolve to bring the called-up cart to play. A memory for 10,000 events is included; access time is 5 seconds. The system has been designed for ready interface with a business automation system for total computer-controlled operation.

Better moderate-capacity multicarts. Probably most automated stations, in fact, will want a capacity more like that of the Cetec-Schaefer Audio-file—up to 48 carts. On the market for several years, Audiofile appeared this year in an improved version called Audiofile II, with microprocessor logic, redesign of mechanical elements for easier servicing, and new cartridge handling sequence to maximize audio performance. Specifications of Audiofile II are given as wow and flutter, 0.15% maximum, peak weighted; worst-case cue-time, 8 seconds; distortion less than 0.5% at +18 dBm output; other characteristics, NAB standards.

IGM also showed their earlier multicart machines, the GoCart and Insta-cart, GoCart with expandable capacity to 72 carts. And SMC was on hand with, of course, the Carousel and Caro-stat, used widely for a number of years.

Complete automation: any level you choose. All the firms established in the complete automation field were on hand: SMC had their DP-2, digital programmer with microprocessor control; Harris showed System 90, introduced two years ago, the extremely flexible full-automation system; RCA showed their DAP systems; Cetec-Schaefer had the 903E, three-day memory system with 8000 event memory. These systems are all supplied with numerous options and adaptations which make any one of them fully responsive to the particular needs of just about any station.

At the other extreme, that of simple, low-cost equipment for stations needing only short-sequence automation, Microprobe Electronics had a new system extending the ideas they have introduced at earlier shows. The "Log 4" system can provide up to two hours of walk-away time. With thumbwheels set for a sequence of 5 events from music tape decks, followed at clock time by a cluster of commercials from a multicart machine. Or the commercials can be sequenced in with the music. The system includes 4 Otari

continued on page 110

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reel-to-reel tape machines, 2 SMC Carousels, and the Microprobe Model 100 Programmer to run the show. Basic price is $13,500.

Interface for total automation. A system of a kind brand new on the broadcast market was introduced by Trace, Inc.: it is an in/out unit for amalgamating business automation systems with switching automation. Aimed to reduce the "interface pains" when a station wants to go to total automation, the Trace I/O system is market ready, and sells for around $4000. It handles efficiently any brand of automation at the two ends of the linkage.

For more information on automation: IGM, **382;** Pacific Recs., **383;** Schaefer, **384;** Microprobe Electronics, **385;** Trace, **386.**

Audio consoles: more of them than ever

The console scene did not disappoint: there were more consoles on the floor than at any previous NAB show. Every long-established maker was there with at least one model; and there were some new brands (they will be hanging in alongside the others next year, which we now predict will be an even bigger console show).

IS! shows new audio console designed for television service.

Audio Designs and Manufacturing also showed audio board for TV.

The one important new technique was automation and this applied to only a very few of the models on the floor; obviously the on-air console function in medium to small broadcast stations can get along nicely without automation. Stations doing a lot of complex program production, however, with post-production mixdown from many mic channels, should begin to consider whether or not automation would be a worthwhile addition.

MCI of Fort Lauderdale, showed their JH-50 console automation unit, designed to mate with their JH-500 series of consoles. The consoles were shown last year marked "automation ready." The JH-50, using microprocessor control, provides level, mute and grouping automation for all input/output modules and echo returns. MCI says that their processor logic eliminates controls and procedures inherent in "many automation systems," being human engineered to free the operator "of time consuming setup and null routines."

Another optional feature of the JH-500 is a "plasma display" audio metering system. One-hundred segment neon glow tubes produce a lighted meters. It uses a one-hundred segment neon glow tube to produce a lighted bar graph for each channel. The bars can be switched to read either VU or peak; an accumulate mode, preserving the highest reading over a period of

continued on page 112

The Amazing ASACA

ACC-2000

Superior performance ON THE STREET or IN THE STUDIO for UNDER $30,000!

On the street. The ASACA ACC-2000 portable camera is specifically designed for electronic news gathering applications and on-the-spot video location work. It's compact... note the single-unit form so no back pack is required. Light ... with a combined camera head and view finder weight of under 20 lbs. Versatile ... with built-in gen-lock. And offers a picture quality that meets or exceeds broadcast standards!

The excellent picture results from a 2 line contour compensator, 3 Plumbicon® (Saticon®) tubes, and I and Q encoder... features seldom found on other cameras in this price range. Plus, add the advantage of a pre-heat circuit—low power consumption of approximately 30 watts with AC power, and easily adapts to battery (DC) —even an optional adaptor for use with 12V car or truck batteries.

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Easy set-up. The ASACA ACC-2000 has overscan and underscan switching ... a wobble circuit for quick and accurate alignment adjustment... and a sawtooth signal (100-200%) for gamma correction, knee level, white clip, etc.

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time, can be added.

A line of consoles with capacity appropriate to most medium to small radio stations and with fresh design ideas, has been coming from Ramko Research. This year they added some new ones with a number of ideas off the beaten console path. The new DC-12 and DC-38 series have completely DC controlled attenuation and switching; electronics can be rack mounted remote from the console. Switching is by illuminated touch pad; meters are solid-state light emitting, readable from a distance at a glance. Time shared attenuators for stereo have zero tracking error. DC-38 has 5,8 or 10 mixer channels, with 4 inputs per mixer. Prices run from $2400 (5 mixer mono) to $4780 (10 mixer stereo).

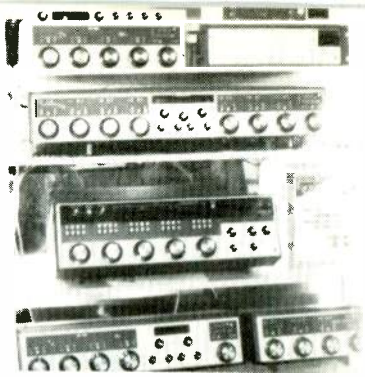
New McCurdy flexible production console.

Automated Processes also showed an automation programmer system bringing full automatic control to their "programmable consoles." It uses a cassette memory, allowing for control of every function on the console. System will control up to 512 continuously variable functions and will actually change up to 80 simultaneously. A setting chosen early in a program can be changed at any later time without affecting other settings. Automated Processes has begun deliveries of the system.

Neve, another of the top-line console makers, is another with an automation system. Their "NeCam" has been in use in England and on the continent for a couple of years.

Neve was emphasizing at the show, their Model 5305 and 5312, TV sound production consoles with 12 to 36 inputs, 4 bus, 2 main. The units are in use in a number of broadcast plants around the world.

Ward-Beck, also called on frequently to supply the most elaborate console functions to network radio and TV origination points, had equipment in the show to demonstrate their range "from the smallest to the largest."



A collection of Ramko consoles.

Audio Designs and Manufacturing introduced, at the show, a new console with some good new ideas. All switching is done with sealed reed relays, so all is electronic. Selection is with thumbwheels that give fast operation. At the top of the console there is a status readout for each selected function, providing a quick summary at all times. Audio Designs also emphasized their five year warranty.

