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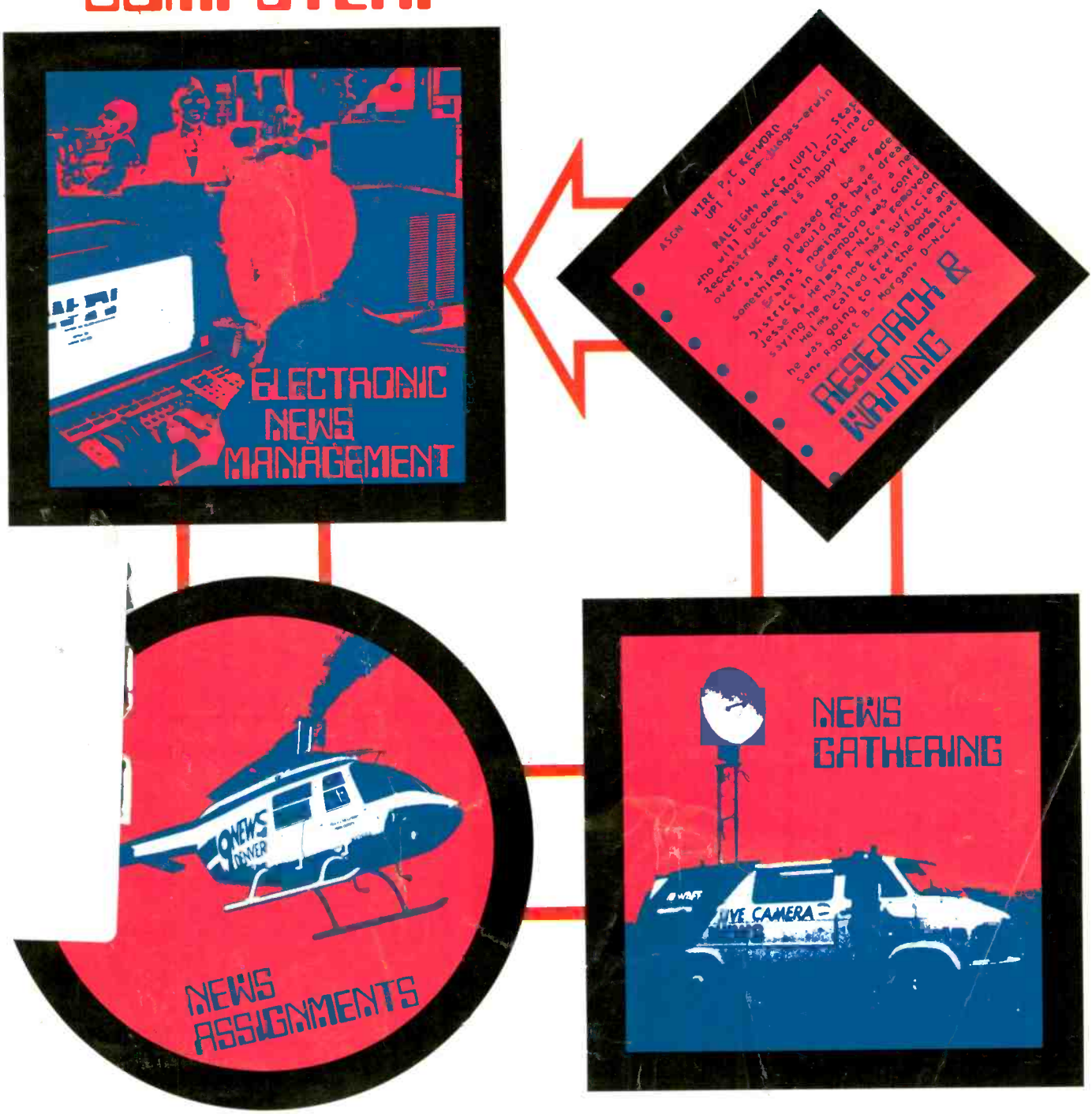

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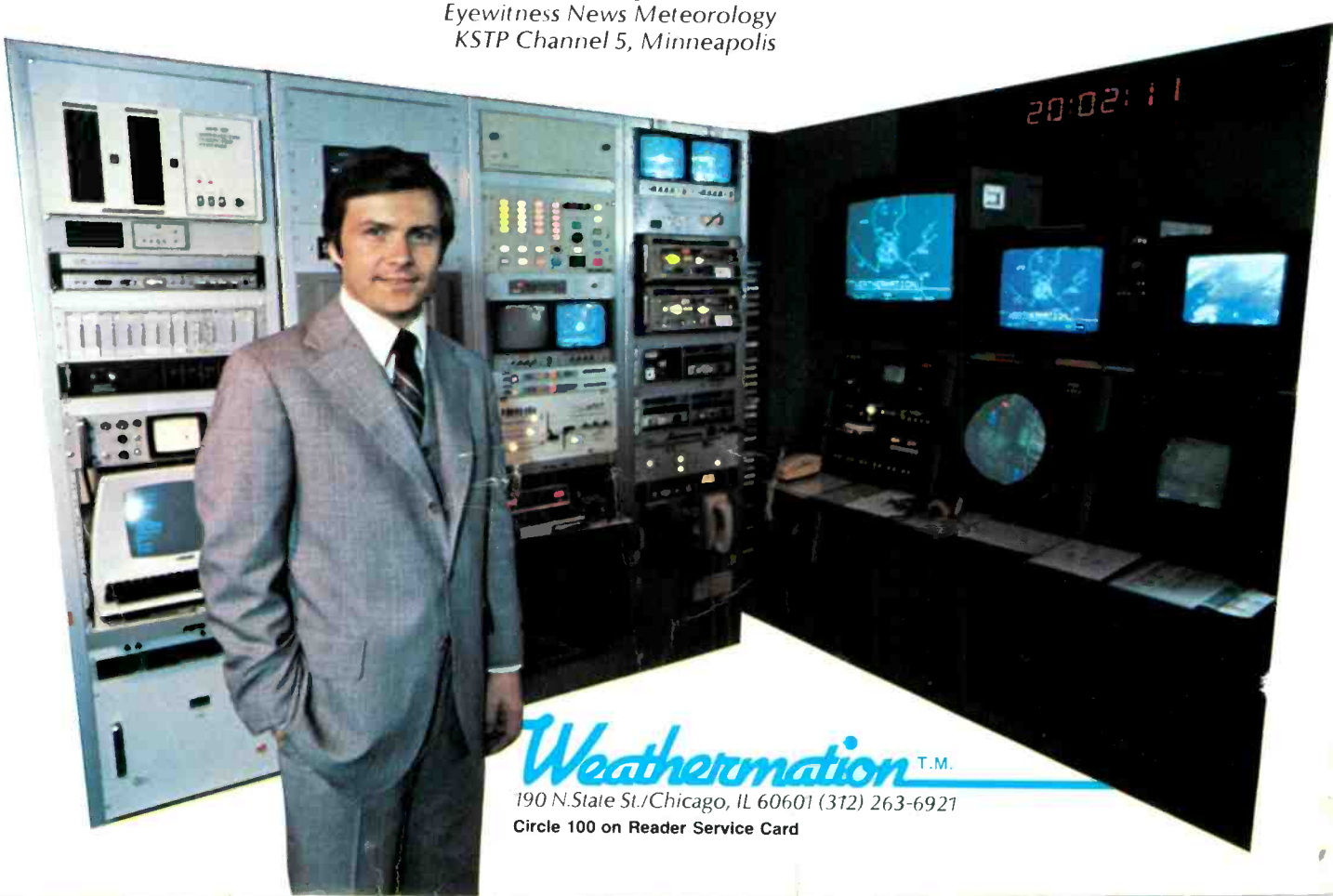

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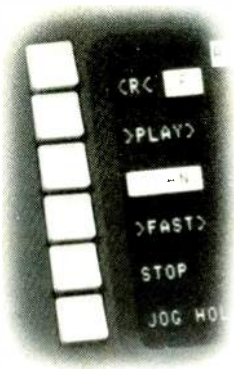

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CMX is the company that set the standard for computer-assisted editing over 11 years ago in broadcasting and teleproduction. We made video tape editing a practical art. Today we're still the standard.

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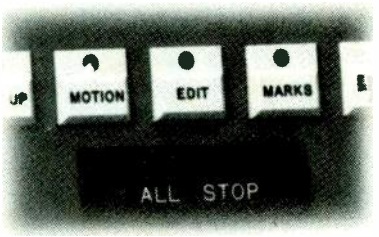
We didn't stop being smart at the function keys. We've reduced the operating mode buttons to three— MOTION, EDIT and MARKS.

The MOTION mode, you guessed it, controls the motion of the VTR's. Teamed up with our REEL MOTION CONTROLS you get a combination that's hard to beat. The motion controls are a joy to use and have the "feel" of "reels" along with a Hold function that permits viewing of tape at any speed.

The EDIT mode describes the type of edit—video, audio 1, audio 2, transition type, split, and two general purpose interfaces (GPI's) for control of external automatic switchers, character generators, digital video effects and still stores.

A super CMX exclusive lets you enter the location of splits and GPI events from audio-only or video content without the use of numbers. This mark function, the same as is used to select edit points, can be performed "on the fly" with user programmable reaction time still under CMX's Reel Motion Control.

The MARKS mode allows full access to time code numbers including set, trim, backtime, and transfer when you need them, yet another CMX exclusive.



Fastest Edits

For maximum speed THE EDGE does open-ended edits automatically when you set "in" points and press RECORD. By pressing ALL-STOP you can end the edit with a clean "out" point. The Reel Motion Controls and MARK IN/OUT buttons are then active to select the next "in" points. The speed that these features provide is a must in today's ENG world and whenever maximum throughput is required of an editing system.

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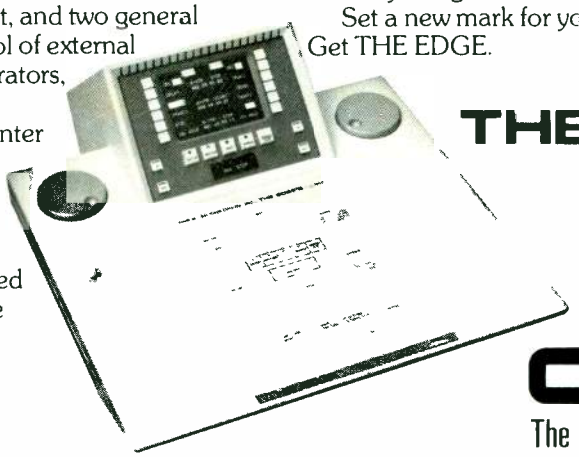

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New from Hitachi

A Colossal One-Inch Step

One-inch is the VTR format of the future. It's too important a step forward for a scaled-up 3/4" or a scaled-down 2" system. It deserves to be totally original, with every advance designed in. That's how we approached the new Hitachi HR-200, after almost 20 years of experience making quad machines. The result: a one-inch Type C VTR destined to establish new broadcast standards everywhere. In every department, the Hitachi HR-200 is miles ahead of the one-inch competition!

Fast, sure, easy operation

Hitachi one-inch VTR's are loaded with features—many of them Hitachi exclusives. Like the brake release for easier threading. Both video and audio confidence. A "B-wrap" configuration, for reduced dropout. A *precision* moveable tape guide for easy loading, with an incredible 1-micron tolerance that's accurate for up to 2 million threadings! Plus a sloped design and easier-to-see top mounted drum for still easier threading.

Dazzling performance extras

Imagine shuttling a 1-hour tape end-to-end in just 80 seconds! It's possible, only on the Hitachi HR-200, because an internal air compressor injects a column of air into the tape guides to reduce friction and increase acceleration. The same air compressor provides air for the non-contact air drum, cushioning the tape when in the standby or fast shuttle modes. For fumble-free shuttling and jogging and fast editing, a single knob controls both. There is audio spot erase capability. And a Hall-Effect head on the third channel reads the time code more accurately, regardless of tape speed.

A microprocessor makes the built-in editor the most advanced you'll find today. And, just as important: it can be re-programmed to interface with editing systems of the future. Serial or parallel logic for remote control? Both have advantages, so Hitachi gives you both. Built-in cable compensation boosts the signal so you can use cable up to 300 feet.

Uniquely simple service

Serviceable components have been human-engineered for easy access and replacement. The PC modules are front-mounted and can be removed in an instant. The six heads come as a pre-aligned drum assembly that snaps out and snaps back in minutes.

HR-100 Portable Model

The HR-200 is available as a console, or for tabletop use or 19" rack mounting. Best of all, it costs no more than ordinary 1-inch VTR's!

Smallest Type C portable ever!

The HR-100 portable model has many of the HR-200 features, yet it's the smallest Type C portable in the world. And the most serviceable too, with plug-in PC modules. Die-cast uniblock construction makes the HR-100 durable yet extremely light. And like the HR-200, it has a non-dropout tape path. Plus an extended tape path for less edge wear, an auto back space assemble editor, and 3-way power with built-in battery pack, AC adapter or external DC.

Take a big one-inch step. See the New Hitachi 1" VTR's...today.

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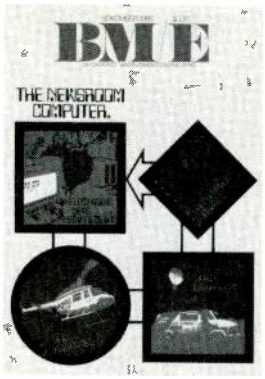

News has become, for many stations, the single most complex and expensive operation. The newsroom computer promises to give broadcasters a firm grasp on this rapidly growing area

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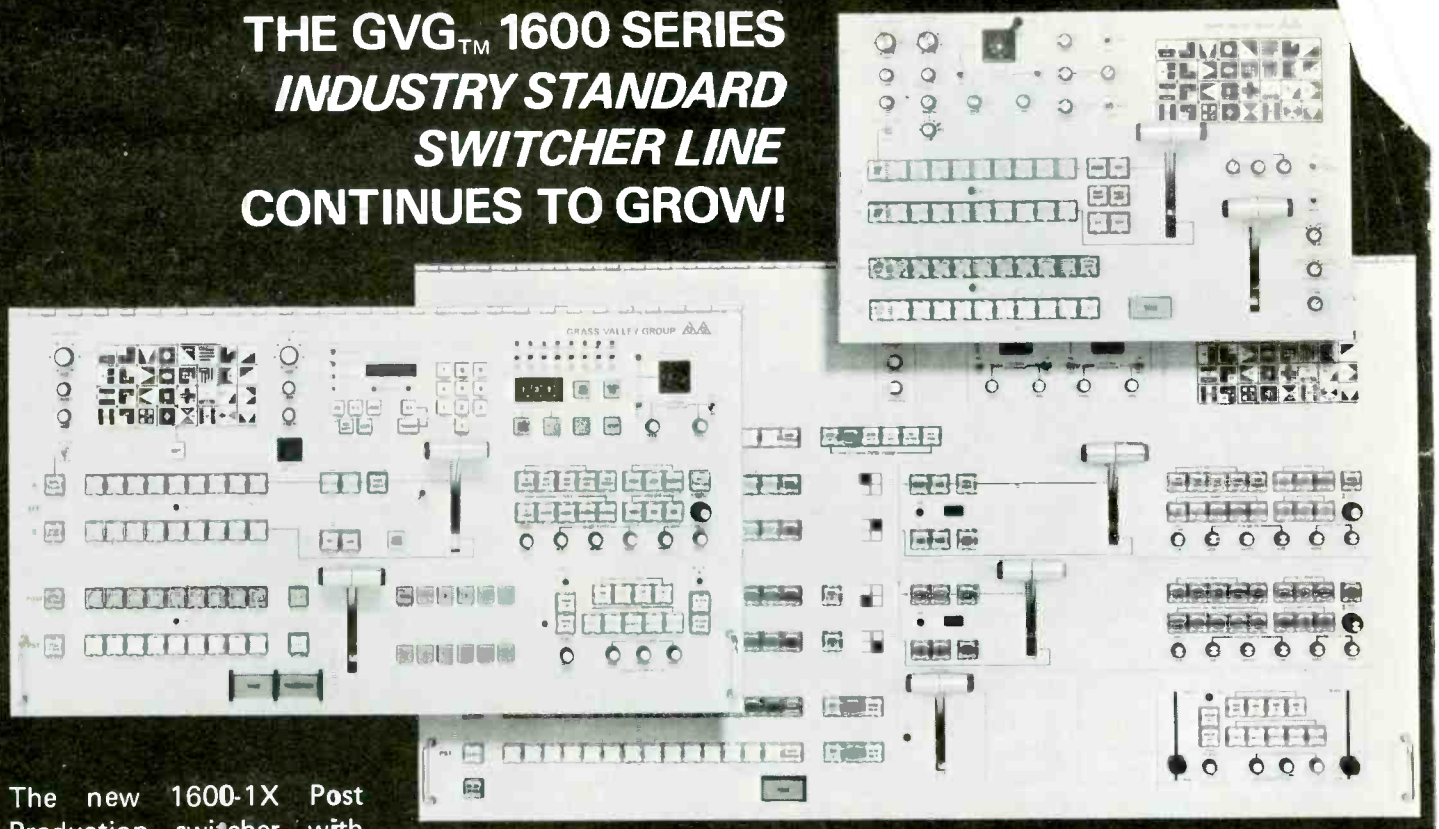
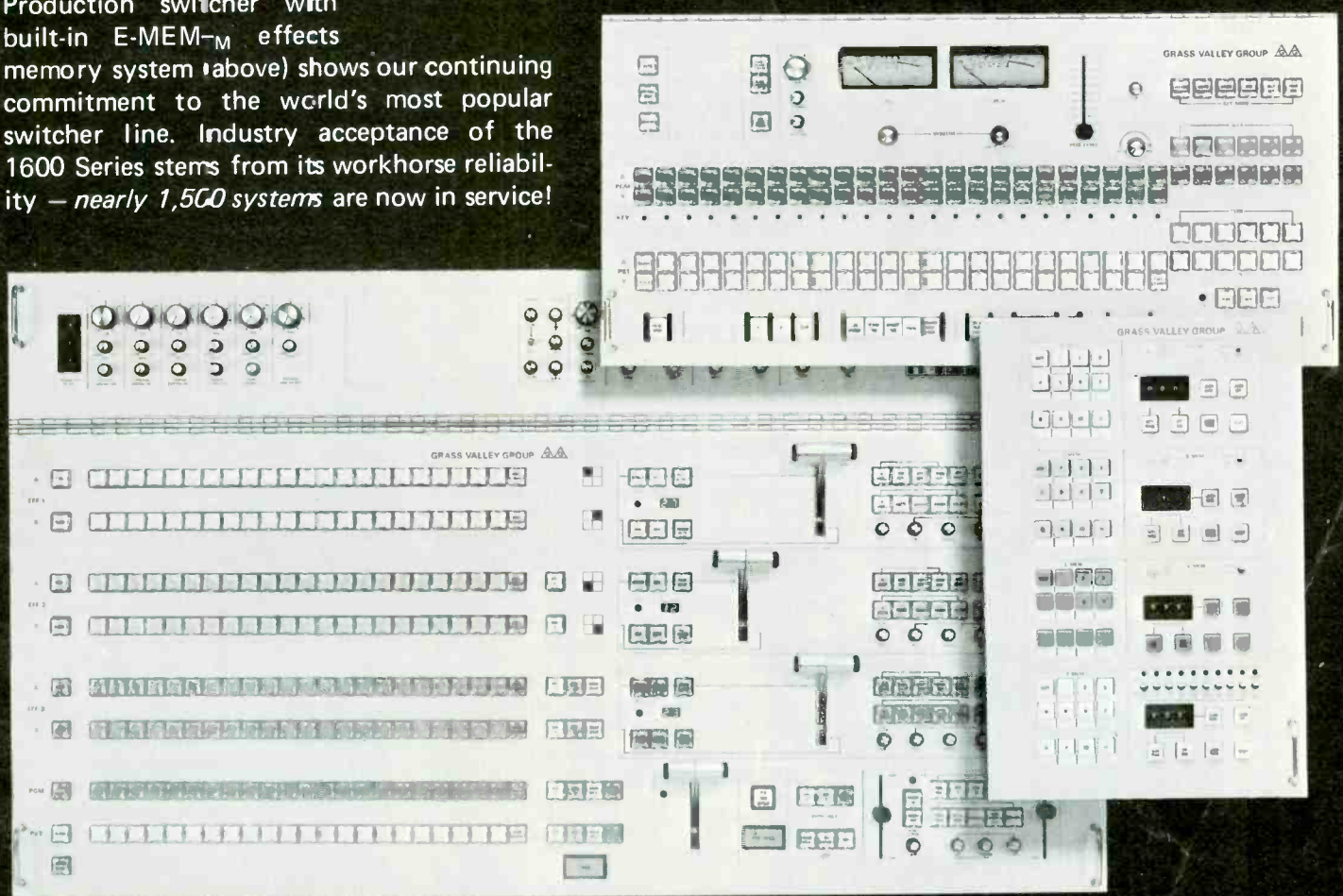


The new 1600-1X Post Production switcher with built-in E-MEM–$_M$ effects memory system (above) shows our continuing commitment to the world's most popular switcher line. Industry acceptance of the 1600 Series stems from its workhorse reliability – *nearly 1,500 systems* are now in service!