Auditronics, another console maker giving a five year warranty, showed their "Grandson," console series designed specifically for broadcasting, introduced two years ago. Pacific Recorders and Engineering showed their broadcast consoles, which use a digital control-logic system to make all inputs adaptable to any input requirement, for

continued on page 114

HITACHI SK-70

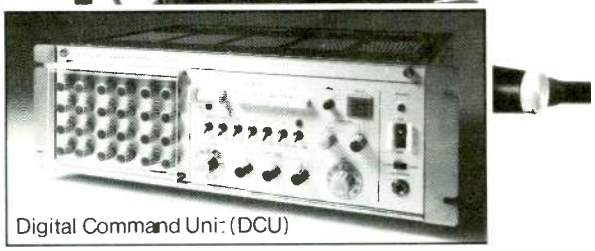
The One Camera That Can Do The Work Of Four... Inside Or Outside The Studio!

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.

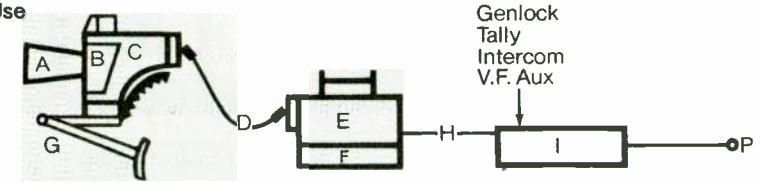
As you can see, our outstanding Hitachi SK-70 is a sound investment for broadcasters, production studios, and universities who need broadcast quality performance in a wide variety of assignments, all for the price of a single camera. We'd be pleased to arrange a demonstration of how the SK-70 can fit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

1. Fully studio-equipped

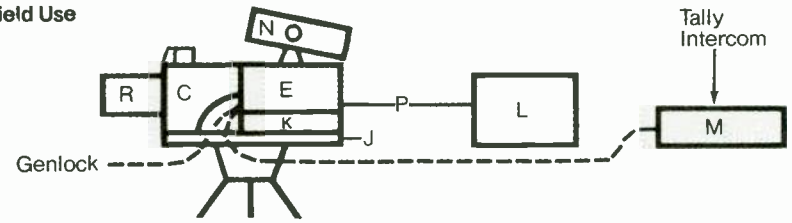


Digital Command Unit (DCU)

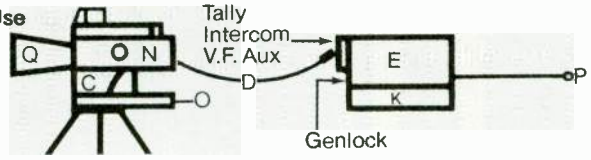
2. Portable Use



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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very high input flexibility.

McCurdy, widely known for complete studio "packages" and for complex audio switchers, introduced the SS8400 mono production console. It has modular design, plus a very extensive list of optional functions, allows the user to get just the functions he needs, without buying others not needed. Basic unit has 12 input mixing channels, switchable to 24 inputs.

Revox had a new small mixer, the Clubman 4, a low-cost, up-to-date design for two turntables, two tape machines, three microphones—appropriate to a college radio station or other like application.

Broadcast Electronics had examples from their very extensive line of stereo and mono consoles of small to moderate mixing capacity.

A new brand from England, called "Alice," made by Stancoil Ltd. of Windsor, has been brought over by CCA Electronics. Included are desktop units and free-standing consoles with 2 to 8 mixer channels and a full complement of modern console operation features.

Another new name for audio consoles was Industrial Sciences (seen last year, and again this year, with video switching and control equipment). ISI brought their 700 Series of consoles, which allow assembly from modular channels for 4, 8, 12 mixing inputs, each group of four inputs switchable to up to 36 sources. Each module supplies the functions now expected in top-grade consoles: equalization, foldback, echo send and receive, solo, etc.

Robins continued strongly the Fairchild tradition of plug-in console assembly for medium-priced systems. New this year was a new modular channel with improved equalization. Robins also emphasized their extensive line of plug-in amplifiers, equalizers, control units.

Central Dynamics, a leader in video switching and control, brought something new: an audio "mixer-switcher," Model AFM-10, which can be used separately as a seven-channel audio control console, or as an audio-follow-video switcher, with the seven channels switched and remotely controlled. The two modes are switch selectable, and there is a third one, in which the "follow" mode is combined with level control by the individual faders on the AFM-10. The unit also includes a built-in compressor/limiter, with a 3:1 compression ratio, and threshhold adjustable by the relative positions of channel and master faders.

Collins had a new Mark 8 console, with eight mixing channels switchable to 25 stereo input pairs. LPB added to their line of Signature II consoles the S-13C, for 8-channel stereo; the S-14A, 5 channel mono; and the S-15A, 8 channel dual mono. All have the operation features of earlier Signature II consoles, among them LED peak level meters built into the VU meters, switchable mic preamp gain settings, auxiliary input/output switching. LPB also showed a new line of free-standing console tables, single and dual turntable cabinets, and complete studio systems with consoles and turntables pre-wired and installed.

Ampro showed an updated, or "B" version, of their line of consoles, ranging from 6-channel to 12-channel mono and stereo, each mixing channel switchable to four different inputs. All now have modular plug-in amplifiers and remote start contacts for external source equipment on each input line. Prices run from about $2300 to about $5200. In the design of complete studios (an area entered by Ampro last year), there were a number of examples illustrated and described.

Another firm specializing in complete studio setups, Microtrak, emphasized their System D Newsdesk, an integrated system with console, microphone, typewriter, telephone and news teletype, all functionally ar-

ranged in a compact console-desk. At the show the news teletype was line wired to UPI and brought in current news reports throughout the exhibit hours.

Other exhibitors showing well established console lines were Cetec, Harris and RCA. Another manufacturer to show professional audio mixing equipment was Rank. Philips also had audio equipment on display.

For more information on consoles: MCI, **387;** Automated Processes, **388;** Ramko, **389;** Audio Designs, **390;** Pacific Recorders, **391;** McCurdy, **392;** Revox, **393;** CCA, **394;** ISI, **395;** Central Dynamics, **396;** Collins, **397;** LPB, **398;** Ampro, **399;** Micro-Trak, **193.**

Recorder/players for open-reel tape

This category was at the top of the pre-show "most wanted" list for radio managements. No sharp innovations in open-reel machines appeared, but quality/price ratios continued to improve. And refinements in operation flexibility, including more automation of operation, were also brought to the show.

On the price-saving front, Scully announced a new series of machines, Model 250, recorder/reproducer, and Model 255, playback only, at about $1900 and $1200 respectively, intended specifically for broadcast use. Scully said they are "designed for continuous operation in automation systems and other playback requirements . . . extremely rugged . . . using trouble free TTL control logic, low-noise plug-in electronics and precision milled heavy cast deck plate . . ." Scully also showed their 280 and 284 series, widely used in broadcast stations for a number of years. Added to the machines this year is a new optical-control constant tape holdback tension system for further improved tape motion.

Studer brought in a revision of their medium-prided A67, the B67, with all features of the old one plus front panel control for basket editing, real time electronic counter, all electronics plugging in at the front. Prices run from about $2600 to about $5700, depending on track configuration and enclosure. Studer also had a repackaging of their A80 machine (same transport); all plug-in cards have LED indicators for transport logic status.

MCI showed their JH110A series, on the market for several years, with a new "variable profile" cabinet that allows the transport deck to be tilted through 22 degrees, for best operating angle. The machine has the manual velocity control (editing joystick), return

The new low-priced Scully Model 250.

to zero and other features introduced by MCI in recent years. Also at the show was the MCI JH-16 series, multi-channel recorders, with their optional "Auto locator."