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BROADCAST INDUSTRY NEWS

UHF Task Force Seeks Rule Changes

More moves in the UHF comparability game came recently from the FCC, which began a rulemaking based on ideas from its UHF Comparability Task Force.

The four proposed rule changes, if adopted, would specify that channels 70 to 83, now allocated to land mobile service, need not be included on receivers; require that tuning and reception aids included in a set's VHF portion also be included in the UHF portion; and consolidate the channel selector rules for better performance. The final change would be a clarification of existing rules, stating that TV transmitters need not be capable of operating at 110 percent authorized power. This would save power costs for UHF operators.

Other task force recommendations were not included in the rulemaking, but were offered for comment. They included experimentation to allow TV stations to reduce aural power to less than 10 percent of visual power, for UHF power savings; an antenna measurement program; a consumer information program; development of an improved method for measuring weak signal performance of TV receivers to replace the inaccurate UHF noise figure; further evaluation of channel selection systems; and consideration of improved technical planning tools for more specific determination of coverage area.

Comments are due January 5, 1981, and replies by February 19.

DBS Study Urges Free Rein

Marketplace forces will make regulation of direct-broadcasting satellites almost unneeded by the middle of the decade, a study by the FCC staff has concluded. The staff cited the study in urging the Commission to take a "hands off" approach toward direct satellite broadcasting early in October.

DBS won't be practical until the mid-1980s, the report says, by which time other competitors — CATV, STV, home video, and the like — will be firmly ensconced in the broadcast marketplace. If anything, DBS will need to be encouraged, not restricted.

The FCC has not adopted or acted on the report yet, but has asked for comment by the broadcasting industry and the public. It indicated, also, that it would consider applications to provide DBS services on an interim basis before a definite policy is established.

Comsat is still alone in its proposal to provide DBS service via a subsidiary, Satellite Television Corp. (see *BM/E*, April, 1980). No other firm has yet spoken up with a definite DBS plan.

Ministation Proposal Generates High Interest

The FCC's notice of proposed rulemaking calling for the conversion of TV translator stations into low-power "ministations" permitted to originate an unlimited amount of programming has generated thousands of inquiries in the weeks following its announcement.

While many of the inquiries are from individuals with little broadcasting knowledge, quite a number are from groups that have seriously considered the idea. One of these is Community Television Network, a black-owned group proposing to set up a network of ministations that would link 14 cities. Financing the net is Golden West Broadcasting, which will use the stations as a vehicle for STV several hours a day.

The proposed rulemaking, which could result in thousands of new TV stations, is designed to increase TV service to areas that are now underserved, especially rural areas, and to increase minority ownership. Costs of setting up and running such stations would be significantly lower than for regular VHF or UHF stations, making ownership accessible to people for whom the price of TV broadcasting has been prohibitive. Coverage area, of course, would be much smaller.

As outlined by the FCC, the rules governing the ministations would allow operators considerable latitude. While they could originate unlimited amounts of programming, they would not be required to originate programs at all, and there would be no restrictions on program types. They would also not be required to construct studios. Unlimited multiple ownership would be permissible, and no separate authorization would be necessary for STV operation. Duopoly and one-to-a-market rules would apply, and the major national nets would be prohibited from owning low-power stations.

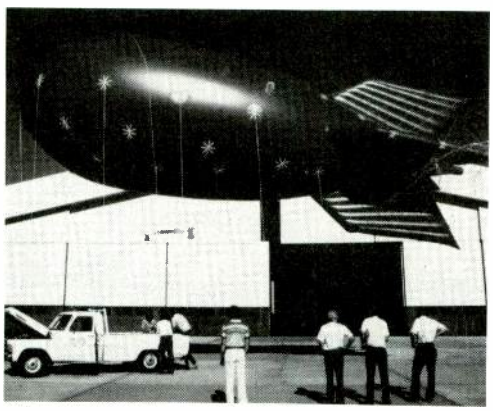
ABC Golf Coverage Full Of Hot Air

ABC's coverage of golf tournaments has really taken off with the addition of the net's latest microwave vehicle — a helium-filled blimp.

The red zeppelin, built by Raven Industries of Sioux Falls, S. Dak., has a 50-pound microwave relay module fastened to its underside. ABC engineers worked with Tayburn Microwave to design the module, which covers a three-to-five mile transmission radius when the blimp is 500 feet up.

Tethered with a high-strength cable secured to a winch system, the blimp allows more mobility to camera crews covering golf tournaments and similar stories.

Another Raven blimp aided ABC in its exclusive coverage of the Camp David summit talks, where relay towers were unfeasible.



ABC's red "balloon" is 50 feet long and 17 feet in diameter, with a special inflatable fin structure

Embarrassing questions to ask audio console salespeople

Sometimes it pays to ask questions. If the subject is audio consoles, asking difficult questions can be very revealing in comparing one console to another. Here are some of the questions that make most console salespeople squirm.

Is the console "human engineered"? Does the console have an esthetically "professional" appearance? Is the layout well defined and uncluttered? Are controls large? Do they fit the hand? Are they well labelled and lighted? Do they provide adequate visual feedback to affirm the position of the control? Is console nomenclature permanently engraved?

Easy to service? Are all components readily accessible and isolated for individual servicing? Are op-amps in plug-in sockets? Are there service loops in the wiring harness? Are extender boards provided? Are all wires uniquely numbered and referenced to your system documentation?

How responsive is the service department? Can they provide a history of fast, efficient customer service? Are they confident enough to furnish a complete list of customers for you to call?

How easy is installation? Is the console completely assembled and ready to install? Are installation points readily accessible? Are all program inputs and outputs uniquely transformer isolated?

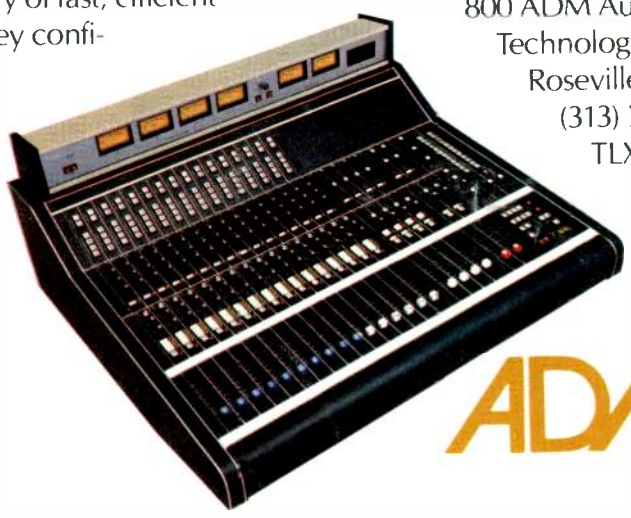
How about specifications? Are the manufacturers' published specifications consistent and easily understandable or mired in the game called "specsmanship"?

How good is reliability? Do all modules receive three levels of testing? Does the total system receive 4 levels of performance verification? Do both the modules and system receive extensive burn-in?

Is the console backed by a 5-year, all-inclusive warranty? (*Only* ADM answers "yes" to that one.)

ADM and only ADM answers all of these questions with a full, no weaseling, resounding "YES"! The only question remaining is, when would you like to talk to us about a new audio console?

For facts about our Series 3200, 2400, 1600, or 800 ADM Audio Consoles, contact ADM Technology, Inc., 16005 Sturgeon, Roseville, Michigan 48066. Phone (313) 778-8400. TLX 23-1114.



ADM 1600 Audio Console –Modest but mighty.

ADM® The Audio Company

Low-power stations would be secondary to regular VHF and UHF stations; they could be authorized on any VHF or UHF channel. The minis would be free of program log and ascertainment requirements.

FCC chairman Charles Ferris, in a separate statement, called the proposals "highly innovative," saying that they would encourage "a new breed of broadcaster, and broadcast networks, that are priced out of TV today." Commissioners Lee and Washburn issued separate concurring statements; Washburn, however, objected to the idea of unlimited multiple ownership.

RKO Spinoff Plan Meets FCC Resistance

A plan by RKO General to save its broadcast licenses by spinning them off into a new subsidiary has failed to gain FCC approval, dampening the company's hopes of hanging on to 12 radio and one TV station.

The FCC refused to approve RKO's proposal, which would have created a subsidiary called NewCo to hold the 13 licenses. The firm would also have included the RKO Radio Network, RKO's sales company, and RKO Tape. None of the directors of RKO or General Tire would be permitted to serve in NewCo; Richard W. Jencks, former president of the CBS Broadcast Group, came out of retirement to head the operation.

The Commission claimed that RKO had not provided enough information for it to find that the transfer would serve the public interest. In addition, the Commission continued, the proposal did not prevent officials of RKO or General Tire who were not board members from joining NewCo. Several other questions also stopped the commissioners from giving their approval.

They did not deny the proposal outright, however, and it is possible that RKO may persevere with the NewCo plan once it has thoroughly studied the Commission's response. The FCC action also put the license renewals of the 13 stations up for evidentiary hearings, which will not take place until judicial review is completed in the original RKO case, involving TV outlets in Boston, Los Angeles, and New York (see *BM/E*, March, 1980). RKO lost those three stations as a result of one of the harshest rulings in the FCC's history, which it is presently appealing.

Commissioner James Quello, "reluctantly concurring" in the action, decried the "gross injustice of the first RKO decision," basing his concurrence on the "guarantees that hearings will not commence until court appeals are completed." He was upset that in both that first decision and the present one, the Commission overruled the advice of the Broadcast Bureau (which had recommended approval of the spinoff).

Abbott Washburn, also concurring, still defended the spinoff idea, saying that its "rejection . . . compounds the error of the majority's earlier decision . . ." finding RKO guilty of wrongdoing. He stated that the loss of the three TV licenses was punishment enough for RKO, adding, "I cannot see how approval of the transfer could possibly encourage other broadcasters to engage in the alleged conduct on which the majority relied to deny RKO's renewals of WNAC-TV, WOR-TV, and KHJ-TV."

AF Gears Up To Sell Marconi Type C VTRs

Appointment this fall of AF Associates, Northvale, N.J., as distributor of Marconi TV studio products in the U.S. bodes to be of major importance to teleproduction houses and broadcasters as

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A Bell JetRanger III puts you on top of the competition, giving you an edge in audience share.

Get a big story on the early news instead of the late night edition and you have a tremendous competitive advantage. If the viewer watches the early telecast, you stand a good chance to hold him all evening. And that means rating points!

The best way to beat the competition is with a Bell JetRanger III. It gets you into otherwise inaccessible areas. It lets you transmit live up to 120 miles away, or tape and transmit enroute. The story can be on the air before you land.

Bell's JetRanger III is a superior ENG platform, offering low noise and vibration, so you get sharper pictures and cleaner audio. The large cabin allows shooting from either side through large sliding windows. And there's no need to clutter the space, because there's plenty of storage room in the baggage compartment, as well as in other accessible storage areas.

Bell's JetRanger III. Backed by the world's most extensive parts and service system.

Would you like to see what one can do for you?

For more information on Bell helicopters designed for the communications industry, contact Bell Helicopter Textron, Department 698, Box 482, Fort Worth, Texas 76101, or call 817/280-2117.

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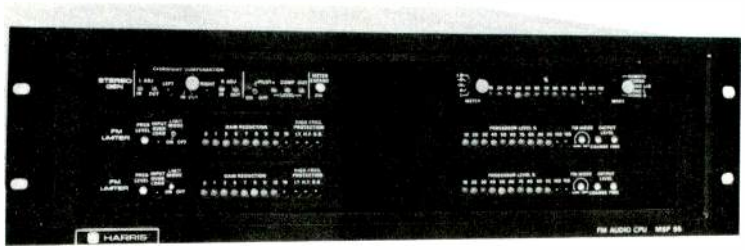
well as the two principals. For one thing, AF becomes another major source of Type C VTRs in the States, joining the ranks of Ampex, Sony, 3M (NEC), Hitachi, and RCA. It has not been well known that the Marconi recorder, the MR-2, and the MTBC-2 TBC, produced under license agreement with Ampex, are now almost entirely made in the U.K. Only the scanner mechanism and a few piece parts are supplied by Ampex. Deliveries of the Marconi-made machines will precede by several months those expected to begin shortly from RCA. AF Associates has 48 MR-2 VTRs and over 59 Marconi monitoring units ready for placement with customers. Vice president Lou Siricusano expects that over 65 units will be in the U.S. before NAB 1981.

Marconi Electronics, Inc. (USA), which signed the agreement with AF Associates, sees the pact as beneficial to both companies. AF has gained considerable expertise in the VTR market as a result of its quad rebuild program and its major systems installations (large mobile vans, studios). The firm will market, install, and maintain all gear it sells. In addition to VTRs and standards converters, the New Jersey firm, with offices in Palo Alto, Calif., also expects to sell Marconi cameras. It has recently increased its systems and VTR field sales force. Marconi Electronics retains its office in Northvale (the two companies are neighbors) and intends to be active in television transmitter sales as well as providing support to its new distributor.

NOW, A High-Performance STL-FM Audio Processor/ Stereo Generator



Harris' New MSP-95 FM Audio CPU

Designed specifically for FM stations using an STL Link, the MSP-95 FM Audio Composite Processing Unit delivers studio program fidelity to your remote FM transmitter and listeners. Engineered to match high-performance studio equipment to an STL Link, the MSP-95 increases listener satisfaction.

The Harris MSP-95 inherits the finest family traits: DSM (Digitally Synthesized Modulation) and DTR (Dynamic Transient Response) circuitry from the MS-15 exciter and MS-15R remote stereo generator. Superior field-proven operation from the MSP-90 FM stereo limiter. And there's more. Active transformerless inputs for best transient response. True peak reading LED displays of all stereo functions. Precision switches to control all important functions tailoring individual sound. A rare blend of utility and technology for management and engineering priorities.

For more information, contact Harris Corporation, Broadcast Products Division, P. O. Box 4290, Quincy, Illinois 62301. 217-222-8200.

HARRIS
COMMUNICATION AND INFORMATION PROCESSING

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Closed Captioning On The Rise

This fall has seen closed captioning of TV programs increase 40 percent over last spring, according to John E.D. Ball, president of the National Captioning Institute. NCI captions network and non-network programs to make them accessible to hearing-impaired viewers whose receivers are equipped with special decoders.

A total of 22½ hours of programming on ABC, NBC, and PBS will be captioned by the end of this year, NCI reports, including such shows as *Little House on the Prairie, Barney Miller,* and *Masterpiece Theatre*. NBC's *Shogun* miniseries, which ran away with ratings in September, was also captioned by NCI.

Advertisers are also taking notice of the hearing-impaired audience, with Procter & Gamble, Sears, Roebuck and Co., and Kraft, Inc. calling on NCI to caption their new commercials. AT&T, GTE, and IBM are a few others on the list.

In addition, NCI will caption 600 hours of programming for the U.S. Department of Education over the next three years, including one show, *Que Pasa,* to be captioned in both English and Spanish. The programs will be made available to schools; many will be broadcast by PBS.

Corrections

In The Source, BM/E's September buyers' guide, Frezzolini Electronics was inadvertently omitted from section 4 of the Instant Source Locator, "Lighting." Frezzi should be listed under "Lamps" and "Lighting heads, stands, and fixtures." These products should also appear under the Frezzolini listing in the manufacturer's section.

A printer's error listed Clear/Com Intercom Systems as making "hand-wired" intercoms. Clear/Com's intercoms are hardwired.

Also in September, the Business Briefs section erroneously reported that Avab America had moved. The firm remains at its offices at 967 Howard St., San Francisco, Calif.

Budgeting For a "Super Editor"?

Get a VANGUARD and Save Enough To Buy a Tempo 76 Too!

You don't have to spend a fortune to get the creative flexibility, speed and convenience that you want in a videotape editor.

Over 400 Tempo 76 and Vanguard editing systems are in service at post-production facilities all over the world. No one else in our price/performance bracket has more editing systems in operation.

The reason for our success? Simply this: Tempo and Vanguard offer higher performance and more features for the money than any other editing systems available.

Tempo provides A/B roll editing capability with up to 3 decks and a switcher. Vanguard provides A/B roll and A/B/C/D sync'd roll editing capabilities with up to 5 decks and a switcher, and also gives you selectable preroll, postroll and operator reaction times.

Both Tempo and Vanguard share an impressive list of features rarely found in their price ranges:

- ***Modularity*** — Your editing system can grow as you do.
- ***SMPTE or Control Track Operation*** — Edit with or without SMPTE code, or through time code dropouts.
- ***Interfaces*** — for over 40 makes and models of decks: quads, 1" types A, B & C, ¾" VCRs, audio decks, and the Rank Cintel Mk IIIB.
- ***VaraScan™*** — Variable speed tape search control allows continuously variable forward/reverse tape shuttle from high speed to freeze frame. Tempo can be equipped with one assignable VaraScan™ control; Vanguard can be equipped with dual controls. Also available on Vanguard is SmartScan™, which allows the system to memorize and perform variable speed edits, edit compression/expansion & a variety of other variable motion edit effects.
- ***Edit Lists*** — Tempo can store up to 300 edit decisions; Vanguard, up to 999. Both feature powerful, uncomplicated edit list management and the full range of edit list I/O options.
- ***Auto-Assembly*** — Tempo performs auto-assemblies from up to 2 source decks; Vanguard can draw upon up to 4 source decks.
- ***Human Engineered Operator Consoles*** — Dedicated function keyboards for fast, efficient entry of edit and split times, switcher control commands and tape deck motion control commands. Large, well organized edit parameter displays.

And to cap-off this impressive list of features, we back-up Tempo and Vanguard editing systems with a complete line of compatible SMPTE code equipment, routing switchers and editing production switchers.

Find out why creative editing doesn't have to cost a fortune. Call or write us today. Datatron, Inc./Video Systems Division, P.O. Box 11427, Santa Ana, CA 92711, Telephone (714) 544-9970.

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VIDEO SYSTEMS DIVISION
We Make Creative Editing Affordable

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News Briefs

The U.S. House of Representatives passed a bill in late September to **protect newsrooms against police searches** if the subject of the search is not accused of a crime. The Senate voted in a similar bill in August . . . . Cosmos Broadcasting, operator of four VHF network affiliates and two radio stations, will **purchase Orion Broadcasting** for $110,000,000 pending FCC approval. Cosmos will get Orion's WAVE-TV, Louisville, WFIE-TV, Evansville, Ind., and WMT-AM/FM, Cedar Rapids, Iowa; WMT-TV, Cedar Rapids, WFRV-TV, Green Bay, Wisc., WJMN-TV, Escanaba, Mich., and WAVE-AM, Louisville, will be sold to satisfy FCC requirements . . . . The FCC has granted Mauna Kea Broadcasting of Honolulu a CP for construction of a **new UHF outlet.**

With the addition of 49 stations since last April, **CBS Radio Network has grown** to 375 affiliates . . . . Robert K. King, senior VP of Capital Cities Communications and chairman of the NAB TV board of directors, says the FCC has **not adequately investigated** the technical ramifications of increasing the number of radio and TV stations . . . . NAB says it's encouraged by the Justice Dept.'s proposed **guidelines on open trials,** but believes they should be strengthened and made more specific . . . . A 20-minute cassette tape assisting broadcasters in complying with **EEO requirements** is available from NAB. Order from Judy Meehan, Publications Manager, NAB, 1771 N Street NW, Washington, D.C. 20036.