Otari introduced the Mark II series, with all the features of the earlier MX-5050 recorder plus: separate transport and electronics, standard DC capstan servo with ±7% pitch control, plug-in electronics, and interface jack for DBX or Dolby noise reduction. Mark II prices are $2195 for two channels, $3195 for four channels. Also new: a 25 Hz cue tone sensor and variable time delay for the ARS-1000, reproduce machine for automated radio systems: and the MX5050 compact recorder in a full-track version (single channel record and reproduce) plus

two-channel half track playback; with optional variable speed dc capstan servo.

Nagra, as announced in advance of the show, had their new Model E, a moderate-priced unit (about $1800) aimed specifically at broadcast use. Weight is 12.1 lbs., tape speed 7½ ips, power supply, 12 "D" cells or re-chargeable NiCads, or commercial power with ATN-2 accessory. Seven-inch reels can be used with cover open, five-inch cover closed. The specs are thoroughly in the Nagra tradition of all-out quality in portable form.

International Tapetronics had their 750 and 850 series of open reel machines and Ampex showed full line.

Cart machines and carts

Cartridge recording and playing units have come on the market from more and more makers over the last several years while most companies making them over a longer span have continued to push them strongly. Result: intense competition.

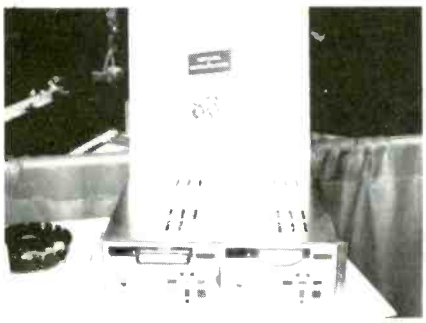
Two comparatively new makers at this year's show were UMC and Audi-Cord. UMC introduced their "Beaucart" series last year, expanded it this year with Beaucart II, a no-frills, low-cost series; and Beaucart 4D, a four-unit system with four completely independent drives. All the UMC machines use a Beau motor with pan-cake, inside-out design.

Audi-Cord had only advance information last year, but had the hardware this year. The 100 series were playback units, the 110/120, the recorder units. Specs were claimed at NAB standards or better. Also introduced was the "Mod-Quad," a 4-transport system with four independent drives in one assembly. The four can be sequenced by a single start, with cue tones starting one after the other.

Telex introduced a new cart series, the Magnecord MC, which uses a Hall effect motor and flutter-filter drive belt system simed at very low acoustical noise and flutter, cool operation so that no ventilation is needed. Units meet all NAB specifications for A and B cartridges.

Cassettes were at NAB too. Rapid Q showed the CA 77 series. Technics showed the larger Elcasset.

BE stressed multi-plug-in decks and a new mechanical design which assures accurate capstan positioning



New Audi-Cord tape decks.

Other very well known cart lines seen on the floor included those of Ampro, Broadcast Electronics, Edco (Rapid-Q), Harris, ITC, and Sparta.

New tape, new cart. Fidelipac gave a boost to cart performance with a new tape they called "Hot Tape": it has, they said, up to 6 dB more output than earlier tapes, a large advantage that can be used in a number of ways.

Capital Magnetics announced a brand new cart, the AA-3, to reach the market in early fall. It has a redesigned tape path, new transport mechanism, tape tension stabilization and other features aimed at improved cart performance.

For more information on new tape recorders and cart machines: Scully, **194**; Studer, **195**; Otari, **196**; Nagra, **205**; UMC, **198**; Audi-Cord, **199**; Telex, **200**; BE, **201**; Fidelipac, **202**; Capitol Magnetics, **203**.

Transmitters: high-power FM and some solid state

Transmitters, too, like carts, consoles, processors, etc., are being steadily refined under competitive pressure. Every established maker showed new models at the show, as additions to his line.

McMartin brought a new high-power FM transmitter, the BF-55K, rated at 55 kW, which puts it in the top power bracket among available FM systems. McMartin also added to their line a 5 kW AM unit, the BA 5 K. Other units from McMartin's large line were on display.

Transmitter design has been, in gen-

continued on page 118

eral, at a very high level for a number of years, of course; we can expect all these transmitters to perform exceedingly well.

CCA Electronics also introduced a new 55 kW FM transmitter, formed by joining two 27½ kW units. It was added to the very complete CCA line which covers both AM and FM from 10 watts to 50 kW. Continental Electronics emphasized their AM units for 5,10 and 50 kW; they also had information on the very high power AM transmitters, in the megawatt range, made for foreign applications.

American Electronics Labs was another maker moving into the high power FM market, with a new FM 25-kG, rated at 27½ kW, to be ready about June 1. AEL said that two of the units are readily diplexed for 50 kW.

Harris Corporation showed their MW-1A, completely solid state 1 kW AM, introduced two years ago; and their MW-5A and MW-50A, for 5 kW and 50 kW respectively, all three in new versions that include built-in audio processing for high modulation density. All have 125% positive peak capability, and the higher power units have Pulse Duration Modulation, Harris' specialty.

On the FM side, Harris brought two new transmitters, the FM-2.5K for 2.5 kW, and the FM-20K for 20 kW. Both use a brand new exciter, the MS-15, which has been designed for low overshoot, low distortion, for increased loudness—Harris claims a 2 to 6 dB increase in loudness over earlier exciter designs with no degradation of quality. A basic advance in the MS-15 is a dynamic transient response low-pass filter, which is rated to have no more than 2% over-shoot at any level.

Three other makers showed medium-power all solid state transmitters. Sparta had the new SS1000A, a 1 kW AM transmitter, to be ready shortly for the market. Like the other solid-state systems, it could claim the very significant advantages of successful solid-state design. Sparta also projected a line of other all-solid-state AM transmitters, at power ratings up to 5 kW, now in development.

RCA had full information on their new BTA-5SS, an all-solid-state 5 kW AM transmitter, promised for early next year. The projected specifications, like those of most other new transmitters, reflect a definite upgrading in signal quality as compared with the last "generation" of AM transmitters. The reaching for better AM signal quality, evident in the AM stereo and audio processing discussions reported in the foregoing, is finding definite response among

transmitter manufacturers; but we still have a big barrier to improvement, abysmal receiver quality.

RCA also introduced a new FM exciter, BTE-115, for which they claimed better S/N ratio, reduced distortion, lower cross talk, than in earlier exciters.

Sintronics showed their new TAM-1K-B, a 1 kW AM, all-solid-state, to be ready this summer. Like others, it embodies a number of new ideas, including a modulation system Sintronic calls Digital Duration Modulation: it is a switching mode voltage regulator in series with the final amplifiers, driven by a 60 KHz digital signal whose duration changes in step with the audio signal.

Collins added to their Generation 4 FM line, familiar from the last two shows, a new 25-kW FM, the 831G-2C, with the very high grade specs of the earlier Generation 4 transmitters; Collins says it is ATS compatible with automatic power output control, automatic filament voltage regulators, overload recycling, overload fault indicators. Also new for Collins was the 5 kW AM transmitter, Model 828E-1, another system with series switching modulation. It is ATS and AM stereo compatible, with automatic modulation control.

CSI continued to emphasize their very complete line of AM and FM transmitters at a broad range of power ratings, starting with 10 watt FM educational units, and carrier current systems for 1 to 50 watts. New carrier current systems at 2 to 20 watts came also from LPB.

A source of transmitters not yet familiar to most American broadcasters appeared at the show: AEG-Telefunken, whose extensive line is available through Bayly Engineering, Ltd., Ajax, Ontario, Canada. Bayly showed data on AEG-Telefunken FM transmitters for 50, 100, 300, 1000, 3000 watts and 10 kW; all were 100% solid state, except the 10 kW model. Specifications claimed put them in the top bracket for FM on-air quality.

Another American maker with a new FM transmitter was Wilkinson: their FM1500E, rated at 1.5 kW, is all solid-state except for the 5CX1500A final amplifier.

For more information on transmitters: McMartin, **207:** CCA, **208;** AEL, **209;** Harris, **210;** RCA, **211;** Sparta, **212;** Sintronics, **213;** Collins, **214;** LPB, **215;** AEG-Telefunken, **216;** Wilkinson, **190.**

Remote pickup, for fast developing radio ENG

As *BM/E* noted in the January issue, radio's remotes, nearly as old as broadcasting itself, are getting an uplift from new equipment and ideas that give radio its own instant-on-air ENG.

Marti, whose equipment appeared in several of the station stories on radio ENG, showed complete systems and individual units, emphasizing especially the hand-held transceiver series, RPT, the under-two-pound walkie-talkies with good audio quality that help put remote news directly on the air. Aimed directly at radio ENG systems were two new units: the ARS 450 automatic repeater, which can pick up signals from hand-held transceivers and relay them to the studio; and the RR 50/450 mobile repeater, which can be quickly moved by car to an advantageous relay point for the same function.

Motorola, a new name for NAB conventions, also laid out a line for radio ENG with emphasis on their "handie-talkie" transceivers, operating with up to 5 watts RF output in VHF and UHF. Also shown was the Motorola Spectra-Tac satellite receiver voting system, which carries out the automatic diversity operation when a number of satellite receivers are distributed through an area to collect signals from mobiles. This function is essential in the more elaborate radio ENG systems which cover a large city with several judiciously placed receivers (see story on CBS Washington system in *BM/E,* March).

Comrex, which developed one of the early high-quality hand-held transceivers, specifically for radio ENG at WBZ in Boston, brought to the show a new, lighter version, Model HHT-1KA. It operates on UHF or VHF, has 1 watt of RF output, weighs 1.5 lbs with batteries, is 8 in. × 1¾ in. × 1½ in. The automatic modulation system, says Comrex, is engineered specifically to handle on-site crowd noises and street interviews, which differ ballistically from studio program. Price is $950.00.

McMartin added to the "new ENG" parade with a new somewhat larger and more powerful portable: a 6-pound unit (with batteries), with 3 watts RF output, Model RPU-1103. It has 3 front panel LED status indicators, works on 150 MHz, has microphone transformer and line inputs, compressor/limiter on both mic and line, talk-over-line capability, battery rated for up to 10 hours of 30% intermittent transmitter duty, charger jack for charging battery while in place. All controls and indicators are visible when the unit is carried on a shoulder strap.

Moseley showed their very complete line of remote pickup units and systems. As reported in earlier stories, Moseley equipment, too, is playing an important role in the upgrading of

continued on page 120

ENG for radio.

For more information on remotes: Marti, **217**; Motorola, **218**; Comrex, **219**; McMartin, **220**.

Microphones, turntables, pickups, headphones, etc.

There were no radical innovations among these audio systems but rather a complete representation of the firms that have been the solid suppliers over a number of years.

Shure, Electro-Voice, AKG, Beyer, Sony showed microphones. Studer showed the Schoeps microphones, having recently taken over their distribution in the U.S.: a secure domestic source for the Schoeps instruments will be welcome since they have been warmly regarded in recording and broadcasting in the U.S. and abroad for many years.

Harris Corporation introduced the CB-1201 turntable, a new design aimed at day-in-day-out broadcast use. Specifications claimed include rumble at 45 dB below the NAB reference of 1 kHz at 3.54 cm/sec; wow and flutter less than 0.1%, NAB unweighted; speed accuracy ±0.3% at 33⅓ rpm.

Another very high grade turntable seen at the show was the Panasonic SP10 Mark II, which uses direct servo drive with a crystal controlled oscillator for frequency reference. This is a refinement of the SP10 direct-drive table which has been adopted lately by a number of broadcast stations seeking extremely low noise in broadcasting disc-to-air.

Headphones. Swintek, an English firm with a great variety of wireless mic systems, had a comprehensive showing of them through their U.S. distributor, Allan Gordon Enterprises of Hollywood. Vega's long-known wireless mic systems appeared, of course, in the Cetec booth. Thomson-CSF had an improved version of their 950-Hz band system with automatic diversity.

Television Equipment Associates showed a quadruple diversity system developed by Reslo Sound, of the U.K., in cooperation with the BBC. Signals from the four receivers, spaced around the studio or other room to be covered, are not chosen separately by the system according to which has the best S/N ratio, but are combined at all times. Signals are weighted by a digital control system that automatically adjusts each for optimum contribution to the total. TEA also showed their widely-used series of "sportscaster" headphones.

Revox showed two innovations in the Beyer headphone line: an electrostatic set, aimed at the extreme range and low distortion characteristic of this design; and a cordless headset connected to the signal source by an infrared transmission system. In a short trial in and near the Beyer booth, the sound output of the infrared headset proved to be totally steady throughout the area.

Speakers. Shure introduced two monitor speaker systems, Models SR112 and SR116. Each has two 8-inch cones in a sealed bass enclosure, plus a high-frequency 1½ inch cone directly at the apex of a horn. Gotham showed the Klein and Hummel monitor speaker widely used in Europe. Electro-Voice showed their line of monitor speakers, very well known in broadcast stations here. Panasonic had in live demonstration their new "Phase Linear" line of speakers, aimed primarily at the hi-fi market but claiming specs fully acceptable for monitoring.

Phono pickups. The two principal suppliers of phono pickups to broadcast stations, Shure and Stanton, were both on hand with data for their ex-

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tensive lines.

Noise reduction. Two comprehensive noise reduction systems were on the exhibit floor. Dolby showed its various classes of noise reduction hardware and also showed a sampling of FM receivers from various manufacturers with Dolby decoding built in.

Gotham had the new Telefunken Model C-4 noise reduction system, new to the NAB, for which a dynamic range improvement of 30 dB is claimed. The C-4 is aimed at program production, noisy input lines, etc.; it is not for over-the-air applications in its present form.

Magnetic heads. Nortronics had data on their very extensive line of heads for magnetic recorders, with a new gap material, Duracore, described at last year's NAB, which the maker says increases head life by up to 10 times. Taber had something new in replacement heads for audio machines: construction entirely of aluminum (in non-magnetic sections). This, said Taber, greatly improves the mechanical precision and stability as compared with phenolic structures.

RF loads. A number of firms were on the floor with very complete lines of RF loads at all power levels. Bird Electronics, Dielectric and Electro-Impulse each showed RF loads—dry, water-cooled, air-cooled, etc.—for just about any conceivable broadcast requirement. Electro-Impulse, for example, introduced at the show, the Model CFTN, rated at 7500 watts, for AM stations. With loads up to 2.5 kW, the unit is air cooled. When the load goes above 2.5 kW, up to 7.5 kW, the water cooling system automatically goes into action.

A miscellany

Flashing tower lights. As at several recent shows, Flash Technology Corporation showed their high intensity beacon systems for antenna towers. These can produce a minimum of 200,000 candles for day-time service at 40 flashes a minute, automatically dropped to 4,000 at night which meets all warning requirements of the FAA. New this year was a "hot tower" option for the standard FTB-205 system. Flash Technology also had a new system, the FTB-300, an omni-directional light for the tops of obstructions. with 20,000 night-time candles—again in conformance with FAA requirements.