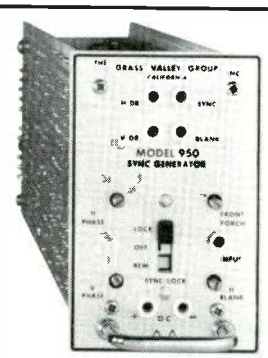
A **new weather satellite,** GOES-D, was launched at Cape Canaveral early in September. It was built for NOAA by Hughes Aircraft . . . . Pioneer's **laser videodisc system** is now available in 15 cities across the country . . . . The NCTA is developing suggested **teletext and videotex standards** for submission to the FCC.

The Commission has denied a petition from the National Citizens Committee for Broadcasting seeking a **180-day time limit** for action on rulemaking petitions . . . . Phase 2 of the FCC's **fee refund program** has begun; for information call (800) 424-2901 . . . . Copies of the FCC's **political broadcasting primer** are available from the Office of Public Affairs, Consumer Assistance and Information Div., Room 258-A, 1919 M Street NW, Washington, D.C. 20554.

Business Briefs

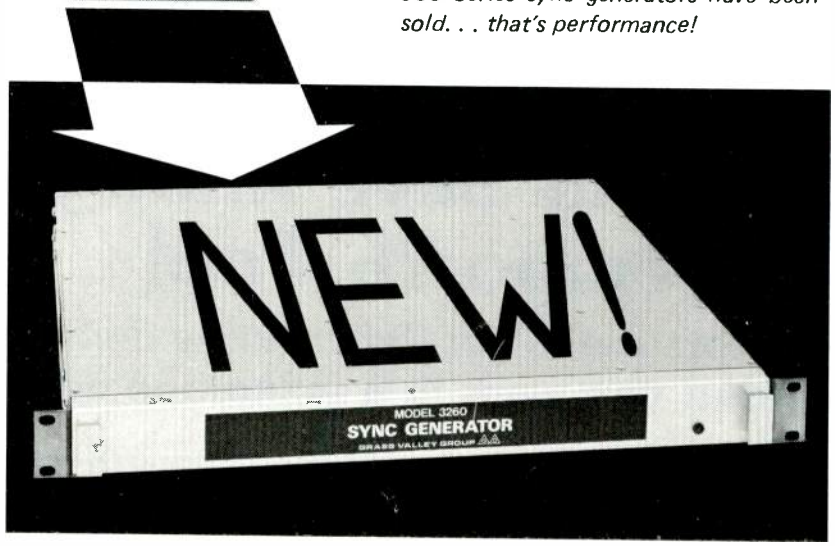
California Microwave has acquired **Satellite Transmission Systems** of Hauppauge, N.Y., an earth station equipment manufacturer . . . . **Broadcast Electronics** has relocated the manufacture of the entire line of **QRK** broadcast studio equipment from Fresno, Calif. to its expanded plant in Quincy, Ill.

The **NTV Network,** headquartered in Kearney, Neb., is installing **RCA** TTG-30 transmitters at its four Nebraska stations. The transaction is valued at over $1 million. Also buying RCA transmitters is **Summit Communications** of Winston-Salem, N.C., which has ordered two BTA-5SS 5 kW AM transmitters . . . . **RCA Cablevision Systems** has won a $21 million contract from **UA-Columbia Cablevision** of San Antonio to supply equipment and installation for a major CATV system . . . . **Ampex** has delivered five BCC-10 color cameras and 10 control units to KPRC-TV, Houston. Four more BCC-10s are on the way . . . . **Digital Magnetics** of Los Angeles has outfitted itself with a full complement of **Sony** digital audio equipment, including two complete PCM systems, a BVE-500 editor, and a pair of APM-8 speakers.



Model 3260 NTSC Sync Pulse Generator...

More than 7,000 dependable GVG™ 950 Series sync generators have been sold. . . that's performance!



Now the all-new 3260 *replaces* the 950 Series with a more advanced, stable system. A new system with GVG 'proven by performance' reliability *plus*!

Features such as composite video genlock, SC/H phase free run mode, and output pulse drivers with color black outputs put the 3260 Sync Generator at the top of the list for today's system requirements.

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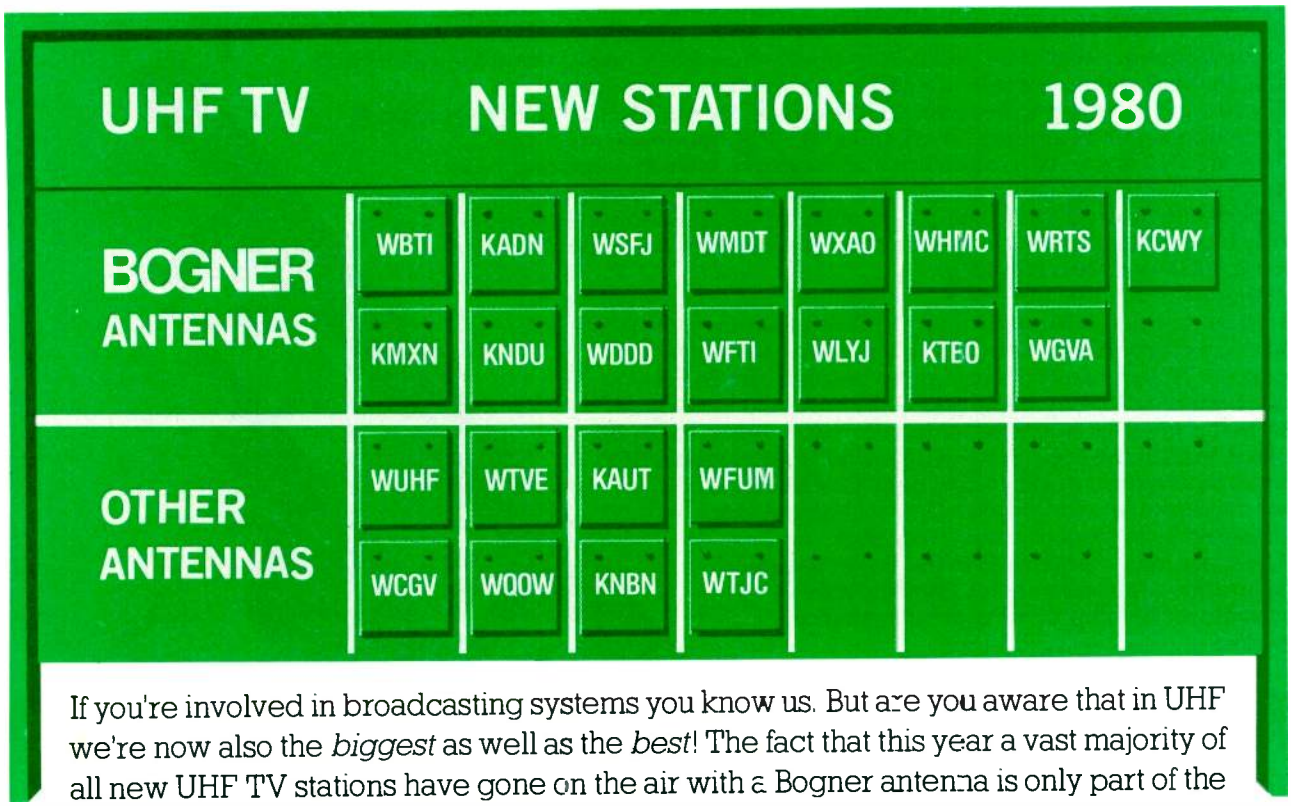
Do you know the score?



If you're involved in broadcasting systems you know us. But are you aware that in UHF we're now also the *biggest* as well as the *best*! The fact that this year a vast majority of all new UHF TV stations have gone on the air with a Bogner antenna is only part of the story. Since 1964 we have put into broadcast use more than 600 slot arrays, with over thirty 55kw to 200kw slot antennas during the past three years alone. Antennas that are all still meeting their promise—trouble-free, dependable operation with solid coverage.

Put together all the qualities you want in your antenna: exceptional performance, proven durability, economy and on-time delivery, and you'll know the score about Bogner. We have competitors but no equal.

Prove it to yourself. Talk to the stations listed above (or call Len King for the names of all TV stations using Bogner manufactured antennas). Find out first hand why Bogner is the champion of UHF antennas. Bogner Broadcast Equipment Corp., 401 Railroad Avenue, Westbury, New York 11590, (516) 997-7800.

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CHAMPIONSHIP BROADCAST ANTENNAS

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Beyer. We make the best broadcast mics, too.

In recording studios, concert halls and theatres worldwide, Beyer is the premier name in microphones. Loved by performers and respected by engineers.

Now that same Beyer quality is available in a full line of innovative broadcast microphones, to meet every need and solve every problem.

The Beyer MCE 5 is the world's smallest electret condenser and provides true broadcast-quality audio from a 7 x 23 mm. cylinder weighing just 6.5 grams. It has wide frequency response, but is immune to most body noises. And you can hide it almost anywhere and connect it to a cable or a wireless transmitter.

If you can't get the mic near the sound source, try our Beyer MC 717 shotgun. It has a directional gain of at least 20 dB and a 40-20K frequency response.

The MC 717 is part of a modular condenser mic system consisting of six different transducer capsules plus amplifiers and phantom power supplies that can be perfectly tailored for a wide range of broadcast situations. They're all ruggedly built to handle ENG as well as studio work and can accept temperatures up to 160° and 99% humidity.

Other mics include: the M 55 – an omni-directional dynamic mic that is especially suited for reporters and field interviews; the M 69 – a uni-directional hypercardioid dynamic mic that is perfect for announcers on TV and a studio mic in radio stations; the M 88 – a uni-directional cardioid dynamic mic with warm and full bass response that is ideal for booth or radio announce. This is easily one of the best mics in the business – with a special suspension that eliminates transmitted noise if hand held. Our M 201 is another microphone with excellent vocal characteristics that is favored by singers and reporters alike.

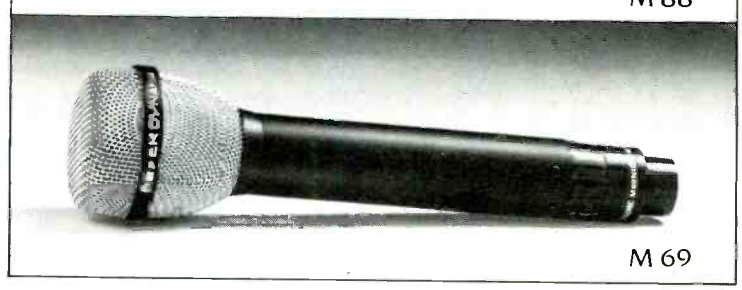
There are many more mics in the Beyer line, plus stands, booms, headsets and accessories. Visit your local Beyer distributor for more information and specs.

MC 717

M 55

M 201

M 88


M 69

Beyer Dynamic

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RADIO

PROGRAMMING & PRODUCTION FOR PROFIT

The Computer Opens A New Level Of Audience Research

COMPUTERS ARE DOING a startling variety of things in radio stations, beyond the program automation and business automation that have been common for a long time. It is apparent that understanding and creativity on the part of the user can keep opening new roles for computers, with no limit in sight.

The establishment of audience measurement as a far more detailed, specific, and useful management tool than it has generally been in the past is another computer-mediated advance. This advance of computer power has come from a fairly new firm, the Radio Information Center, and in particular from its founder and head, Maurie Webster.

Leaving the management group at CBS in 1973, Webster first went to Compunet, which specialized in automation systems. In 1976 he set up his own business, the Webster Group, to act as management consultants to radio broadcasters, with emphasis on sales tools that are effective in competition with newspapers.

Webster's work with radio managements convinced him that programmers can act much more effectively if they know the many facts about the audience that are ordinarily buried in the ratings-book figures. A few programmers and station managers were taking the trouble to dig some of these facts out of the Arbitron reports. But the effort was usually time-consuming and expensive, with results tending to arrive too late to be useful.

What if a station management could have, in a few days or a week, a tabulation of facts about its and its rivals' audiences, showing strengths and weaknesses of every period in the day's programming for each part of the market demographics? Knowing where you are low is the first step on the road to improvement.

In mid-1979, Webster set up the Radio Information Center to produce a large series of audience measurement figures of this kind and others. RIC contracted for computer time on a large machine (IBM 370), and Webster worked with computer experts to develop the necessary programs.

The subscriber report he developed includes a standard list of 30 individual reports (see table) presented under the general title of "The Analyst." Six of the tables show trends, as can be seen: the changes as compared with the year and the six-month point before, including market listening, market AM vs. FM listening, stations by daypart, ranks of increase or decrease, one-station quarter-hour shifts, and one-station cume shifts.

An example of one actual trend report — "Changes, Stations by Daypart" — with pseudonymous call letters, shows the kind of detail Webster provides. One section covers average quarter-hour figures for men 18–34 for six stations (including, of course, the subscriber), in the April/May 1979 ratings, the October/November 1979 ratings, and the April/May 1980 ratings.

First is shown Monday to Sunday, 6:00 a.m. to 12:00 midnight, then the figures for each daypart, Monday through Friday, then Saturday and Sunday. For this one central demographic group, the station programmer can see just when he improved, or weakened, in comparison with his main competitors. Station "WBBB," for example, was generally on top throughout the day, but was weak in morning drive time. Station "WFFF" was weaker throughout, but did maintain its general level in morning drive. Moreover, WFFF rose several points in each daypart over the year covered.

This kind of information comes in clear tabulations for all the demographic groups, for all dayparts, for the subscriber and at least two competitors (more can be ordered). The program management can pinpoint every problem area and determine which program segments are doing well with which listeners much more exactly than has been possible with the "raw" ratings figures. This guides programming decisions effectively toward audience building.

It also allows "cross-promotion," with the station using its strong programming sectors to enhance interest in the whole station performance.

The "gains/losses" information is presented in another very useful way: a tabulation of "ranks of increase or decrease" over the year covered, for full week performance, in each demographic target group, shown for both average quarter-hour and cume figures. Is anybody moving up on you as competition for your main target group? Where are the main threats? Are you slipping in any specific area?

As noted above, the "trends" tables cover a number of other important facts on movement through a year's period, including the significant trend of overall radio listening in the market, and the trend of AM vs. FM listening. These facts are vitally significant in evaluating a station's performance.

Other sections of the table supply new statistical understanding not previously available to radio managements, such as "Home vs. Outside Station Listening" and "Market Listening To Various Formats." The underlying facts may have been apparent in a generalized way, but not in the specific terms supplied by these reports. Other sections also have information clearly of great value in program planning, such as the turnover report: are we holding on to our listeners? How well is the competition holding its listeners? Station age profiles show which stations are reaching which parts of the audience. It sometimes happens that a sta-

Table Of Reports

TRENDS

CHANGES / MARKET LISTENING
CHANGES / MARKET AM VS FM LISTENING
CHANGES / STATIONS BY DAYPART
CHANGES / RANKS OF INCREASE OR DECREASE
CHANGES / ONE STATION AQH SHIFTS
CHANGES / ONE STATION CUME SHIFTS

MARKET

MARKET POPULATION PROFILE
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ONE STATION

ONE STATION: DEMOGRAPHIC SHARES
ONE STATION: TARGET AUDIENCE RANKS BY DAYPARTS
ONE STATION: BEST TARGET GROUP AUDIENCES
ONE STATION: AUDIENCE SHARE, SIZE, LISTENING TIME
ONE STATION: DEMOGRAPHIC CUME REACH BY DAYPARTS

ALL STATIONS

STATIONS' AGE PROFILES
STATIONS' HOURLY AUDIENCE SHARES (M-F, SAT, SUN)
STATIONS' CUME REACH BY DAYPARTS
STATIONS' TURNOVER REPORT
STATIONS' DAILY LISTENING TIME
STATIONS' WEEKLY SCHEDULE REACH
STATIONS' TSA AUDIENCE INCREASES
STATIONS' EXCLUSIVE CUME SHARES

GENERAL

AUDIENCE RANKING REPORTS
CPM RATE COMPARISON WORKSHEET

"Our Auditronics on-air and production consoles pay off three ways",

says Chuck Cooper, General Manager of WKOR in Starkville, Mississippi. "When it came time to rebuild this station, we wanted to go first-class all the way to the tower. Of course, that meant starting with first-class consoles for both on-air and production. But when you own a 1 kW station in a small market, you've got a modest budget to work within, and you can't afford to make a mistake."

"So we took our CE, PD and Op. Mgr. to NAB to look at everybody's hardware with an open mind to make sure we got the best value for our money. We believe we got it in our two Auditronics 110 consoles. First, our on-the-air people love the Auditronics boards, and being able to show this type of equipment helps us to attract the level of talent we want."

"Second, in a small market like ours, the stations do most of the commercial production, and the quality we get out of this Auditronics production board has helped us capture 80% of the production work in The Golden Triangle. Third, the Auditronics boards give us an audibly superior on-air quality that sells very well to our advertisers, and that's the real bottom line."

If you'd like to know more of what WKOR's Chuck Cooper and 500 other satisfied users in both small and large markets have learned about Auditronics console quality and pay-back, circle reader service number or call us for complete information and the name of your nearest demonstrating Auditronics dealer.

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tion with what seemed to be a noncompetitive format is actually the main competitor: the station age profiles can bring this out.

TSA audience increases are interesting because an additional factor is involved: the station's signal strength outside the metro area. If a station is doing poorly outside the metro, signal levels in the relevant areas should be measured. Probably every management has a general idea of the station's performance outside the metro, but specific figures can guide actions that may be needed.

Programmers can study the list of reports shown in the table for other tabulations that will help them. Subscribers to Arbitron may want to try their own extraction of some of the data, if one or two tabulations seem especially important. But Maurie Webster's computer will, of course, do the job many times as fast, with very high accuracy. Anyone who is interested can reach him at the Radio Information Center, 575 Lexington Avenue, New York, N.Y. 10022, telephone (212) 371-4828. **BM/E**

BM/E's Program Marketplace

Syndicators — Where They Are Now

Bonneville Broadcast Consultants
274 County Road
Tenafly, N.J. 07670
Tel.: (201) 567-8800

THE FIRST ARTICLE in *BM/E's* program coverage, in the January, 1977 issue, was a profile of Bonneville Broadcast Consultants. This syndicator, along with Schulke Stereo Productions, had an originating role in the creation of the Beautiful Music format as a main factor in radio programming. Bonneville started 10 years ago (the anniversary falls just about as this sees print), and the operation has been a success from the first year.

The initial drive, as described in the January 1977 article, was to put out Beautiful Music of top technical quality, arranged in effective sequences for the "matched flow" quality that became the great contribution of the early Beautiful Music. "Matched flow," considered in more general terms as applying to the sequenced effects of any kind of music, is universally recognized now as an essential element of most popular music programming. The listener is carried forward strongly from one number to the next, not by a complete sameness (that would certainly become a tuneout), but by a well-planned rise and fall of mood and pace to sustain interest, without abrupt shifts, also prime causes of tuneout.

Bonneville is still producing Beautiful Music with these characteristics, and new subscribers are winning radio market battles with the format. In an interview at the NRBA convention in Los Angeles, Bonneville president Marlin Taylor, one of the founders and key figures in the Beautiful Music program development, told *BM/E* about a few of the latest successes. Those noted here represent, of course, a very small sampling of the Bonneville Beautiful Music stations that are maintaining top positions in many markets. KJYE in Honolulu joined in March, 1980 and tripled its audience in the next few months. WEAZ (formerly WDVR) in Philadelphia, where Marlin Taylor programmed Beautiful Music as a program director 18 years ago, recently decided that doing their own programming was too burdensome and turned to Bonneville. No ratings have been determined in the meantime, but audience response has indicated a strong upsurge. WFOG in Norfolk, Va., was experiencing difficulties and called in the Bonneville team for consultation. The management is now satisfied that the station is on the way to a very healthy operation.