Discharge arrays for lightning protection. As described in earlier articles in *BM/E,* Lightning Elimination Associates of Downey, California, have for several years marketed and installed their "discharge arrays," assembled of many small metal points, to protect facilities from lightning. The theory of the array is that the voltage gradient between a cloud and that point on the ground is reduced by the leakage of charge, to eliminate lightning strokes at that point.

LEA this year introduced additional anti-lightning gear: surge and transient eliminators to block destructive surges on power lines and on signal lines; and a lightning warning system, which uses the current through a discharge array, when there is a strong local "field" as a warning signal.

For more information on microphones, headphones, etc: Harris, **221**; Panasonic, **222**; Swintek, **223**; Thomson-CSF, **224**; TEA (Reslo), **225**; Revox, **226**; Shure, **227**; Gotham, **228**; Taber, **229**.

TEST EQUIPMENT

The new test equipment and systems shown at NAB '77, carrying forward trends of recent years, leave a station operator no excuse for putting out a bum signal. Advances in audio, video, and RF test gear make it possible to test every component and system in a radio or television station more accurately, more rapidly and more easily than ever. All one had to do was visit the Tektronix Measurement Theatre to learn the large amount of test data, audio, video and RF that a good spectrum analyzer alone can gather.

Among the more interesting pieces of test equipment at NAB '77 were these:

TV
- New TV demodulators from several sources
- New VITS analyzers
- New S/N noise measuring equipment

Radio
- Monitors for ATS applications
- Stereo Vectorscope

New demodulators

In the past, two manufacturers stood out—Rohde and Schwarz and Telemet—the former for its precision but expensive system, the latter for its practical approach to evaluating transmitter performance. This year there was a bigger choice. Tektronix unveiled its 1450 NTSC demodulator which it claims added no distortion of its own—a shortcoming of envelope

detector types. Philips Test and Measurements Dept. demonstrated the PM 5560 demodulator. Both of these units use synchronous detection but offer envelope detection as well. At the Townsend Associates stand, the Norweigian NERS precision TV modulator was shown. It's a synchronous demodulator only. Optek exhibited the model 1400 demodulator (shown last year) using an "advanced envelope detection" circuit. Optek's unit was designed to work with VIRs automatic video correctors.

In announcing its new unit, Tektronix said most older demodulators suffer from three shortcomings: *1.* quadrature distortion (caused by envelope detection), *2.* poor long- and short-term stability of tuned circuits and *3.* changes in bandwidth characteristics with varying amplitude input signals.

To avoid quadrature distortion, the Tektronix 1450 uses two synchronous video detectors operating in-phase quadrature—one detects the in-phase signal, the other, the quadrature component (which is a measure of the changes in visual carrier phase that results from a change in video level). But the 1450 also uses an envelope detector to accurately determine the actual phase present since synchronous detectors can't measure incidental phase modulation.

To avoid meticulous adjustments associated with tuned circuits, which are often complex when the bandpass filter approaches the ideal Nyquist curve, Tektronix uses new surface acoustic wave (S.A.W.) filters. SAWs can be easily tailored to the required bandpass characteristics, Tektronix says SAWs save money, too, because no adjustments are necessary as a result of mechanical or thermal shock.

To overcome bandwidth changes with input, the 1450 uses constant gain amplifiers with pin diode attenuators to adjust the overall sensitivity of the demodulator. The unit provides a digital readout of input power.

The Philips PM 5560 TV demodulator uses double conversion in its tuner to get good selectivity. (Both VHF and UHF channels can be tuned.) Thumbwheel selectors make it easy to tune.

As mentioned, the synchronous detector avoids quarature distortion encountered when using envelope detectors. With synchronous detection, full modulation can be used. (This leads to accurate and reliable VITs measurements, for example.) Philips says its filter and group delay equalizer are of conventional design but that a computer-aided design has made it possible to minimize possible drift problems. And buffer stages included with each filter make alignment "easy."

Because of double conversion tuning, the synchronous detector works at IF frequencies. Since incidental phase modulation in certain types of transmitters can disturb the differential phase measurement in the synchronous detection mode, an envelope detector is also available.

The sound detector of the Philips unit is of the phase locked loop type featuring very low distortion. Two modes for sound detection are possible: intercarrier and split carrier. Built-in meters give an indication of IF level, sound modulation and video modulation.

The NERA demodulator is built up from subassemblies including an RF section, multiplier section, filter section, IF video section and IF sound section. The NERA unit can tune in all bands I through V as set by international standards. The internal IF frequency is 17.22 MHz. The Nyquist filter is a transversal type for stability. As mentioned, synchronous detection is used.

VITs measuring

A new VIT Distortion Meter was shown by Rohde and Schwarz. This unit is used to automatically evaluate test signals inserted in line 17 and 18. Sync, burst amplitude and hum can also be determined. The instrument is modular in design and each parameter to be tested is handled by a separate plug-in board. Irregularities that can be signalled include lack of synchronization, V component not present, luminance bar amplitude too small, etc. (over nineteen all). The equipment can be used to test components, video systems or RF transmission lines and links.

The new Philips VITs analyzer measured 21 parameters. Two sets of VITs can be selected. It is capable of performing continuous measurements of the distortion of television lines or equipment. Each parameter, which is selectable by a rotary switch, can be read directly via a digital display. If the parameter is out of limits, a selected LED flashes indicating which parameter is off.

The VITs analyzer has a data transmission output for transmitting the measured results and alarm to a distant center for remote monitoring, logging. In conjunction with auxiliary equipment, the analyzer can be used for correction.

Last year, Marconi showed its automatic VITs Insertion Analyzer, the 2914. That product was featured again this year. Marconi's line is that there is no need to manually monitor VITs.

In a related area, Matthey showed a working model (in the Television

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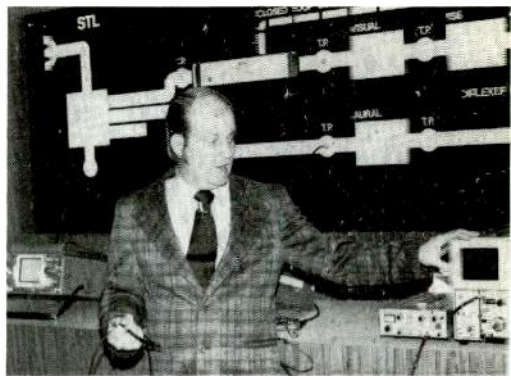
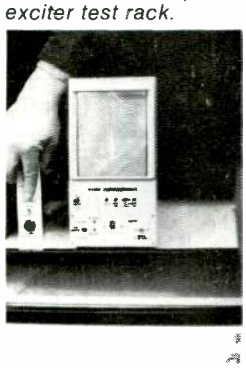


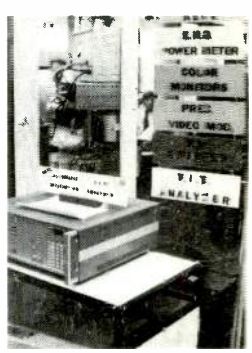
Cliff Schrock, "instructor" at Tektronix.

Pointing out the new Philips demodulator.

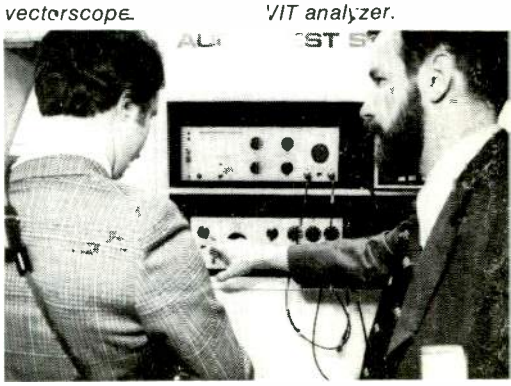
Leonard Hedlund, McMartin, shows exciter test rack.



S.S. Smith vectorscope.



Rohde & Schwarz VIT analyzer.



Potomac's new audio test system.

NAB SHOW-IN-PRINT

Equipment Associates booth) of its Automatic Video Equalizer, the 2504 N. This unit corrects ten parameters that can affect the picture (video gain, tilt, 2T gain, chroma gain, etc.) Another useful Matthey device was the TV Line Selector which triggers an oscilloscope for a given line only.

A new noise measuring idea

A new approach to television signal to noise measurement was shown by Lenco. The Lenco Model VNM-428 Video Noise Meter employs the tangetial noise measurement technique. During measurement, a variable and calibrated square wave is added to the waveform under test which results in the display appearing as two identical waveforms, one displaced vertically from the other by a distance equal to the amplitude of the square wave. When the amplitude of the square wave is large compared to noise, the two traces are separated. When the square wave is reduced leaving a single trace of uniform brightness, the square wave is equal to twice the RMS noise voltage of the signal. The amplitude of the square wave is then measured by the Noise Meter, converted to a log scale, referenced to the peak-to-peak signal and displayed on a digital meter as S/N in dB.

Lenco says its method is more practical than the Rohde and Schwarz TV Noise Meter (which is essentially precision lab equipment) and the Tektronix visual comparison technique (which requires a special line-selection oscilloscope).

Other TV testers

To generate a composite video sweep test signal which can be routed through a television plant, Datatek this year showed the D 629 videosweep generator.

A Digital Monoscope Signal Generator was a unique piece of test equipment shown by NTI America, Inc. Conventional monoscope cameras contain deflecting distortion, shading modulation and signal distortion due to induction in the signal itself. Thus one does not know if the signal itself is bad or if there is monitor deflection distortion present. The Digital Monoscope Signal Generator Model 525 eliminates this possibility of producing a pure electrical signal.

Among some of the other pieces of test equipment shown were studio test generators for "day-to-day line-up" by Richmond Hill Labs, (a multi-output device, the STG 700) and a series of calibration test generators from Leitch Video Ltd. Signals put out by the CTG 210N and 220N series exceed industry standards thereby extending the range and accuracy of measurements that can be made.

Exhibitors that stood out by showing a full line of test equipment for TV were Philips, Rohde and Schwarz and Tektronix.

AM and FM monitoring

Monitor deisgn in general reflected the coming of ATS, with monitor makers introducing new units designed especially to work with ATS or stressing the ATS compatibility of older units.

Belar showed their new Model AMM-4, AM frequency monitor, aimed at ATS service. It provides a 3½ digit LED readout showing deviation from assigned frequency over a ±1999 Hz range. The assigned frequency can be anywhere between 10 kHz and 50 MHz. Sensitivity is 100 mV, unmodulated or 2 V rms with 99% modulation. Gate time is 2 seconds, resolution, 0.5 Hz.

The unit has a series of alarm actions which supply ATS functions. A 10 Hz deviation starts a flashing LED, triggers a relay for an external alarm after three such counts. A 20 Hz deviation lights another LED, also triggers a relay after three counts. Belar also introduced an AM RF amplifier, Model RFA-4, allowing a broadcaster to pick up any station in the AM band for monitoring.

Also from Belar was the FMS-2 stereo modulation monitor. Two independent peak meters read left, right, or L+R and L−R. Two independent auto-ranging voltmeters read separation, crosstalk, pilot phase, 38 kHz, left and right audio. Pilot alarm has panel indicator; there are remote outputs for two or more meters.

Bird Electronic Corporation brought in a high-speed RF monitoring system, (also relevant to ATS) the "Wattcher" Series 3170, for remote metering of RF power, with alarms systems for low power and high VSWR, the latter caused by icing, moisture, or accidents to the transmission line or antenna. It has adjustable reaction speed as fast as 200 microseconds, includes models for power levels from 1 watt to 250 kW. Alarm conditions can activate relays to call in back-up transmitter or antenna. Four auxiliary inputs for external sensors allow detection of trespass, low water levels, site temperature, or other conditions at transmitter site.

QEI showed their line of FM and AM monitors. Time and Frequency Technology also had their very complete line of monitors, to which they added a new FM modulation monitor.

Delta, another firm with a comprehensive line of monitors, introduced their new systems for modulation and power *control* (see above under Remote Control report), which, of course, includes monitoring func-

tions. Another new idea from Delta is a series of RF ammeters designed specifically for remote control and monitoring of the antenna and RF.

Potomac Instruments was showing antenna monitors, well known from earlier shows. Potomac also showed field strength meters, including the new FIM-71, for the 45 MHz to 225 MHz range. This high-accuracy instrument, ruggedized for field use, reads to ±1 dB at any one frequency, for voltage or field strength. The tuned voltmeter has a range of 140 dB, there is selectable wide or narrow bandwidth, peak or average reading of TV or pulse modulated signals, AM or FM demodulation. There is a DC output voltage, proportional to meter reading, to drive a chart recorder.

Eric Small and Associates, as part of their debut as a company at the NAB, introduced their LM-III "Lite Alert," a system for "fail safe" remote monitoring of tower light conditions. It is designed to give Go/No-Go indication, independent of line voltage variations, for practically any tower light configuration, covering both constant lights and flashers. The maker says it will resolve the failure of one 116-watt lamp in a total load of 3000 watts. It is, of course, aimed directly at ATS. LED indicators, plus relays are activated by out of tolerance conditions.

Dielectric (Div. of Sola Basic) showed their large line of directional RF wattmeters.

Audio testing

The audio sessions at the Tektronix Measurement Theatre were highly instructive in showing the great range of tests available with signal generators plus spectrum analyzers. Tektronix' very complete line of instruments of these types was, of course, emphasized at the tutorial sessions.

Sound Technology's distortion test systems, which automate the measurement of intermodulation and harmonic distortion to accuracy at the state of the art, have made a strong impression in the last couple of years and were again popular show items. Potomac Instruments brought a brand new system aimed to make just about any standard test needed in audio design and maintenance particularly for proof of performance. The AT-51 consists of two units, an audio analyzer and audio generator. Signals and modes are available through front-panel switching for harmonic and intermodulation distortion, wow and flutter, signal-to-noise, ac volts, and phase and ratio of stereo signals. Distortion ranges are 0.1% to 100%, full scale. Both instruments have a considerable number of refinements which help to make the measurements both extremely accurate and simple in operation.

A new kind of audio measurement device, the Stereo Vectorscope, Model SV1, shown by R&S was the S.S. Smith Co of Sea Cliff, NY. It displays on a CRT screen both the phase and amplitude of stereo and quadraphonic signals. As Smith says, this is an invitation "to see what you hear." The unit functions not only to show phase and amplitude relations among stereo signals, but also is an excellent peak or VU meter. The two stereo signals are shown at right angles to each other (mixtures are, of course, at intermediate angles). Levels can be read with good accuracy directly from the screen. A few of the applications noted by the maker are: determination of monophonic compatibility of stereo program material; direct indication of multi-track mix down, greatly simplifying this operation; aids in mic placement for proper phasing and levels; aids tape head alignment, and alignment of phono cartridges on a dynamic basis; there are many others.