The last example points to a new strong part of the Bonneville operation. One of the changes is an opening of new format directions, administered in a new way. Alongside the Beautiful Music operation, Bonneville is now developing programs in Adult Contemporary, MOR, Rock, and Country music. These formats are developed by a scheme that Bonneville calls the "totally tailored format." A comprehensive consultation by the Bonneville staff with the station management determines the exact form the station's programming should take, with the competition, the market demographics, the station's staff and facilities all considered. The determination will cover in detail what kind of music the station needs, in what precise sequence, for each part of the day.

Bonneville then takes this detailed

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An audio must. Broadcast quality on a standard dial telephone line. For networking, "first & last mile" satellite delivery, news, sports, weather, farm, stock market, religious or special interest programs.

Cue Systems

The ideal way to direct ENG field personnel. A 1 watt IFB system that allows ENG crew to hear both program and instructions in one pocket receiver. ALSO - TV Aural Monitors. Rugged pocket receivers fix-tuned to your TV channel for live off-air cuing. 50-550 MHz.

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A new line of ENG gear.

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plan to its computer, which holds in its memory several thousand music titles, each one coded for 14 different characteristics. The characteristics of the music needed during each part of the day are punched into the computer, and in a short time the computer produces a complete playlist for the station.

This playlist is available in hard copy for sending to the station. If the station has its own computer, the Bonneville computer can be set to transmit the information directly in computer language to the station's computer. The latter then makes the readout.

Obviously, this greatly speeds the delivery of the information to the subscribing station. It is just one of the many ways that computers are serving broadcasters, the main theme of this issue, which is illustrated in several of the feature articles.

This computerized playlist creation and delivery speed are not just extras. Bonneville and the subscribing station watch the market from day to day, and also watch developments in popular music. The details of the playlist are altered weekly, or even daily, if changes seem desirable. Taylor pointed out that a revised playlist can be developed and can reach a station with its own computer, all in an hour or less.

The totally tailored format is already doing well for several stations and for Bonneville. It is a major part of the company's large increase in consultative operations for radio stations covering every aspect of operation — sales, promotion, technical performance, as well as programming. The Bonneville staff has recently grown to 22 persons, and a team can be assembled for station consultations with experts of various kinds. The staff now includes well-seasoned programmers for each of the popular music formats, and their skills go into the development of the computer material and classificatory titles on which the system depends.

Another enlargement of scope for Bonneville now getting underway is the production of specials — long, one-time programs on a variety of themes. Bonneville has made some specials for a number of years. Taylor told *BM/E* that this activity is due for a large increase.

Two examples are brand-new and were, in fact, announced at the NRBA convention: a four-hour program called "An American Country Christmas," and another four-hour program called "An American Country New Year." Both include interviews with the stars, looks at the great in Country music, as well as a lot of the music. The New Year program has a look ahead for Country music in 1981, based on the predictions of a number of experts. The list of guests reads like a list of Country greats. The programs have been put together by Dick Broderick and Brad McCuen, both extremely well-known as expert programmers in the field.

Taylor made the point that the "totally tailored format," with its capacity for nearly instant response to the market and to popular music developments, has become a necessity as radio gets more competitive. A station has to be fine-tuned to stay on top in many markets. The same intensifying of competition motivates Bonneville's continuing fanaticism on technical quality. This was at a high level in the very beginning, and was a main factor in getting Beautiful Music to the point of large technical influence in radio programming.

But Taylor says he is convinced that neither the syndicator nor the station can rest today on "good" audio. There must be a continuing drive to get the audio up to the top with state-of-the-art equipment, increasingly a necessity for radio survival. **BM/E**

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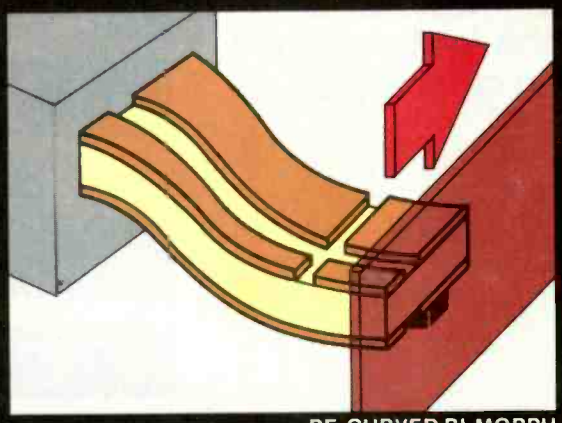

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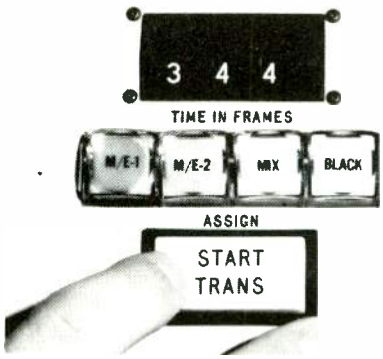

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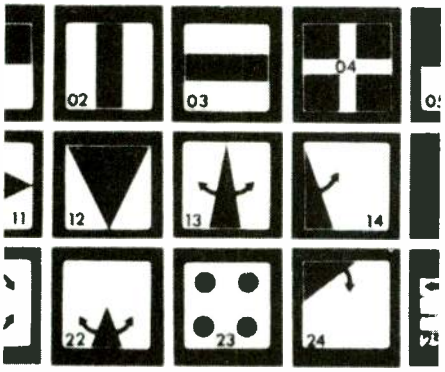

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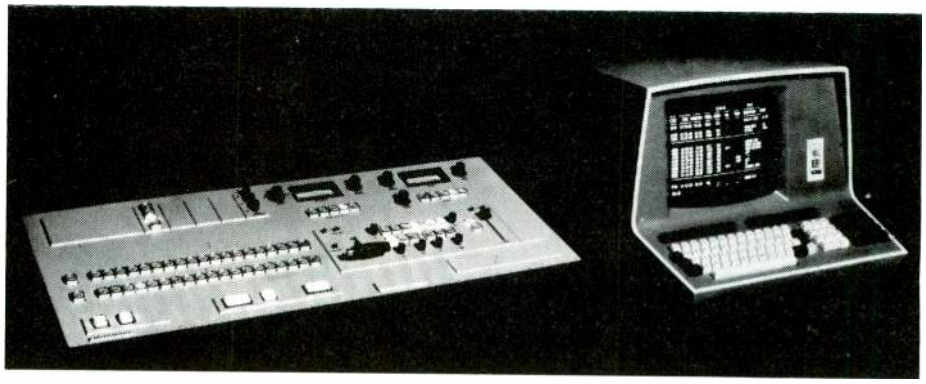

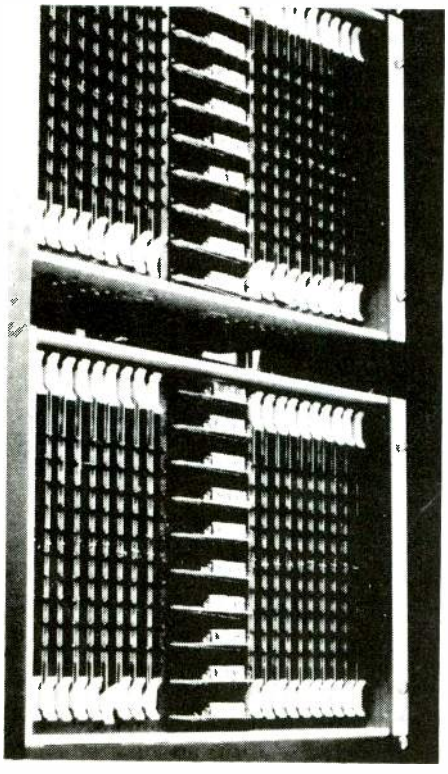

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NIWS Fills The Information Gap

GIVEN THE SEEMINGLY unlimited appetite for news that the viewing public has shown, local stations have been in a quandary as to how to fill that pit with quality news programming. Even stations in the largest markets have budgetary limits that make it difficult to consistently come up with quality material outside the realm of breaking news. With many markets doing from two to three hours of daily news programming, the problem is how to fill that time with interesting quality material?

News and Information Weekly Service (NIWS) is a new syndication service that believes it has an answer for that local news appetite. NIWS combines elements of current offerings from both the network affiliate feeds and the news feature services.

While NIWS will be a producer, it will also be a major purchaser of outside material. This could be of prime interest to those stations that produce quality news pieces and multipart series but have little or no market for that work. Many stations have been reluctant to send pieces to the network syndication services because of the pay scale. NIWS officials won't quote exact figures, but it is known that they plan to pay a higher amount for accepted material than the networks.

"We're looking for quality material with a hard news peg or strong informational value," says Don Ross, VP and news director.

NIWS will offer to its member stations a weekly package of 15 to 20 stories. These will include pieces by its stable of regular contributors. Carl T. Rowan will furnish one-on-one interviews with Washington newsmakers and analyses. Dr. Art Ulene, currently featured on the *Today* show, will provide health features. Doug Llewelyn will cover the entertainment beat from Hollywood. Dr. Art Mollen will have reports on keeping fit. Robert Rosefsky will specialize on financial advice.

The service will also provide sports features aimed at the non-sports fan and a historical piece based on film from the old Pathé Newsreel. In addition to the pieces that NIWS will produce itself, a group of what are called "core stations" will provide news stories and multipart series. Some of the stations involved are WDVM, Washington, WFAA, Dallas, WHAS, Louisville, KTVI, St. Louis, WTMJ, Milwaukee, KTLA, Los Angeles, KCRA, Sacramento, and to make the syndication service international, CITY, Toronto. NIWS will be limited to one station per market, but will accept material from any station that it feels produces superior reports.

When NIWS goes on line, it will have a four-week backlog of material. Stations will then have a month in which to air the material. That should give members both a wide range of material and time to use it. Four weeks of NIWS material will comprise about 60 to 80 pieces. That should go a long way toward slaking hungry news appetites.

Ross hopes there will be a flood of good material so that the number of pieces on the weekly reel could go as high as 25 to 30.

David Salzman is the force behind NIWS, which is a joint venture between his company, United Software Associates, and Telepictures Corporation.

NIWS has also taken on the services of news consultants McHugh-Hoffman, who will provide research backup on viewer preferences.

While the pieces supplied by NIWS will be complete in and of themselves, it is being stressed that most of the material could act as a springboard for localized versions. For example, if there is a multipart series on the preparedness of the National Guard, the member station could check out the local Guard unit to see how it stacks up against units elsewhere.

Several news executives polled feel NIWS will be a valuable addition to the breadth of their news coverage if it lives up to its claims. "We need to bring in as much material as possible on events which our audience needs to know about," says W. Vincent Burke, VP, news at WHAS, "and we're interested in anything that can help us do a better job."

Mike Buchanan, executive producer at WDVM, holds similar hopes for NIWS but also takes a more pragmatic view: "Thanksgiving and Christmas week it is going to be a Godsend," to have good news pieces sitting on otherwise bare shelves. **BM/E**

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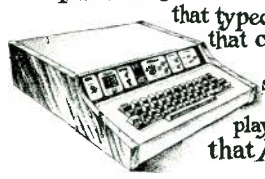

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GETTING THE BUGS OUT: THE LATEST ON NEWSROOM COMPUTERS

Fitting computers to the special needs of broadcast newsrooms has not been without snags. But trial by fire in working newsrooms has ironed out the kinks that beset the pioneers of this new technology.

THE MANAGEMENT AT KCBS all-news radio in San Francisco has one big advantage over other broadcasters who are interested in computerizing their newsrooms — they've already done it. The first experience, though, was a compromise system using a computer not designed for broadcasting. In 1977, CBS and UPI began an experiment to see if computerization would work as well for broadcasters as it had for newspapers and wire services.

It did. But not without problems.

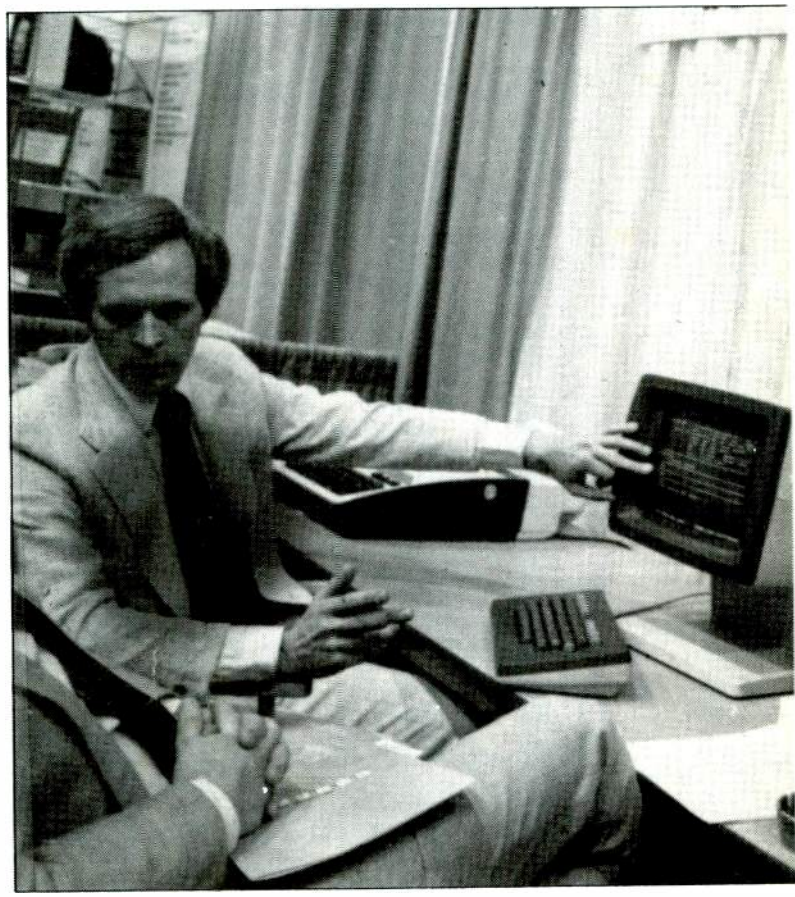
The main problem was the UPI computer. It works very well for what it was designed for: the high-speed delivery of copy to UPI's many clients who set type by computer. The manipulation of that copy by the client was minimal since there was already agreement on what form the end product was to take.

Broadcasters have a different set of needs. The wire services aren't geared up to meet those needs because there hasn't been the clamor for computer-generated information (most stations still use 300 wpm printers, not the 1200 wpm printers that are available). Broadcasters have had no cost effective manual way to handle the glut of copy available on the high-speed wire.

The KCBS-UPI experiment came up with some agreement on just what kind of information broadcasters need, and a program was written that delivered that information in as usable a fashion as possible. As with all compromises, no one was completely happy. But, as they say in diplomatic circles, there was a useful dialogue. KCBS was able to go through that first generational process of debugging.

"We tried it with the UPI system," says Larry Cooper, associate director of news and programming for KCBS, "and we found out the pitfalls we felt should be corrected for a broadcast system."

The new system, though, has been cloaked in a mild air of mystery. Unlike some of the other systems, the design parameters came from CBS, which then searched for a software company to fill those needs. Integrated Technology of Merriam, Kans. ended up with the contract. At this point, there is still little information about the system. The CPU is one designed by Integrated and will be marketed at some future date. Zentec ZMS-50 terminals are being used, but the software has been completely rewritten. It has a dual disc drive using CDC Winchesters. While a lot about the system is still vague, according to Cooper, "It's



Ron Hudson, marketing director of Newscan, demonstrates the system

Getting The Bugs Out

two years ahead of anything else on the market."

But there have been some problems with the system. The original delivery date was supposed to be last March. One observer blames the slippage on CBS's insistence that the system be completely debugged before delivery. The system has been up and running for months and KCBS staffers have been flown to Integrated's offices outside Kansas City repeatedly to run the system through its paces.

"We didn't want to install the system," explains Gerald Nachman, news director at KCBS, "until we were sure it would work."

It apparently does. CBS gave tentative approval for the system late in September and installation was to begin by mid-October.

"I'm impressed with the system in a number of ways, but the main thing is its speed," concludes Cooper. "You can ask for something within the database and receive it within a tenth of a second. In fact, it kicks it back to the terminal faster than the terminal can fill the screen."

Speed has been one of the problems with Newscom, the Station Business Systems entry into the newsroom computer market. Pilot systems were installed at KSL in Salt Lake City and WQAD in Moline, Ill. The initial problem was in the production program.

Once all the inputting was complete, the system was taking too long to kick out the printed copy and rundowns. "In some cases," says Mike Billie, news director at WQAD, "it was taking up to a half-hour to get everything back."

SBS reworked the program, and the response time is down significantly. "I'm confident that it will be even faster by the time we're through," adds Dave Finley, operations manager at KSL. News director Spencer Kinard puts the issue in perspective: "We knew going in that there might be problems. This is, after all, a pilot program."

While the production program may have caused some problems, the other programs get good marks for the stations. The assignment desk program gets a daily workout at KSL and, says Finley of the wire service interface,

TvNS Study Details Computer Needs

The following is a summary of a survey of a major-market television newsroom, researching ways in which a computer system could aid the operation. The report was prepared by Slyboom, Inc., a consulting and systems development firm that markets the Television News Support system (TvNS).

The study took place over a two-month period and involved in-depth interviews with management and the news staff. It defined five areas that would benefit from computerization: (1) what falls through the cracks?; (2) impact of personnel turnover; (3) efficiency and productivity; (4) non-news document searches; and (5) credibility and on-air performance.

What falls through the cracks? Inadequate backgrounding has a number of negative consequences. Reporters are unable to ask important questions, produce reports with limited viewpoints, and, most important, lose much time — estimated at one hour per developed package — in trying to find information. When each station in a market tries to produce a different story from the same basic information, the station with instant access to its own database will have a competitive advantage.

The computer can also log the glut of ideas, events, and tips to make sure they are all identified and acted upon. In addition, it can replace the system of intrastaff communication via handwritten notes, which can be lost or missed. The system can act as a "bulletin board," becoming the source of various operating logs. A similar logging procedure can handle visual material as well.

Manual systems are not adequate to deal with the immense volume of information generated in the newsroom. A computer-organized information bank will allow the news staff to concentrate on news gathering and preparation.

Impact of turnover on continuing operations. Newsroom staff turnover is regular and frequent, leaving information gaps each time an employee leaves. New employees bring their personal filing and labelling systems, resulting in chaotic filing. Much vital information is stored in people's heads. A computer, while it cannot replace the decision-making process, can function as a collective memory for a news organization, reducing wasted time and money and maintaining a continuum of internal and external information.

Efficiency and productivity. Increased numbers of news stories, growing news staffs, sophisticated news gathering procedures, time pressures, and other factors have made it more difficult to efficiently and effectively use human resources within the newsroom. Scheduling, particularly, is an operations problem area. The station studied requires 12 hours per week for scheduling; even this results in an inefficient schedule, with overtime and penalty costs running as high as $15,000 per month. With an efficient scheduling system, it is estimated this could be reduced by $5000 monthly.

A flexible, central equipment log could make it easier for the maintenance staff to diagnose and solve problems, especially those of an intermittent nature. A computer-assisted log will allow users access for reporting and equipment assignment, and provide the maintenance staff means to provide better service. Story planning, also, can benefit from centralized information with instant access. This could result in more story ideas being developed, more information being discovered about each story idea, and the extension of planning beyond the current 24-hour future.

The assignment editor's job could be greatly streamlined by a computer. A simple MOVE command could consolidate all possible stories into the day's assignment list. Breaking news would be easily appended, and all staffers could see status and assignment instantly.

A computer-supported script module could simplify the script-writing process; changes could be made immediately, with the latest version always available. Additions, changes, and updates could all be handled rapidly without the disadvantages associated with paper scripts, which would be eliminated.

Freed from clerical chores by an organized information system, reporters, editors, and managers can collectively create a better news product.

Non-news document searches. A computer could quickly handle requests for documentation, such as EEO record-keeping and quarterly reports mandated by OSHA. Compliance with subpoenas and other legal requests now takes 20 to 25 hours each month at the station studied; this could be greatly reduced by computer. Other areas that could be streamlined include the ascertainment of community needs, particularly the compilation and cross-referencing of community leader interview information, and the station's monthly report.

Credibility and performance. Efficient allocation and use of resources can create a superior on-air image to give a station an advantage over its competitors. While it is premature to argue that a computer can improve a station's news ratings, it can provide the news organization with the ability to concentrate on the shape of the news, giving it the edge in news program preparation.

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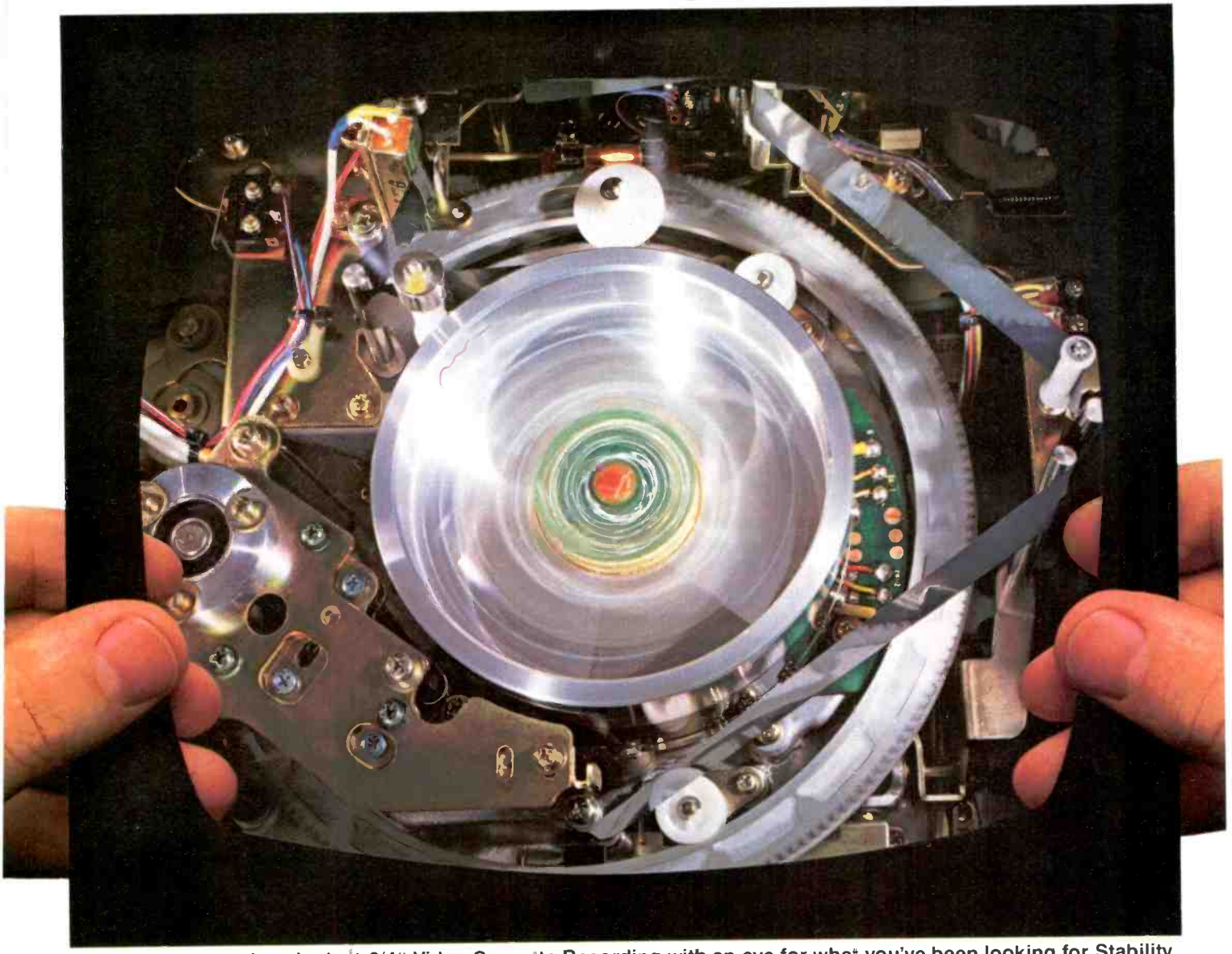

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Getting The Bugs Out

"the news people love it."

Television News Support (TvNS) is the system being marketed by Slyboom, Inc. The company has just completed a preliminary survey (see TvNS study on page 28) of a major television newsroom in preparation to installing a pilot system.

When TvNS first went on the market the system was available on both Honeywell and Microdata hardware. The system is now using Data General equipment. "We switched to Data General hardware," says Laura Powell, marketing director of TvNS, "because we felt that it can interface best with existing or future newsroom equipment, such as character generators."

The TvNS focus has been on the archival program. While the system has all the other functions — assignment desk, producer's rundown, text editing, and wire service interface — one could still do them manually. It is possible to finish those tasks within the time requirements of putting on a daily newscast. But the retrieval of background information was one function that is not easily done under current conditions. A computer-generated morgue could be, in the long run, the crucial difference in the quality of journalism on local stations.

Newscan developed differently from most of the other news computer systems. It evolved out of Weatherscan, a computer-based forecasting service for both broadcasters and private industry. It became clear that the kind of information available on their computer could be easily transformed to a visual presentation.

The problem was that the information needed to create computer-generated weather graphics was in the database, but there was no way to deliver it to the client under the old Weatherscan system. The Weatherscan system delivered the information to its member stations via a telephone link between its computer and the client's terminal.

The obvious solution was to have a computer at the client's end. Even more obvious was that a system with the capacity to handle computer graphics was big enough to do a number of other things. The other things ended up being Newscan.

Both experience and hardware development have kept the system evolving. "We've been able to upgrade our text editor," says Ron Hudson, marketing director (and also a former news director). "With new Hewlett-Packard software and our standard function keys, we've made it easy for people who aren't used to computer terminals."

Since Newscan has a variety of functions outside the normal scope of a news computer, it is being sold both as a total system and as standalone components. As with some of the other systems, a station can start small and add on later, but Hudson claims that Newscan is "the only one that can have a direct effect on how your newscast looks."

Basys's News Fury is the largest of the systems thus installed. Unlike the others, it was not put in a local station but in all the bureaus of Ted Turner's Cable News Network.

The sheer size of the system seems to be causing problems. There are 33 terminals already installed at CNN in its Atlanta headquarters. Ten more are planned. Each of the bureaus has at least three and the Washington bureau has six with several more planned. The problems, which most of the staffers say are minor, stem from the number of people learning to use the system all at once. The increased use by newcomers just makes it more likely that someone will make an input error that will cause the system to hiccup.

Newscom from Station Business Systems is being tested at WQAD-TV, Moline, Ill.

Another problem has to do with transmitting all the information along the CNN computer network. There has been some response lag in the New York bureau because the lease line is 1200 baud and all the other bureaus are on 9600 baud lines. Any problem with the system gets magnified.

One other complaint heard had nothing to do with the system but with getting it installed. Because of the number of terminals and other accessories some of the suppliers weren't able to meet the original deadline, so the system wasn't fully working when CNN went on the air June 1. But according to one New York staff member, "I wasn't too sure about this thing in the beginning, but now I think it's great."

The question is no longer *if* newsrooms will be automated but *when*. The cost of systems seems to be the biggest stumbling block. It is difficult for news directors to justify a $100,000-plus capital outlay.

While it is difficult to make the economic case, it is not impossible. One study found that a computer system could save a television reporter one hour per story. Writers, producers, and assignment editors could save about an hour each out of their work days. The savings in work-hours are significant over a year's time. In a large station, these savings could add up to six figures and better.

Savings in hours do not necessarily result in staff reduction, but, according to Powell, "You might not be able to reduce your staff, but you could expand your newscast with the same number of people. And that is worth a lot."

Bill Ballard, news director at WBTV, Charlotte, says "There is no doubt in my mind that five years from now we won't even be concerned about cost justification. A few years ago, portable electronic cameras were just out of range for the smaller market stations. They can't afford to pay $50,000 for one portable camera. Well, now you've got stations in the 200th market shooting with portable cameras all the time. Computers are going to have that same kind of effect on our business." **BM/E**

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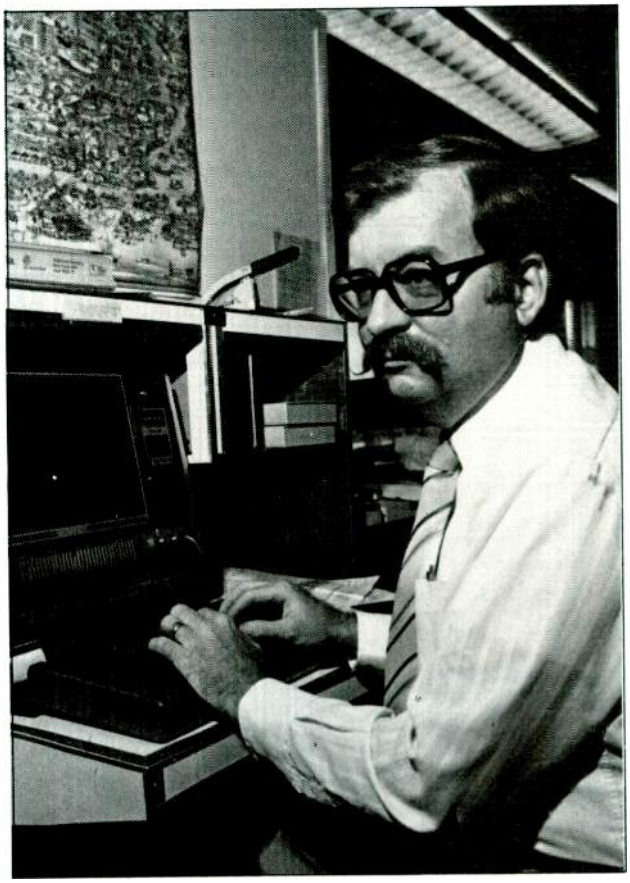
THE NEWSROOM COMPUTER.

NEWSROOM COMPUTERS MOVE INTO MANAGEMENT

As news directors' jobs get increasingly complex newsroom computers are stepping in with valuable aid in all areas of newsroom operations.



Howard Kelley, news director of WLTV, automated his newsroom with an inexpensive microprocessor

ONE APPLICATION OF COMPUTER SYSTEMS that gets little attention in the ongoing debate is the use of news computers as a management tool. The job of news director has gotten increasingly more complex over the past several years. News directors now are required to do a lot more managing, and thus a lot less directing.

That is not to say that they are less involved in the journalism, but that the technological and managerial changes have demanded more of news directors' time and energy.

"I spend 50 percent of my time on administrative duties," says Ed Tobias, news director of WTOP in Washington, D.C. "The time that I could save [with a computer] could be spent concentrating on the nuts and bolts of news."

This shift in the priorities of news directors stems from the fact that over the last 10 years news operations have become profit centers in stations. Station managers who used to ignore or decry "those crazies in the newsroom" now take an active interest in what is happening there and give closer scrutiny into how it is managed.

"News directors have traditionally come from the ranks of producers and reporters," says one observer. "They usually have little or no management experience. To ask people with that kind of background to turn into instant MBAs is asking a bit much."

One solution to this problem of limited management skills could come from computer assistance in those areas that call for specialized but repetitive functions. According to Tobias, "It would make my life easier if the information I need for budget analysis was stored in a computer and not in three or four notebooks that I have to maintain

by hand."

W. Vincent Burke, vice president, news at WHAS-TV in Louisville, says, "the major problem with news computers is justifying the cost." Burke maintains that it is easier to spend money for what will be perceived as having a tangible effect on the on-air product. "Helicopters and microwave vans," he concludes, "can affect the way your newscast looks and also be used as a promotional device for the station. You can't put your logo on the side of a computer terminal and send it up 1500 feet."

As a first step, it has been suggested that an inexpensive microprocessor could be used to handle the administrative details, giving management a chance to ease into the whole area of news computers. That was part of the approach that news director Howard Kelley took at WTLV-TV in Jacksonville, Fla. Kelley is the first to admit that his intention was to combine his interest in home computers with some housekeeping problems in the newsroom.

"I wasn't able," says Kelley, "to go to management and ask for a full-scale computer system; not when I needed new cameras."

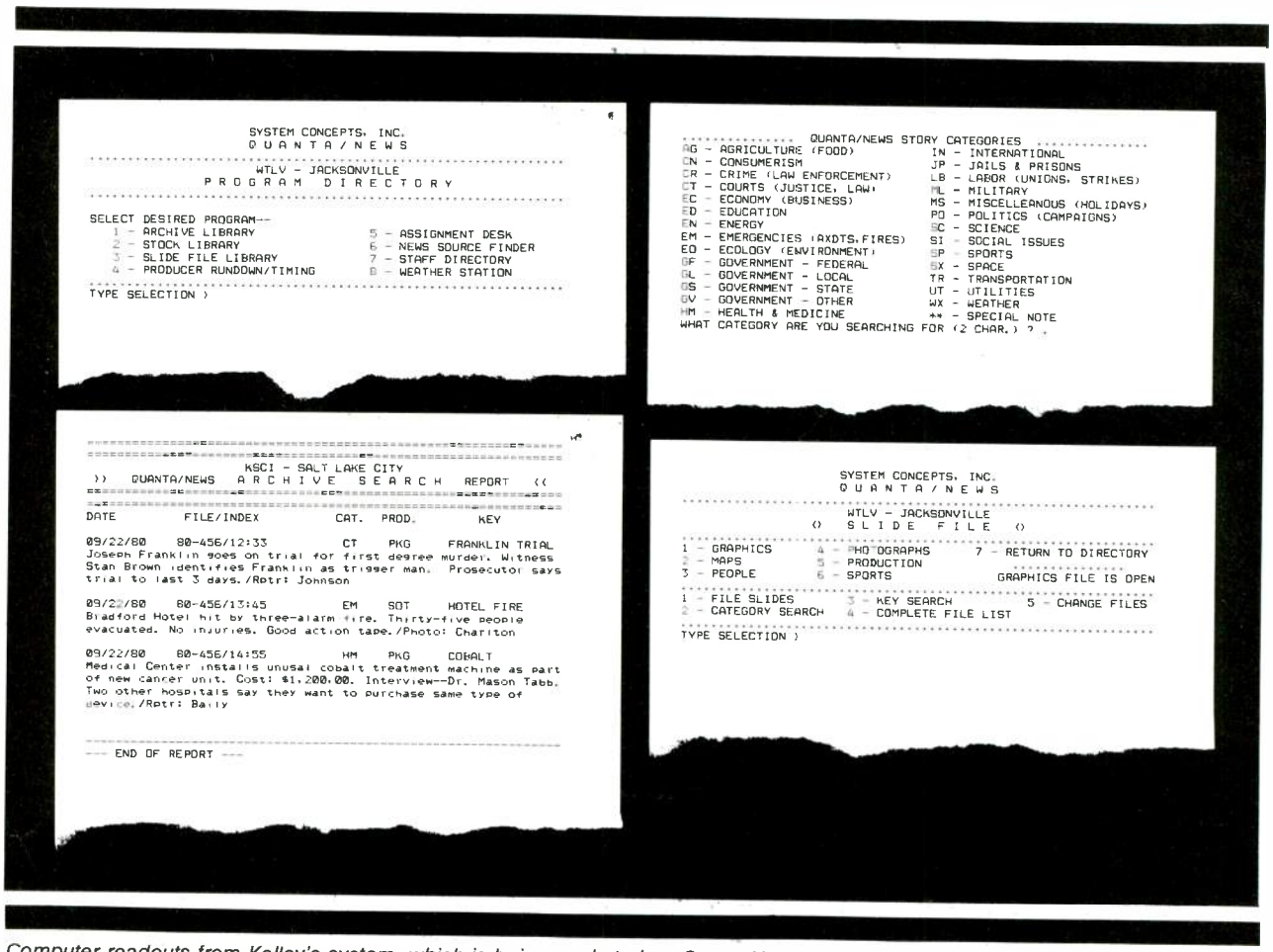
For a life-long ham radio operator like Kelley, it was a logical step to move into computers. He traded in some of his radio gear and bought a Radio Shack TRS-80 Model I, and taught himself to program using some common newsroom problems as the impetus.

"The problem was to eliminate the little things that slow you down: lost file cards, constantly changing phone numbers for news sources and staff, finding old scripts, and keeping track of story ideas," Kelley explains.

It took nearly a year of nights and weekends (and moving up to a TRS-80 Model II) before Kelley came up with eight workable programs. He has one for archives, stock video, slides, news sources, assignment desk, staff file, backtiming, and weather summaries. The programs are not as sophisticated as the other newsroom computers on the market, but they were never meant to be. Rather, they are designed to speed up the search for basic information.

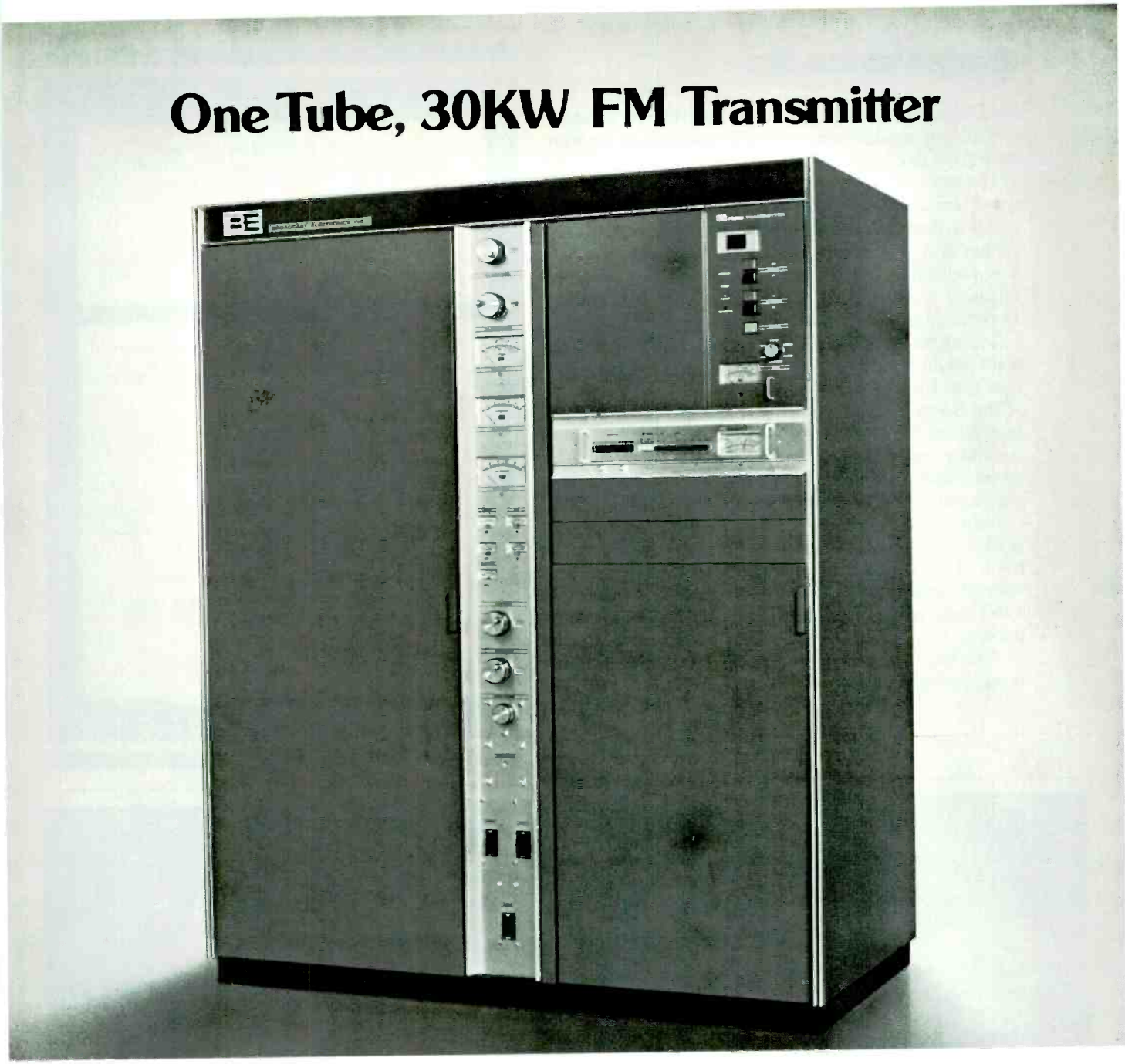
All the programs are indexed in such a way that they allow the user to find the missing data in a systematic way with computer help. If, for instance, you need to find out if the mayor has ever made a statement about nuclear energy, how would you go about a manual search? You might look through the card file and check all the stories about the mayor. You might look up the stories that you have done about nuclear energy, plus all the stories that you have done on utilities. There are other options, but they are all time-consuming. With the computer's help, all the legwork has already been done and all you need to do is code in any of the key words or categories.