Fidelipac came into the test field with their new Model 65-390 wow and flutter meter. It operates with input as low as 50 mV, has an internal oscillator on 3150 Hz, the standard frequency for flutter tests. The meter ranges are 0.1% and 0.5%, full scale. Reading accuracy is given as 3% of reading. It also indicates the speed of the device being measured with a zero-center drift meter.

MICMIX emphasized their Master Audio Meter, a digital system using vertical rows of LEDs in a highly engineered design that reads peak or VU as wanted. There are two parallel rows of indicators, with 22 LEDs in each, giving a total measurement range of 95dB (55 dB above any particular reference). Operating range is DC to 30 KHz, and the resolution is 1 dB in the critical +5 to −7 dB range, five dB at lower values. One column can be switched to read rms (VU), the other to read peak values.

Telcomex, a Canadian firm new to the NAB (see their ATS system,) noted above), showed a programmable oscillator, which produces test tones in a series varying in level and frequency according to the program chosen.

Audio Designs and Manufacturing had a new Model 660 spectrum analyser system, with ⅓ octave filters, CRT readout for peak and other characteristics. It includes a mic input for use in room acoustic adjustment. **BM/E**

For more information on products on this page: Tektronix 1450, **230:** Philips 5560, **231;** VITs, **232;** NERA, **233;** R&S VITs, **234;** Lenco, **235;** NTI, **236;** Belar, **237;** Bird, **238;** TFT, **239;** Delta, **240;** Eric Small, **241;** Potomac, **242;** S.S. Smith, **243;** Fidelipac, **244;** Micmix, **245;** Telcomex, **246;** Audio Designs, **247;** Electro-Impulse, **248.**

INTERPRETING THE FCC RULES & REGULATIONS

Network Broadcasting By Radio Stations

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

DUE IN PART TO WHAT IT TERMED the "tremendously changed circumstances" of network radio since the Chain Broadcasting Rules were adopted 35 years ago, the Commission repealed or revised certain radio network rules. At the same time, the Commission adopted a "Statement Of Policy On Network Radio" which embodies many of the policies contained in the deleted rules. Additionally, the Commission brought Associated Press Radio (APR) and United Press International Audio (UPIA) within the definition of a network and required that stations file all network agreements and agreement terminations with the Commission.

The Commission's *Report, Statement Of Policy And Order*[1] has an effect upon an extremely large number of broadcast licensees because so many stations are affiliates of one or more of the conventional or occasional radio networks. Definition Of A Network

The definition of the term "network organization" is amended to read as follows:

> . . . any organization originating program material, with or without commercial messages, and furnishing the same to stations interconnected so as to permit simultaneous broadcast by all or some of them.

This definition *includes* AP Radio and UPI Audio to the extent that "*program material*" is provided for use on the air in the form that these services are received by the station (e.g., reading excerpts from a wireservice broadtape is excluded).

It is irrelevant whether network program material does or does not contain commercials. The key elements are (1) *interconnection* of broadcast stations, (2) so that program material may be presented *simultaneously* by these stations.

There are certain *exclusions* from the definition. *Commonly owned* stations that maintain simultaneous broadcast arrangements are not deemed to be network organizations. Neither are stations with simple *rebroadcast* agreements deemed to be networks.

Network Control Over Affiliated Stations; Network Ownership Of Stations

Over the years, significant changes have occurred in the broadcast industry. First, there has been an explosion in the number of AM and FM broadcast stations licensed and on the air. Second, the entire concept of network programming has changed. Before the advent of television, the overwhelming majority of radio network programming was entertainment in nature. The television networks superceded radio networks as the primary medium of entertainment. Radio networks are now predominantly news and informational in nature. Thus, program segments are considerably shorter than in the past (e.g., news shows of 5-minute duration every half hour versus 60 minute entertainment programs). Because of reduced "network dominance," the Commission has concluded that the "abuses and practices" dealt with by certain Commission Rules are "unlikely to develop to any substantial extent." Thus, the following Rules were repealed:

Rule Title	AM Rule Repealed	FM Rule Repealed
Exclusive Affiliation Of Station	73.131	73.231
Term of Affiliation	73.133	73.233
Option Time	73.134	73.234
Right To Reject Programs	73.135	73.235
Network Ownership Of Stations	73.136	73.236
Dual Network Operation	73.137	73.237
Control By Networks Of Station Rates	73.138	73.238

Overall, the Commission said that deletion of these Rules would *not* result in a sudden materialization "to a significant extent" of any of the proscriptions previously contained in the Rules. Anyway, the Commission's Statement Of Policy On Network Radio (discussed below) makes plain the continuing policy against the evils which precipitated the original adoption of these Rules. As the Commission stated, these policy principles are still of great importance in individual relationships between stations and networks.

The Rule pertaining to network ownership of stations (Sections 76.136 and 76.236) is unnecessary for two reasons. First, the general multiple ownership rules that have been adopted subsequent to the Chain Broadcast Rules achieve the same goal. Second, barring network ownership of stations in small markets that would result in restraint of competition is unnecessary because such questions can be resolved *when* and *if* a network applies to the Commission to acquire a station in this type of market.

All of these policy considerations are specifically applied to APR and UPIA despite the fact that the repealed Rules did *not* apply to them. The Commission did this, in part, because APR or UPIA, as an interconnected entity, may substantially evolve, at some time in the future, into a form that should be subject to these national policies.

Territorial Exclusivity

The Commission retains its territorial exclusivity rule.[2] Stations cannot enter into a network contract "which prevents or hinders another station serving substantially the same area from broadcasting the network's programs not taken by the former station, or which prevents or hinders another station serving a substantially different area from broadcasting any program of the network organization." Stations may retain first-call exclusivity in their primary service area in network contracts. Despite

[1]FCC 77.206, adopted March 10, 1977; released March 23, 1977
[2]Sections 73.132 & 73.332

continued on page 128

OTARI MX-5050 the original (and still the best) compact professional recorder

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Easy threading; capstan on back side.

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retention of this portion of the Rule, the Commission declared that "the public interest requires more vigorour efforts in the future, on the part of station licensees and networks, to see that network programming is available to the public to the maximum possible extent."

The territorial exclusivity rule does *not* apply to APR and UPIA (at least in their present form). Contracts with APR and UPIA typically contain no exclusivity clause. Neither does the territorial exclusivity rule apply to "occasional" networks and regional sports networks. (An example of the former is the network created to broadcast the Indianapolis 500.)

The *dual network rule*[3] (sometimes called the simultaneity rule) was adopted in 1941 because of concern generated by the operation of two networks by one national organization (NBC's Red and Blue Networks). The Commission repealed the dual network rule for much the same reason that it repealed the other rules noted above: (1) the present nature of short network radio broadcasts (e.g., 5-minute newscasts) make it possible for a network organization to operate multiple networks without enveloping a significant amount or all of the broadcast day upon broadcast facilities serving the particular market and (2) the economics of interconnection dictate that network programming be fed *non-simultaneously* to avoid the use of more than one intercity line. Further, the duopoly rules and multiple ownership rules adequately restrict concentration of control over broadcasting on the local and national levels, respectively.