Kelley's system does not, as some systems do, store complete texts, but it does tell what is available and where it should be located. All the programs operate in this manner, though as the system continues to evolve it gets better because Kelley has become a better programmer—



Computer readouts from Kelley's system, which is being marketed as QuantaNews by System Concepts

One Tube, 30KW FM Transmitter



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and also because he has not lost that small market knack of jury-rigging unlikely pieces of gear and coming up with something that works.

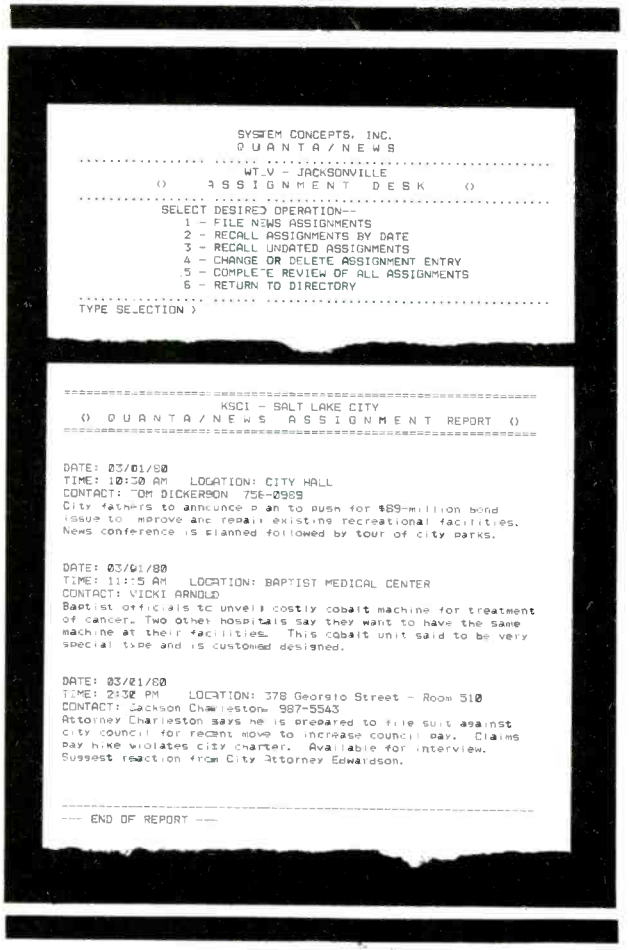
The news department at WTLV has the AP-TV high speed service. Since the service is already coded, Kelley is able to dump the wire into the system for later retrieval. He has also plugged the backup AP printer into his system, and is thus able to print out copy at 1200 words per minute as opposed to the old rate of 120 words per minute. as opposed to the old rate of 120 words.per minute.

Taking notice of what Kelley was doing, System Concepts has made a deal for his software and is using it as the data base for its QuantaNews system.

But Howard Kelley is not one to rest on his laurels. He hooked up his system to the station's old character generator and ended up with an election reporting and on-air graphics package. "It worked like a dream during our recent primary," he notes.

Kelley began with the smallest TRS-80 and has upgraded every time he finishes stretching the system to its limit. He is now up to a TRS-80 Model II with a 32K internal memory, a two-disc drive with a 120K capacity, a 1200 baud printer, and a computer-generated election package.

"Not bad," says Kelley, "for a place that is just getting used to electric typewriters." **BM/E**



Kelley uses his backup AP-TV printer to speed up the readouts to 1200 words per minute

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Circle 123 on Reader Service Card

Electro-Voice's Greg Silsby talks about the Sentry 100 studio monitor

Production Studio, WRBR-FM, South Bend, Indiana.

In all the years I spent in broadcast and related studio production work, my greatest frustration was the fact that no manufacturer of loudspeaker systems seemed to know or care enough about the real needs of broadcasters to design a sensible monitor speaker system that was also sensibly priced.

Moving to the other side of the console presented a unique opportunity to change that and E-V was more than willing to listen. When I first described to Electro-Voice engineers what I knew the Sentry 100 had to be, I felt like the proverbial "kid in a candy store." I told them that size was critical. Because working space in the broadcast environment is often limited, the Sentry 100 had to fit in a standard 19" rack, and it had to fit *from the front, not the back*. However, the mounting hardware had to be a separate item so that broadcasters who don't want to rack mount it won't have to pay for the mounting.

The Sentry 100 also had to be very efficient as well as very accurate. It had to be designed so it could be driven to sound pressure levels a rock 'n roll D.J. could be happy with by the low output available from a console's internal monitor amplifier.

In the next breath I told them the Sentry 100 had to have a tweeter that wouldn't go up in smoke the first time someone accidentally shifted into fast forward with the tape heads engaged and the monitor amp on. This meant high-frequency power handling capability on the order of five times that of conventional high frequency drivers.

Not only did it have to have a 3-dB-down point of 45 Hz, but the Sentry 100's response had to extend to 18,000 Hz with no more than a 3-dB variation.

And, since it's just not practical in the real world for the engineer to be directly on-axis of the tweeter, the Sentry 100 must have a uniform polar response. The engineer has to be able to hear exactly the same sound 30° off-axis as he does directly in front of the system.

Since I still had the floor, I decided to go all out and cover the nuisance items and other minor requirements that, when added together, amounted to a major improvement in functional monitor design. I wanted the Sentry 100 equipped with a high-frequency control that offered boost as well as cut, and it had to be mounted on the front of the loudspeaker where it not only could be seen but was accessible with the grille on or off.

I also didn't feel broadcasters should have to pay for form at the expense of function, so the walnut hi-fi cabinet was out. The Sentry 100 had to be attractive, but another furniture-styled cabinet with a fancy polyester or die-cut foam grille wasn't the answer to the broadcast industry's real needs.

And for a close I told E-V's engineers that a studio had to be able to purchase the Sentry 100 for essentially the same money as the current best-selling monitor system.

That was well over a year ago. Since that time I've spent many months listening critically to a parade of darn good prototypes, shaking my head and watching some of the world's best speaker engineers disappear back into the lab to tweak and tune. And, I spent a lot of time on airplanes heading for places like Los Angeles, Grand Rapids, Charlotte and New York City with black boxes under my arm testing our designs on the ears of broadcast engineers.

The year was both frustrating yet enjoyable, not just for me but for Ray Newman and the other E-V engineers who were working on this project. At this year's NAB show it all turned out to be worth it. The Sentry 100's official rollout was universally accepted, and the pair of Sentry 100's at the Electro-Voice booth was complemented by another 20 Sentry 100's used by other manufacturers exhibiting their own products at the show.

What it all boiled down to when I first started the project was that I knew that the Sentry 100's most important characteristic had to be *sonic integrity*. I knew that if I wasn't happy, you wouldn't be happy. I'm happy.

Greg Silsby

Market Development Manager,
Professional Markets

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The Panasonic Diode-Gun Plumbicon Camera. What better way to say broadcast performance.

Whether you're shooting a 9th inning rally, a political rally or a network special, no other ENG/EFP color camera says broadcast more ways than the new Panasonic AK-760.

The AK-760 combines a high-index prism optical system with three ⅔" diode-gun Plumbicon® tubes. And since the diode-gun Plumbicon tube has a thinner photoconductive layer than conventional Plumbicons, the AK-760 offers outstanding resolution (600 lines center). Another advantage of the diode-gun system is the low beam resistance it generates. Add to that the AK-760's built-in bias light and the result is low beam temperature performance even at high beam current. And that also says lower lag.

The AK-760's feedback beam control reduces comet tailing by stabilizing highlights that exceed normal white levels. What it doesn't reduce is dynamic range or horizontal resolution. And because it's only activated during extreme highlights, feedback beam control helps prolong tube life and preserve edge geometry.

The AK-760 also gives you the edge with a S/N ratio of 54dB at standard illumination of 200 foot-candles at f/4.0. And with the 18dB high-gain switch, all you need is 5 foot-candles at f/1.8.

Mounted on the AK-760's durable die-cast chassis you'll find an impressive array of circuitry like horizontal aperture correction, 2-line vertical enhancement, automatic

white balance and a built-in color conversion filter.

And whether you use it for ENG or EFP, the AK-760 is fully self-contained, and includes genlock, internal sync, adjustable blanking as well as subcarrier and phase controls.

For studio production, you can add an optional remote control unit, 5" CRT viewfinder and zoom lens conversion kit.

Panasonic also makes broadcast quality easy to afford with the AK-750B 3-tube Plumbicon. At $16,000* it comes complete with 2-line enhancement, a $2,000 option last year, plus genlock, a rechargeable battery, microphone and VTR cable.

There's also the AK-710. An electronic news-gathering camera at a newsworthy price, $10,950* Its three Saticon® tubes and high-index prism optical system result in horizontal resolution of 500 lines center and a S/N ratio of 52dB.

Audition the AK-760 along with the entire line of Panasonic broadcast quality cameras. You'll see what we mean when we say broadcast.

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*Manufacturer's suggested price. (Lenses not included.)

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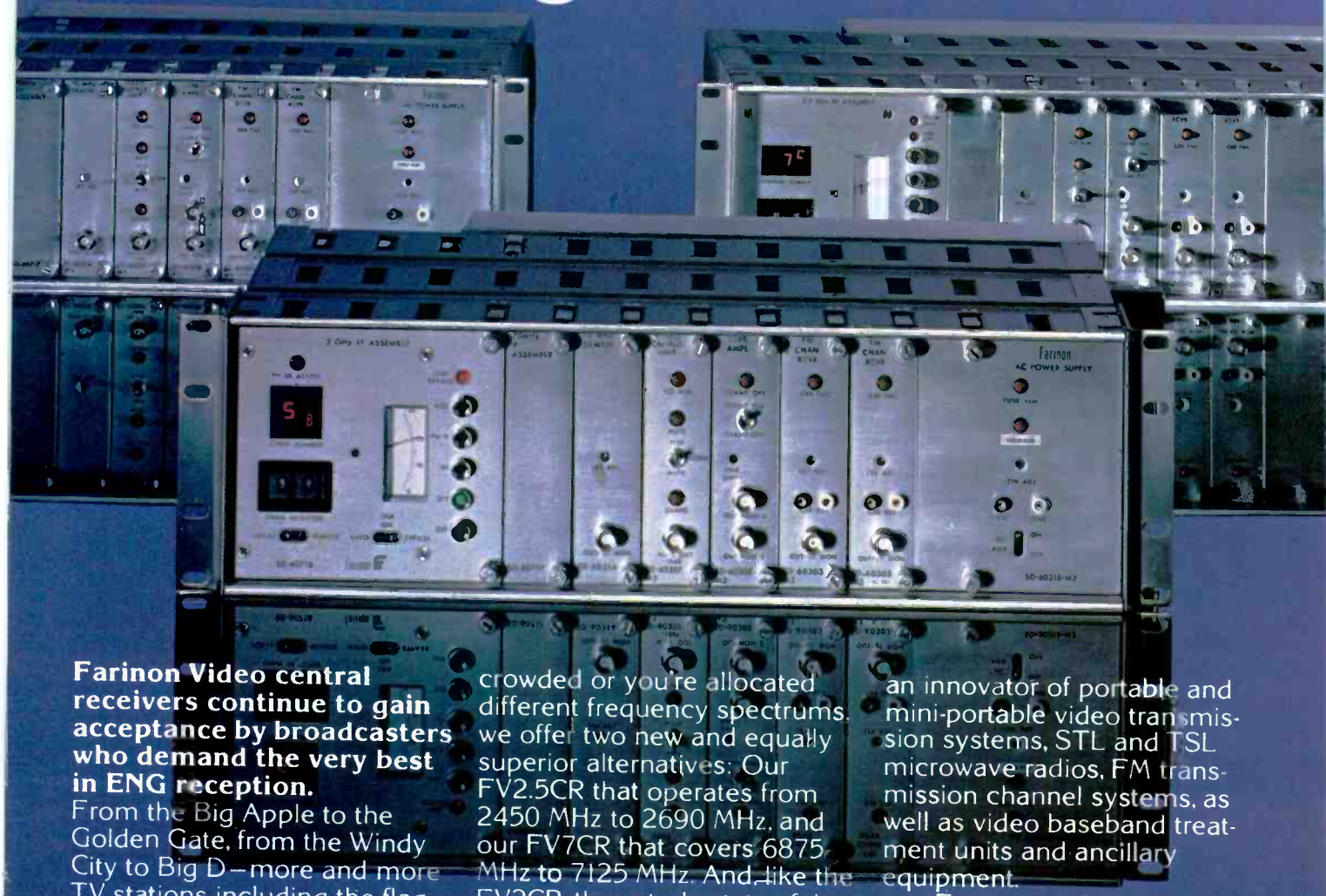

Farinon Video central receivers continue to gain acceptance by broadcasters who demand the very best in ENG reception.

From the Big Apple to the Golden Gate, from the Windy City to Big D—more and more TV stations including the flagships of the major nets are choosing our 2-GHz FV2CR Central Receiver because of its superior performance, flexibility and reliability. With 21 synthesized channels and an unsurpassed dynamic range, the FV2CR has minimized the problems of weak signals and distortion that in the past spelled disaster to ENG reception.

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THE NEWSROOM COMPUTER.

COMPUTER POWER BACKS UP THE RADIO NETS

With quite different operations, both CBS and NPR have found it takes plenty of computer power to run a big radio net efficiently and well. Radio broadcasters will find clues to their own use of computers in the highly innovative systems of CBS and NPR.

THE CBS RADIO NETWORK is one of the fast-expanding sectors of broadcasting during this period of great change and growth. CBS has solidified the net's character with its platoon of top-flight news stars and its worldwide news-gathering operation. In addition to the traditional hourly newscasts there are many specials in the course of a week, adding up to around 150 weekly programs: news summaries, interview programs (*Face the Nation*, for example), play-by-play sports and sports news and commentaries, drama (*Mystery Theater*), health and science commentaries, and much more.

Radio broadcasters have responded to this program mix by joining up in large numbers. The net has grown from around 200 affiliates to well over 375 during the past year, and as this is written there is no slackening in the growth rate.

CBS believes the net will reach 400 stations by the end of 1980. Whatever the number, the operators of the net have now positioned themselves to operate efficiently and well, with a two-tier computer system that will reach full on-line status about the time this magazine is distributed.

The CBS Radio Net is basically live — the central figure is the newscaster on a microphone, distributed directly to affiliates as he speaks. Program automation in the standard mode — recorded material called up at preprogrammed times — is not the operating problem to which computer power is applied. The closest description is probably "live assist," but on a grand scale. The main complications arise, first, in a sales operation reaching a very large volume and variety of national advertisers who want fast, closely scheduled on-air coverage. Second, there is the time zone problem affecting any nationwide programming. The multiplicity of program sources introduces the third large element of complication.

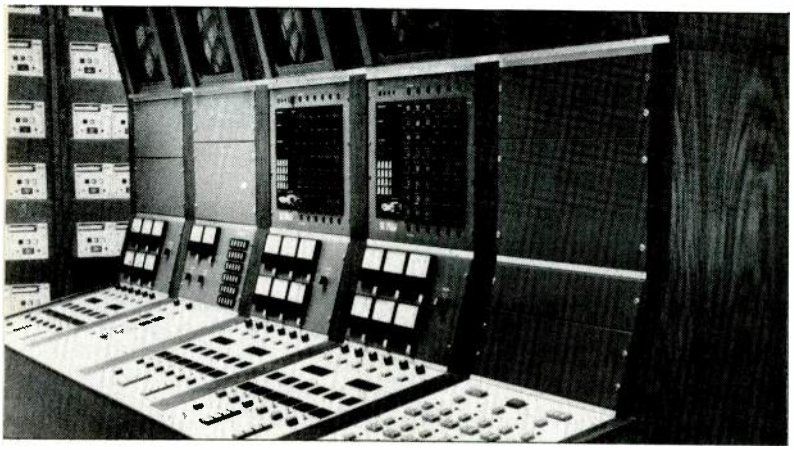
CBS has installed a large computer center in the Penn Plaza Building in New York City, with an IBM 3033 to take input from all sales and programming elements and develop a firm daily sequence. The computer-developed sequences are available on CRT readouts and in hard copy form, as needed. They can be set up for as much as 30 days in advance, but any single element can be changed instantly, at any time.

This vital operation is protected by a double backup, with a second identical computer in Terre Haute, Ind., and a third one in Los Angeles. A failure in New York automatically triggers a split-second cutover to Terre Haute, and if necessary from there to Los Angeles.

The IBM computers are connected directly to the second tier of computer power, a switching computer in the net's New York operations headquarters. The detailed program and commercial sequences are deposited in the memory of the switching computer, which drives a large switching system to set up the incoming and outgoing connections for every minute of a day's operation.

One central operation of the CBS Radio Net, the live newscast, is underway above. News producer, left, gives signal to console operator; newscaster, right, prepares to go on the air. News editing room is beyond studio. All photos: David Knorr, CBS

Radio Computer



Manual control position for CBS switching system has CRT readouts (top) to show upcoming events; NetALERT transmitters above VU meters; and a full set of pushbuttons so operator can take over switching from computer, if necessary

This switching computer is really two identical DEC PDP-11/55s, one a hot standby. There is enough memory in each one, including internal memory plus an external disc system, to store, again, up to 30 days of switching for the network — it takes about 14 megabytes to do this. The sequence stored in the switching computer memory is available on CRT readouts or in hard copy, as needed, and any element can be changed at any instant.

Communication between the two computer tiers is two-way: the switching computer feeds back to the IBM information on the actual switching carried out, for use in the log, which is instantly available at all times. As with many live assist systems, the switching computer also gives the operators a CRT readout on upcoming program and commercial items, up to 24 events ahead.

The switching system, which was near completion as this was written, was designed and built by McCurdy Radio of Toronto, with AVL Digital Ltd., of Scarborough, Ontario as sub-contractor to interface the McCurdy switching system with the DEC computers. Among other things, McCurdy developed for the system a solid-state crosspoint switching device of advanced characteristics. The system requires 2000 crosspoints; switching time is a few nanoseconds.

For CBS, the project from inception to completion has been under the direction of Ralph Green, vice president, engineering, for CBS Radio.

Although CBS solicited a number of American companies with expertise in the field, none chose to bid on building the system. A spokesman told *BM/E* that CBS has been delighted with McCurdy Radio's performance, saying that all contract specs were met or exceeded.

The switching job arises from the existence of 100 inputs, each distributable to any of 20 outputs. Steve Peppard and David Knorr of CBS, who gave *BM/E* a tour of the plant and description of the system, enumerated the inputs and outputs: the list gives a good idea of the general outlines of the job.

On the input side there are, first, 12 lines for live studios (seven already in operation and the others planned) from which the CBS newscasts, interviews, and commentary programs originate. Inputs 13 through 22 are from reel-to-reel tape machines, on which a variety of material is recorded, including actualities for the newscasts.

Inputs 23 through 62 are from the cart machines on which commercials are played back for delivery to the system. The constantly varying routing of these commercials is one of the main complications in the operation, as already noted. At any given break for commercials, there may be three, six, 10, or more different distribution routes to be set up. The computer has these routings all in memory and carries out the required switching according to the clock times on the sequence.

The live assist character of the operation, however, is sustained in the fact that the carts are put into the playback machines by hand, well in advance of use. With nearly 40 separate cart-play positions available, the commercial schedule for a considerable period can be implemented. The computer, of course, has the address of each cart play machine and starts the cart as well as switching its output into the designated route.

The system for playing the carts has many refinements that aid fast, error-free operation. For example, the computer scans the upcoming cart positions each second. If the computer finds an empty slot, the operator gets an alert and has at least a few minutes to make a correction.

Ordinarily this system "cleans" the cart machine assignments far ahead of broadcast time. But last-minute changes are easy to make. The operator can make a cart substitution in a few seconds; the switching instructions in the computer can be altered in a few seconds at an input keyboard.

Inputs 63 through 97 are "utility" inputs, which can be connected to any of a variety of sources. Among them are telco lines bringing in remotes, such as the play-by-play sports programs; internal audio feeds from the CBS television studios; two lines to the United Nations; and the lines from the net's Washington studios, where many of the key programs originate.

Lines 97 and 98 are audio oscillators, continuously available for test signals to be fed through any part of the system. Line 100 is the "quiet line," which can be switched in when a short period of total silence is needed.

On the output side, the 20 lines are set up to provide any feed needed. Most of the time only a part of the outgoing lines are needed; the number will vary from commercial break to commercial break, for reasons already set forth. The 20 output positions built into the systems, in other words, give CBS a good safety margin over average operation demands, which range from three to six or, occasionally, 10 feeds. There are a number of ways in which the system looks toward the future with comfortable growth margins representing some balance between established present cost and estimated future need. One important "margin" is this: the software is so constituted that the whole operation can be doubled by installing a second, duplicate bank of crosspoints.

The system has a second backup in a complete manual control panel from which an operator, using number codes and pushbuttons, can set up any connections in the crosspoints wanted. But whatever an operator does by hand becomes a part of the record just as the computer-driven switching does. Every connection made is "known" to the computer and becomes part of the log, whether it was manually or automatically derived.

That is the main switching operation; but there are some subsidiary operations that are essential to effective program distribution. The "NetALERT" system is an automated way of sending each station information about

upcoming programs or general or special bulletins that are not part of the programming. To make maximum use of the spectrum space, the "NetALERT" system uses a two-digit code with 16 numbers, 0 to 15, in digital form, covering the classes of information to be transmitted. Each station has a "NetALERT" decoder that responds to a number received by putting up the information on a digital readout along with an alerting signal.

The information sent by this system, for one thing, allows the station to efficiently handle the programs coming down the line. For example, "two" means program on the way at next break, "four" means end of program, "three" means rejoin the network after a local commercial break. There are also codes for various special bulletins, including national emergency announcements and updates.

The switching computer originates the "NetALERTs" automatically during routine operation. The computer "knows" what is coming next and as part of the job sends out the code appropriate to the upcoming event without operator attention. The code can also be originated manually at the control panel, so that station operators stand by for special bulletins.

Another "service" operation is the "prefeed," a vocal preview sent out just ahead of programs so that the station, if the operator wants, can key the audience in on what's coming. Prefeeds go out for selected programs and have to be set up in the switching just as the programs are. *BM/E* stood in the CBS operations center and heard a prefeed on the monitor: "Coming up on the 3:00 newscast is an update on the war in Iran, with Reid Collins as anchorman."

Another job for the computer is starting and stopping reel-to-reel tape machines, when there is a recording to be made or one to be played, in addition to switching the right audio feeds into and out of the machines.

Because the switching computer has to do so many things, it has to do them in a hurry. High speed was a major requirement. The internal memories reflect this need for speed, with a bipolar memory that has 200 ns access, an MOS memory with 400 ns access, and a core memory for slower jobs, at 1 μs access.

As an audio system, the whole complex feed from microphone, for example, to telco line has top-grade characteristics. S/N is better than 80 dB; the same figure holds for signal to crosstalk, when feeding one input and measuring an adjacent one. The RFI spec calls for no signal degradation with simultaneous presence of radio frequencies of 2 V/meter for all standard AM frequencies and 0.5 V/meter for 30 percent amplitude-modulated FM radio, VHF and UHF TV frequencies. THD for the system is less than 0.5 percent, 30 Hz to 15 kHz. David Knorr says that McCurdy exceeded spec in all cases.

Knorr made the important point that with so many items on the line, individual units must be more than good to allow such a good overall result. All audio amplifiers in the switching system are from McCurdy Radio of Toronto, of which AVL Digital is a recent spinoff. Each audio line has a dynamic presence equalizer and an Audimax processor to improve modulation density.

The switching system and enough of the audio lines and control system to keep the net in operation can be run by an uninterruptible power supply, a set of batteries and dc-to-ac inverters that can supply 15 kW for up to 15 minutes if commercial power drops out. Before that period is over, emergency generators in the plant will have started and settled into steady operation, if all goes according to plan.

What did CBS get with its computer and switching system? One important thing it got was a good margin of operational capacity for future expansion, without serious overbuilding for present needs. It also got, of course, very high speed and accuracy in meeting the complex input and routing requirements; the jobs would be much slower and less accurate, perhaps even impossible at the volume level the size of the net will soon impose.

Another thing it got was accurate record keeping for a very complicated commercial operation, without an army of clerical workers. All in all we may conclude that the computers make it a "go" for the CBS Radio Net.

NPR computer coordinates complex links

National Public Radio uses computers in different ways from CBS, simpler in some respects, more complex in others. NPR is not a centrally owned operation, but a service organization for "public" radio stations owned by educational institutions, governments, and nonprofit groups of many kinds. NPR basically does only what the member stations tell it to do. Programming distributed by NPR has been collectively "ordered" by the member stations or represents material originated by one station that is being made available to others. Or, in a recent trend, it may come from completely outside the system.

It is very appropriate, then, that computer power for NPR is in many units, with a large proportion of them distributed among the affiliated stations. The NPR net, as described often in this magazine and elsewhere (see last month's *BM/E*), is an all-satellite operation with each affiliate owning an earth terminal. Seventeen of the affiliates also have uplink transmitters, so that material originated around the country can be instantly fed to the net. The affiliates now total about 250.

The signal sent up to the satellite has six wideband multiplexed audio channels (eventually there will be 12), plus two narrow-band data channels. The data channels are not "extras"; they are in important respects the backbone of the operation, as will be seen.

The main switching computer is a DEC PDP-11/70 which drives a 40 by 12 switcher. (The switching system, like that at CBS, is a product of McCurdy Radio of Toronto.) The 12 outputs represent the eventual 12 channels that the satellite feed will have. The 40 inputs cover the live studios and tape machine outputs, remote lines, etc., at the NPR Washington headquarters. Programming production here takes many forms: single newscasters on mics, many discussion and interview programs, recorded music, live music (often brought in on remotes), folk singers, and country fiddlers. Material is also beginning to come from independent software producers who want to reach the public stations.

Bruce Wahl of NPR, who described the system for *BM/E*, pointed out that the event load on this program switcher is much smaller than that at CBS: there are, of course, no commercials. Relays are used rather than solid state crosspoint switchers.

The switching sequences get into the computer memory by a two-step administrative process. An NPR programming group has the responsibility for taking the long-term and short-term requests of the member stations and working out the network programming for a considerable period ahead. NPR's headquarters staff develops certain programs which are offered to the members; other pro-

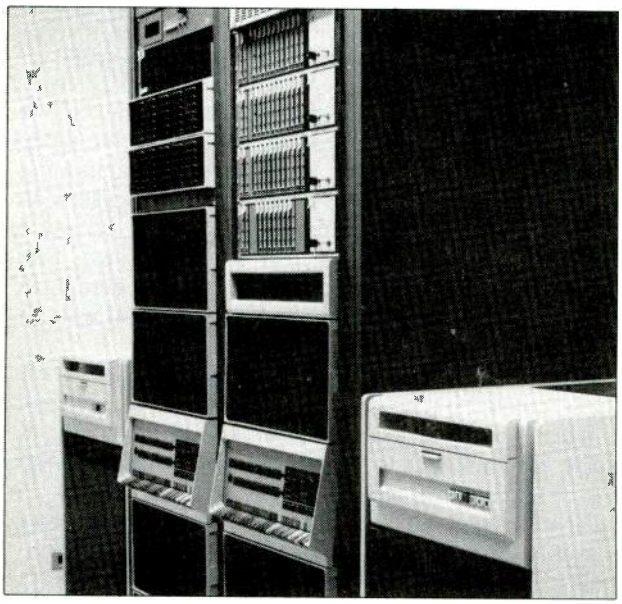
grams result from direct requests by members.

With a series of program days firmed up, a second body, the Technical Distribution Group, then determines in detail what technical facilities will be used to get each program where it is supposed to go. This includes every phase of production of the program plus which of the six channels are to take it to the satellite (and down to the receiving stations). All the switching to accomplish this technical hookup goes into the PDP memory, and at the indicated clock times the specified connections are made by the computer so that each program goes up to the satellite on the planned channel.

One complication in the choice of channels is the necessity for switching from mono to stereo and back fairly often. It would be inefficient, as Wahl notes, to dedicate two channels just to stereo. There would be the constant problem of underloading the two stereo channels, or of having more stereo than the net could handle. Thus, NPR wants to use any two of the six channels for stereo, and the switching system is flexible enough to assign any two channels to any feed.

But this any-channel-to-any-feed plan means that the receiving station will itself have a switching problem for many, or most, programs (specifically, it will be the tuning of the satellite demodulators to the proper multiplex channel or channels). For this and other reasons, the actual tuning of the receiving circuits is done by a microcomputer at each station, under control of signals sent out from Washington over a data channel. Further, the station's choice of the program in the first place involves another computer system using the data channel.

To understand what these various computer systems are and why they are used, we can follow the sequence of events from the final determination of the programming for a given day in Washington. The Washington group sends to every member station a "telegram" over the computer-controlled Direct Access Communications System, or DACS. The computer takes keyboard input and turns it into signals for transmittal over one of the data channels. The DACS telegram is read out at the receiving station on a CRT driven by a local microprocessor.



The two switching computers for the CBS Radio Net, one a hot standby, are the two side-by-side units with piano-key controls in lower half of racks. Disc memories flank racks; interfaces to crosspoints are on cards high in right rack

The telegram tells the station operators what the programs are for that period and posts for each program a three-digit code. The station operators punch into their local microprocessor all the three-digit codes for the programs they want among those upcoming. The microprocessor then tunes the station demodulators at the proper clock times to bring each program in.

Why this apparently elaborate method for getting member stations tuned in to programs they want? It is actually far simpler and obviously far more accurate than having operators at each station constantly retuning the demodulators at each program break. In fact, it may well be that the whole distribution system, with six channels used in a flexible assignment plan, would be impossible without computer control of the kind NPR has developed. The plan puts the program *decisions* in the hands of each member station, but keeps the technical channel tuning under computer control, with a Washington-assigned code as the computer input.

Putting the tuning microcomputer in each station, and having it driven by a simple code, punched in locally, was obviously an inspired assignment of technical responsibilities. It greatly simplifies the load on the data channels, as compared with having everything done by one or more computers in Washington.

The local microcomputers are part of the "Netcue" system originated several years ago for communications in the NPR net by Wayne Hetrick. The decoder/receiver at the local station with its microprocessor has a small ROM memory and a somewhat larger RAM. The latter can be loaded from Washington over the data channel. This allows for alterations in the software that connects the program codes with the actual tuning operations. When any updating of this software is needed, it can be done at high speed over the data channel. We see now why the data channels are in fact the operating backbones of the system.

The data channel and computer power will do a far more elaborate job at the uplink stations under a plan soon to be implemented. Each uplink station will have a Model 7900 remote control system from Time and Frequency Technology, Inc., with a built-in microprocessor. This remote control system will be connected to the uplink transmitter, and with Washington by a separate subcarrier on one of the data channels. The connection will allow Washington, first, to choose any one of 10 audio sources at the uplink station for feeding to the satellite. By agreement with the station, the program originated there will be put onto an input set up by the system.

The TFT system will also allow Washington to check the status of the station's programming and the uplink transmitter in a number of significant respects, and to control the transmitter as needed. Among other things, it will check to make sure the previous program is over; turn on or off the transmitter high voltage; turn on or off the data channel; and tune the channel modulators to the assigned frequencies.

We can see that assuring the technical quality of uplink operations is essential to the network's successful performance over the long run. The use of computer power at both ends of the line makes this possible, easily and accurately. For NPR, as it is for CBS, the computer is a work horse that the net could not move without. **BM/E**

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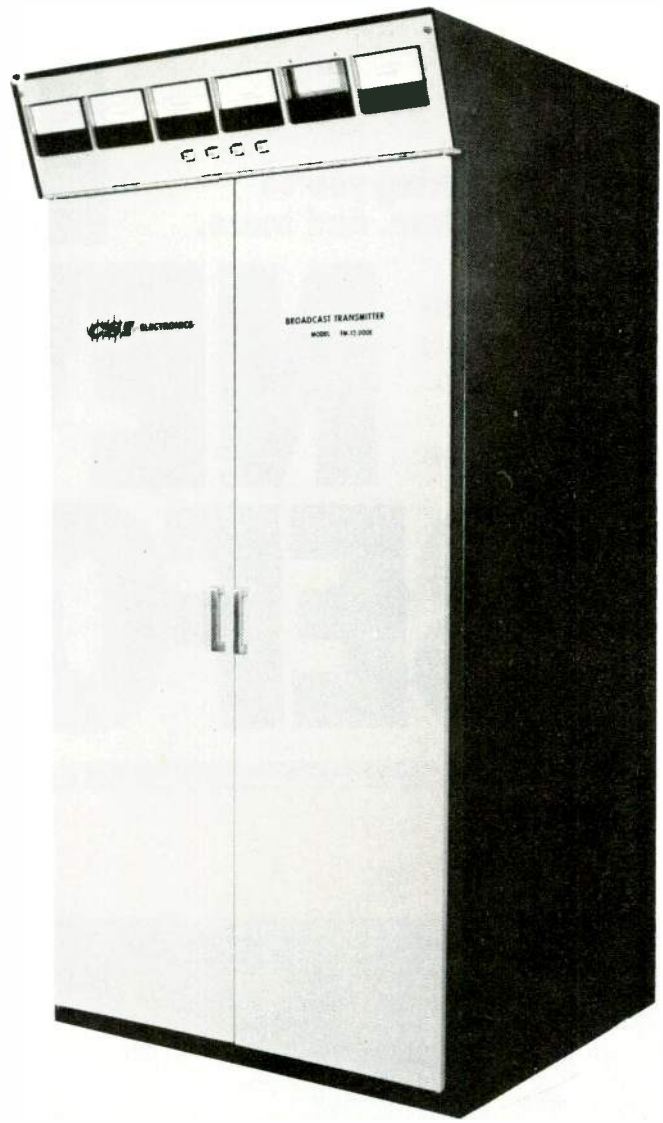

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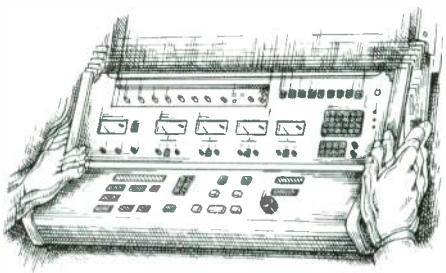

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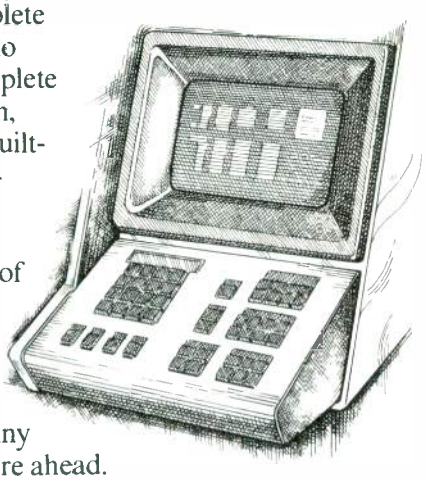

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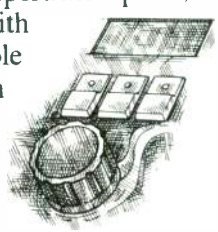

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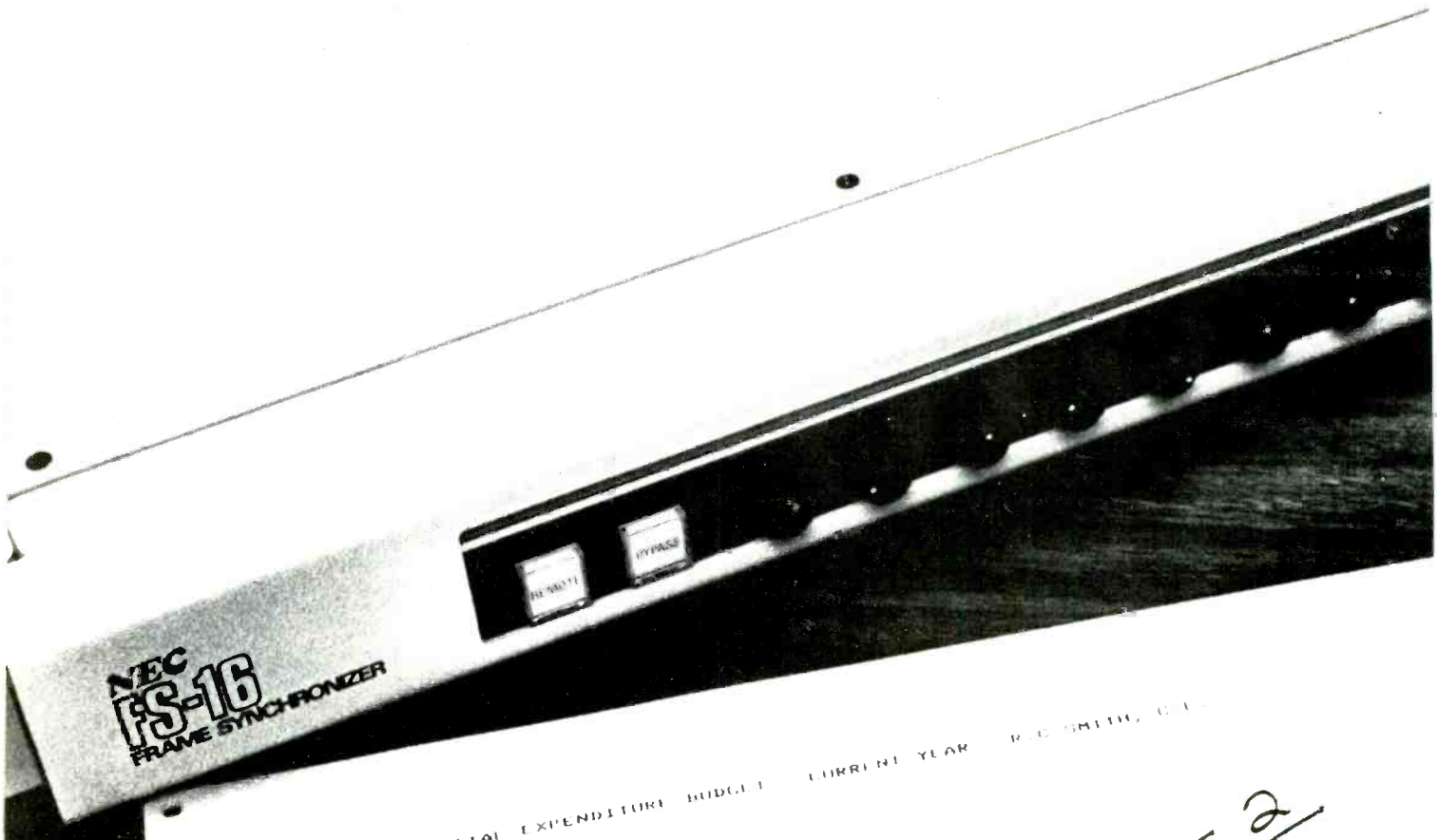

ENGINEERING CAPITAL EXPENDITURE BUDGET — CURRENT YEAR

QTY	ITEM	COST
1	FRAME SYNCHRONIZER	$ 26,000.00
1	SPARE KLYSTRON	55,000.00
1	DIGITAL EFFECTS	74,000.00
6	AUDIO DA'S	1,200.00
1	CHROMAKEY GEN.	6,800.00
1	VIDEO DA'S	1,800.00
4	TYPE C VTR'S	135,000.00
3	VIDEO SWITCHERS	3,000.00
3	CHARACTER GEN.	50,000.00
1	SERVICE SCOPES	8,000.00
2	A/V ROUTING SWITCH	31,600.00
1	ENG/EFP CAMERAS	88,000.00
2	PORTABLE MICROWAVE	17,000.00
1	CONDENSER MIKES	800.00
8	PORTABLE LIGHT SETS	1,600.00
2	ENG VANS	19,000.00
2	GAS GENERATORS	6,000.00
2	HEADSETS	2,000.00
10	DIGITAL TBC	13,000.00
1	3/4 VTR'S	6,000.00
2	AUTO DELAY LINES	5,500.00
2	AUDIO AMPS	1,500.00
2	AUDIO DECKS	10,000.00
3	AUDIO MIXERS	900.00
2	AUDIO CONSOLE	22,000.00
1	STUDIO LIGHTS	6,000.00
18	PROM PROGRAMMER	2,000.00
1	WORK BENCHES	1,200.00
4	WORK STOOLS	500.00
4	RF GENERATOR	3,200.00
1	FREQ. COUNTER	8,000.00
1	SWEEP GENERATOR	3,000.00
1	DIGITAL VOM'S	1,800.00
3	AUDIO CART MACHINE	1,500.00
1	AUX BUS FOR SWITCHER	10,000.00
	TOTAL DEPARTMENT BUDGET	$ 410,800.00
	TOTAL SPENT TO DATE	335,684.50
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THE NEWSROOM COMPUTER.