The Commission's *small market policy* limited each network organization to *one* AM affiliate in the market with four or more AM stations and to *two* AM affiliates in a five-station market. The aim of the policy was to *prohibit having all or most of the stations in the particular market affiliated with a commonly owned network.* After reviewing the policy, the Commission came to the conclusion that (1) it led the Commission "perilously close to the limits of its regulatory authority" and (2) it is impossible to conclude whether or not the policy has served the public since it was enacted in 1969. These two considerations, in conjunction with the relatively recent development of audio news services by AP and UPIA, as well as the significant growth of state networks, led the Commission to repeal the small market policy. The Commission shifted, from itself, the responsibility for providing small market diversity in non-local news and information. The responsibility is now that of individual broadcasters.

Filing Of Network Agreements

During the course of its rulemaking proceeding, the Commission received many Comments from networks and licensees. The majority favored retention of the Rule[4] that requires stations to file "all network affiliated contracts, agreements or understandings between a station and a national, regional, or other network." Despite the desirability of cutting down on excess paperwork, the Commission *retained* the network agreement filing rule and extended it to include network agreements with APR and UPIA.

The filing requirement applies *only* to "network organizations" providing service (1) at least five days per week, (2) at least eight months per year.

The network agreement filing requirement does *not* apply to *occasional* networks (e.g., Indianapolis 500).

[3]Section 73.137 and Section 73.237.
[4]Section 1.613(a).

Even though a particular agreement does not come within the filing requirement, licensees should be aware that they (and the networks) must comply with all other applicable Commission Rules and the Statement Of Policy On Network Radio, discussed below.

Network agreements with APR and UPIA must be filed by September 1, 1977.

Broadcast licensees must file notices of (1) renewal, (2) amendment, or (3) termination of network agreements. Such notices must be "timely" filed.

Educational Networks And Stations

Because of a significant easing of the network rules and policies, the Commission concluded that they should, in their revised form, apply to educational networks and stations. However, non-commercial educational stations need *not* file network agreements.

Statement Of Policy In Network Radio

The policies underlying the above-discussed repealed Rules remain of great concern to the Commission. For this reason, the Commission issued a Statement outlining the policies which should be of guidance to licensees. The important points of this Policy are outlined below:

(1) Licensees must choose *independently* all broadcast programming in light of ascertained community problems, needs and interests; this is an affirmative, non-delegable duty.

(2) Excessively long affiliation contracts that hinder the licensee's ability to select programming is against the public interest.

(3) An affiliate should always remain free to reject particular network programs.

(4) An affiliate should always be free to choose programming from other sources, (e.g., other networks).

(5) Networks should not place "unreasonable restraints" on a licensee's independence through excessive use of options on station time in advance of scheduling particular programming to fill the time period.

(6) Network programming is important to stations in their communities; it should be available without "undue restrictions" (e.g., unreasonable exclusivity agreements).

(7) AM and FM territorial exclusivity rules are retained but, to further Commission policies, networks should make every effort to:

(a) Offer uncleared program units to other stations in a market;

(b) Offer program material to another station in the market where an affiliate airs network commercials, but not programming ("wild-spotting");

(c) Re-examine affiliate exclusivity claims vis-a-vis a station located a considerable distance away that requests affiliation;

(d) Review situations in which affiliates clear little network programming and hinder other stations in the market from using uncleared material.

(8) Networks should refrain from any anti-competitive conduct (exclusive arrangements, pricing policies, etc.) which increase concentration of control over non-local programming and hinder competition by other networks in the market.

(9) There is a strong public interest consideration in preserving the diversity of non-local programming services and sources in small markets.

The Commission warns licensees and networks that if patterns begin to develop which are inconsistent with the concepts detailed above, it may well be necessary to study the need to reimpose strict rules concerning network radio. **BM/E**

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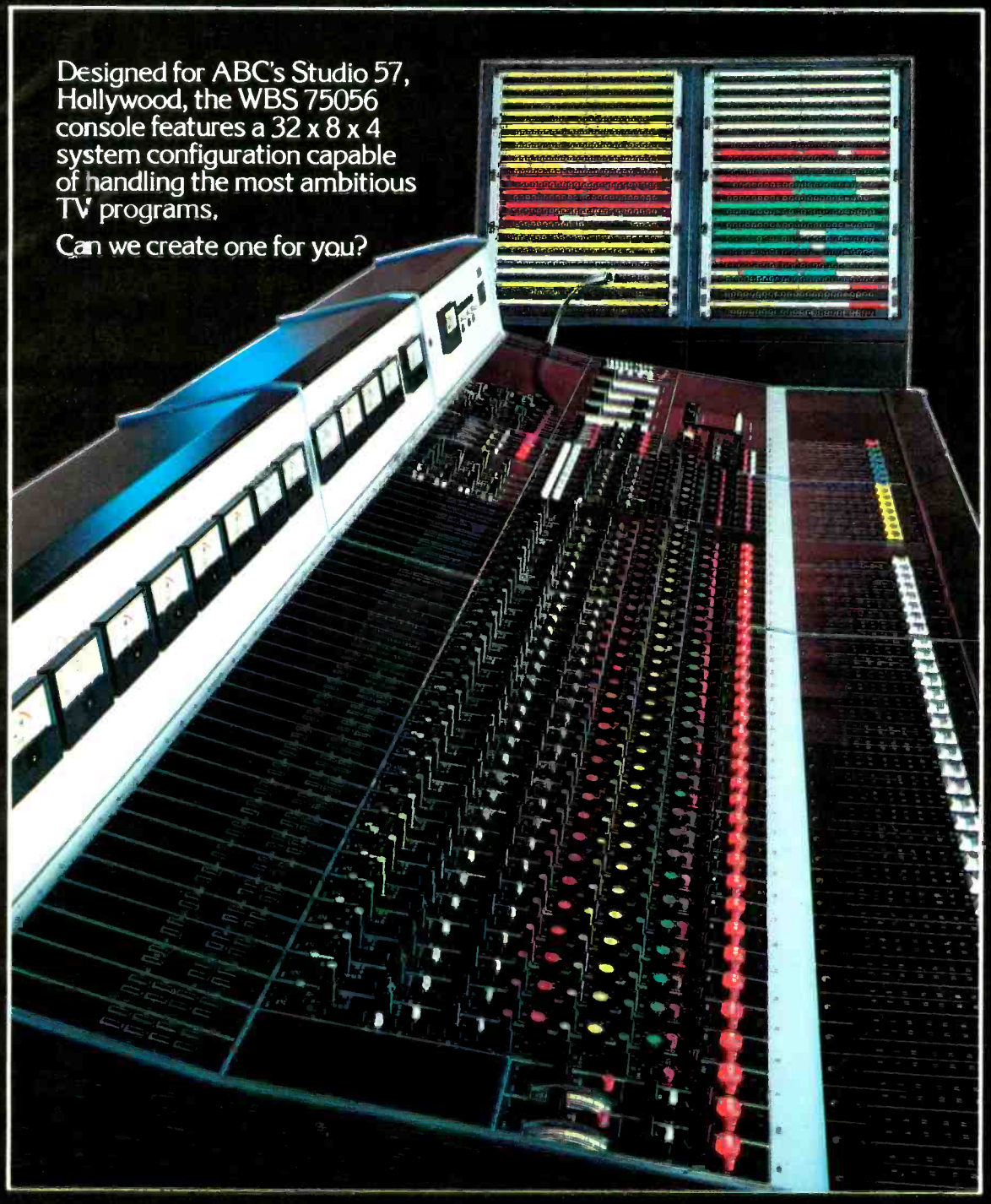

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