JDS, WBTV, AND ENP: AN INITIAL INVESTMENT IN NEWSROOM AUTOMATION

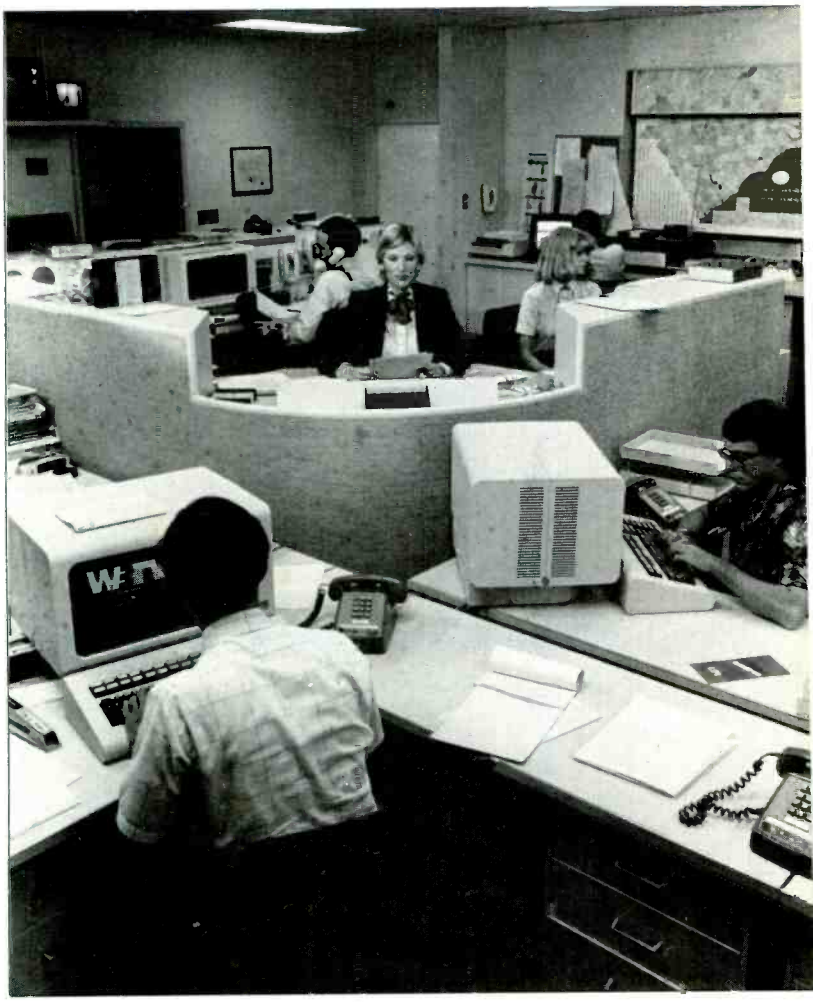
A close working relationship between Jefferson Data Systems and WBTV, Charlotte, resulted in more than just good feelings. An idea generated during a friendly discussion led to the development of JDS's electronic news processing system, now at use in WBTV's newsroom.

IT BEGAN IN a bar in Cincinnati. Bill Ballard, news director of WBTV in Charlotte, N.C., and Ben Avery, broadcast representative for the Associated Press, were taking time out from the AP convention in 1977. As with all conversations in bars between people in the same business, there was speculation about what could be as opposed to what was. The topic was computers and why, as Ballard put it, "can't television stations do the same that newspapers do, [receiving] wire copy with computer delivery and also editing copy on computers instead of by hand with blue pencils?"

The next thing Ballard knew, he and Avery were meeting with then-station manager Jim Babb and Jefferson Data Systems salesman Bill Jennings to discuss the concept. The seed for Electronic News Processing was planted.

The development of ENP was aided and probably speeded up by the fact that WBTV and Jefferson Data Systems are owned by the same parent company. And while JDS is a computer company, it is firmly rooted in broadcasting.

"It was logical for Jefferson Data Systems [to develop a newsroom computer] because they are computer people who are very closely allied with broadcasting people," says Ballard. It seems that there is more than just close-



WBTV's newsroom has been remodeled to ease both the transition to ENP and speed up staff communication

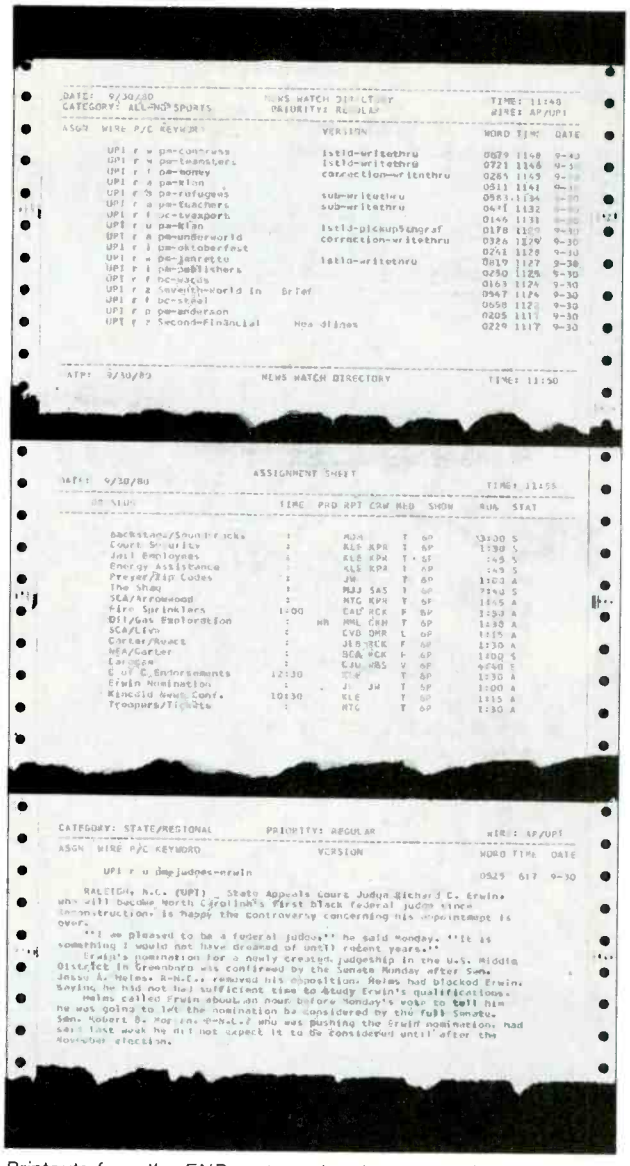
ness between JDS and WBTV. There is an almost constant exchange of staff between the station and JDS.

Paul Woidke, project manager for ENP, pointed with pride during a tour of WBTV all the people who used to work at JDS. The reverse was true during a tour of JDS.

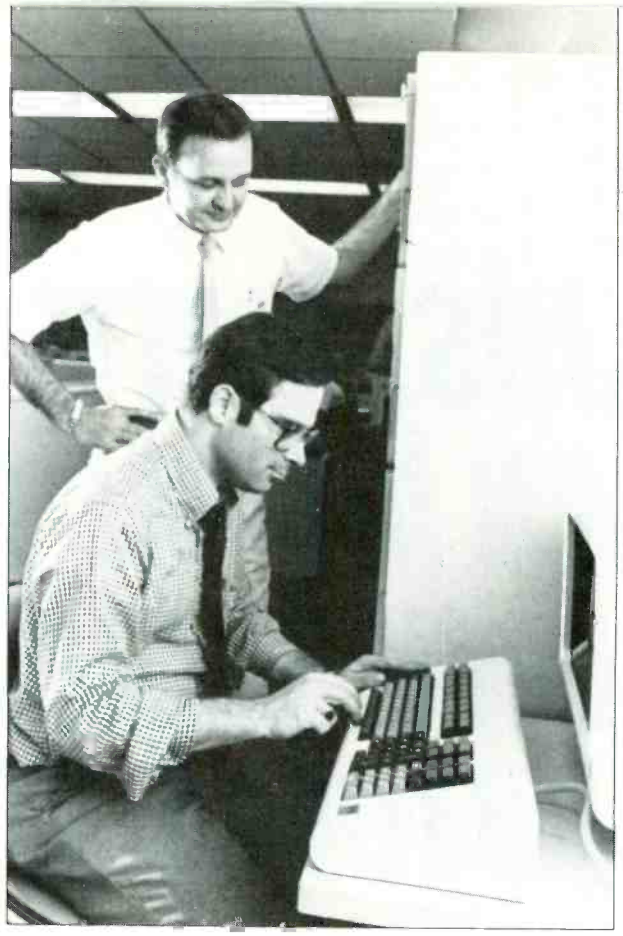
"Yes, we're computer people," says Woidke, "but we're also broadcasters. And that's important because we already know what broadcasters need."

It is a concept that is hard to dispute. Woidke himself spent many years working in radio. He did everything from newscasts to running the station. One of the newest members of the ENP project team, Bruce Bowers, was the assignment editor at WBTV a few weeks ago. Shortly after the system was installed, Woidke says, "he started using the system and kept coming up with such good ideas that it seemed logical to have him working on it full-time."

Despite the close relationship between JDS and WBTV, there is a point at which something approaching normal business dealings take over.



Printouts from the ENP system showing some of the modes available



News director Bill Ballard (standing) watches assistant news director Mike Cozza put ENP through its paces

"We did not subsidize that operation," says Michael Jones, VP and managing director of Jefferson Data Systems. "It was not a no-cost guinea pig situation. They signed up for it just as if we were an outside vendor."

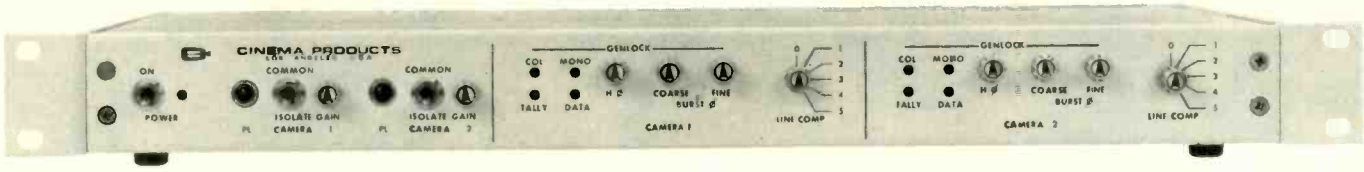
The station purchased an IBM Series 1 computer, five terminals, and high speed printer. And while the cost of the hardware is not to be sneezed at (in the $75,000-plus range), the clear advantage to WBTV is that it did not have to bear the brunt of the research and development for what is in many ways a custom-designed system.

Even though JDS is footing the bill for the R&D, the company clearly thinks that there is a market for news computers. The belief is not misplaced, according to one industry observer, who predicts, "In five years, news computers will be a $100-million business." According to one source familiar with JDS, "Somebody's going to make some money off this thing and Jefferson Data Systems wants to be in position to grab a large chunk of it."

"Our whole philosophy," explains Jones, "has been to be a total service to the broadcaster, meaning that we can supply all their computerized needs. We didn't like the idea of them having to go to somebody else to get their news automation." The feeling at JDS is that it is easier for the present users of the company's sales, traffic, and business systems to make the switch to ENP. Jones thinks that JDS's reputation in the business goes a long way toward predisposing stations to trust the new product. "It's tough," he adds, "to be a new face in the marketplace, even if you have a superior product. We have a clear-cut advantage in that we are not a new name in the marketplace."

Old name or new, the fact is that ENP and similar systems are in the field-testing stage. ENP is at the point at which all the things that can be done to smooth out the

CO-AX DIGITAL REMOTE CONTROL



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- ☐ Eliminates the need for expensive, bulkier, multi-core or triax camera cable, and reduces to a minimum the risks normally associated with the use of such camera cables.
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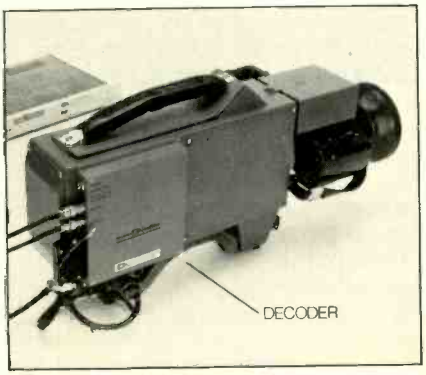
- ☐ System is ideal for all extended shooting situations such as sports events, live concerts, political rallies, etc.

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



Ikegami HL-77 shown with side-mounted decoder.

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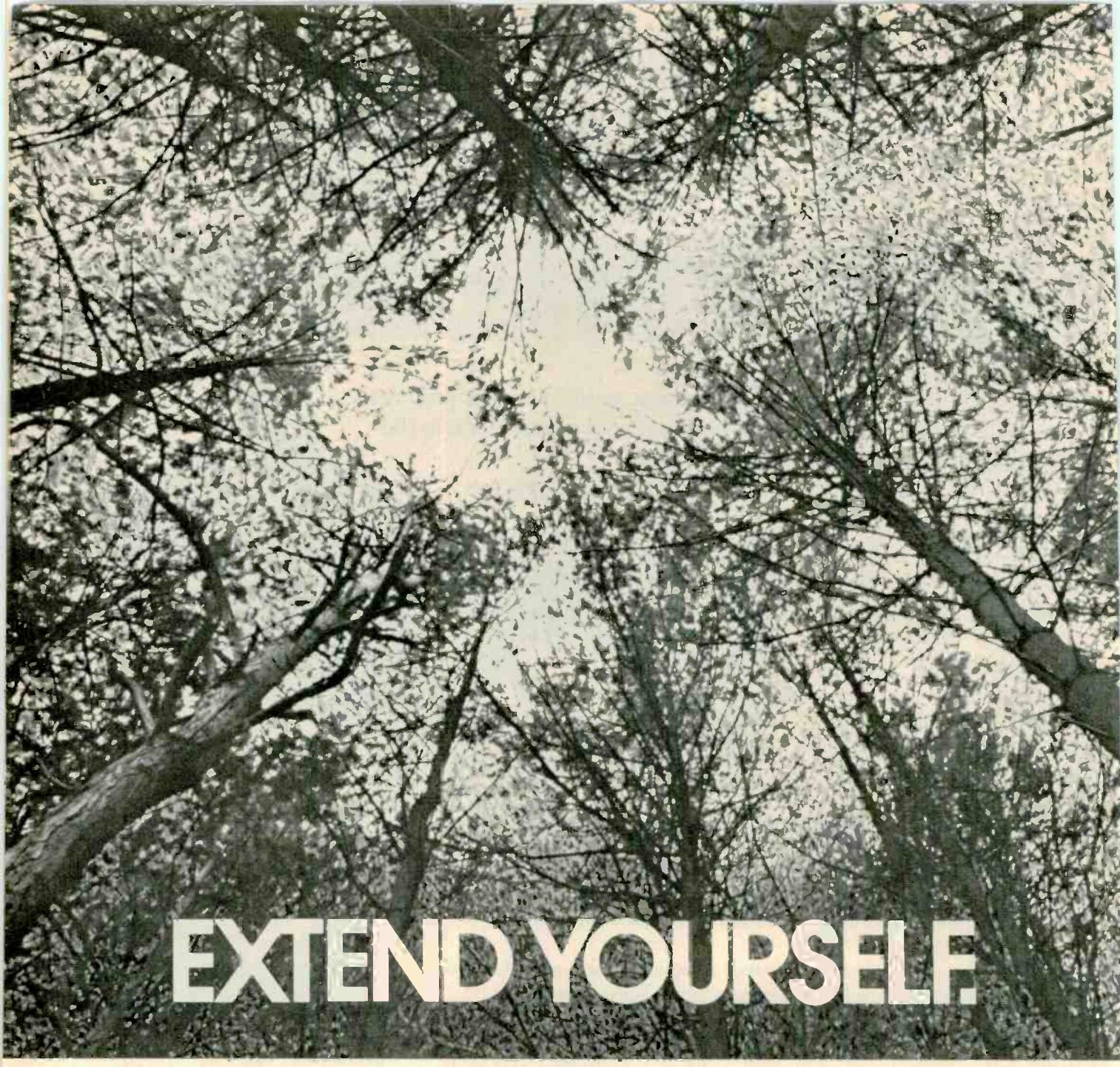

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Circle 132 on Reader Service Card

Ballard talking to then assignment editor Bruce Bowers, who is now working on ENP R&D

kinks in the lab have been done. The system now has to go through its paces where it counts — in a working newsroom.

The WBTV staff is pleased with the progress of ENP. The first day it was installed in late July the assignment editor used the system without once falling back on his old dependable typewriter. He managed to use the assignment function with little or no problem.

"The greatest benefit that I get out of it," says Brian Thompson, executive news manager, "is the wire scanning. I can keep up to date much better with the wires and I don't have to go over to the wire machine and deal with all that paper."

Another aid that Thompson finds very useful is being able to mark electronically where he left off and not check back over wire material that he has already seen.

The wires are dumped into the system and sorted by ANPA codes. Once in the system the data is available in a number of ways. The logic of the system goes from the very general to the very specific. It can give a complete overview of what is on the wire by story slug. Then, by one function key, it will change to a configuration which gives the first four lines of any story. Another stroke of the same function key will put up the complete text of the story. The entire ENP system works on that principle: start with the general and go to a mode as specific as necessary.

The function keys play an important part in the ENP system. When the system was shown at NAB, a number of people weren't sure how easy the system would be to learn since there were 32 function keys. But Woidke answers that complaint by observing, "The point of the function keys is that each does one function. They are all clearly marked and most users will never need to worry about many of them. If you are not a producer, there is no need for you to ever use the PRODUCER RUNDOWN key."

JDS has been introducing ENP to the station in small doses. It was felt that introducing the system all at once would cause more problems than it would solve in its pilot stage. Most of the staff had little or no experience with VDTs. When terminals were introduced into newspapers and the wire services about 10 years ago, there was initial resistance, but once everyone became acclimated to them no one wanted to go anywhere near an old-style typewriter.

Fortunately, there hasn't been any resistance to the new system. "The staff has taken to it much better than I had anticipated," says Ballard.

The system has only been on-line since July, but most of the programs are now running. The wire service interface (News Watch), the assignment desk (News Pro), and the text editor (News Edit) are being used, some to a lesser extent. News Edit is being used to write scripts, but the copy is not being stored in the archive (News File) program. The decision was made to hold off introducing that function until the producer rundown function is working in conjunction with the teleprompting program.

JDS went outside for a teleprompter interface. Bestion is the contractor for the system. It is functioning at JDS but there are still some minor problems. Until those are worked out, it will not be used at the station.

All in all, both JDS and WBTV are satisfied with the progress of ENP. Bill Ballard thinks that it will revolutionize the industry. "We'll be doing things that we haven't even thought of yet," he says. When he talks about the system he starts sounding like an evangelist, but he adds, "I believe in it." **BM/E**

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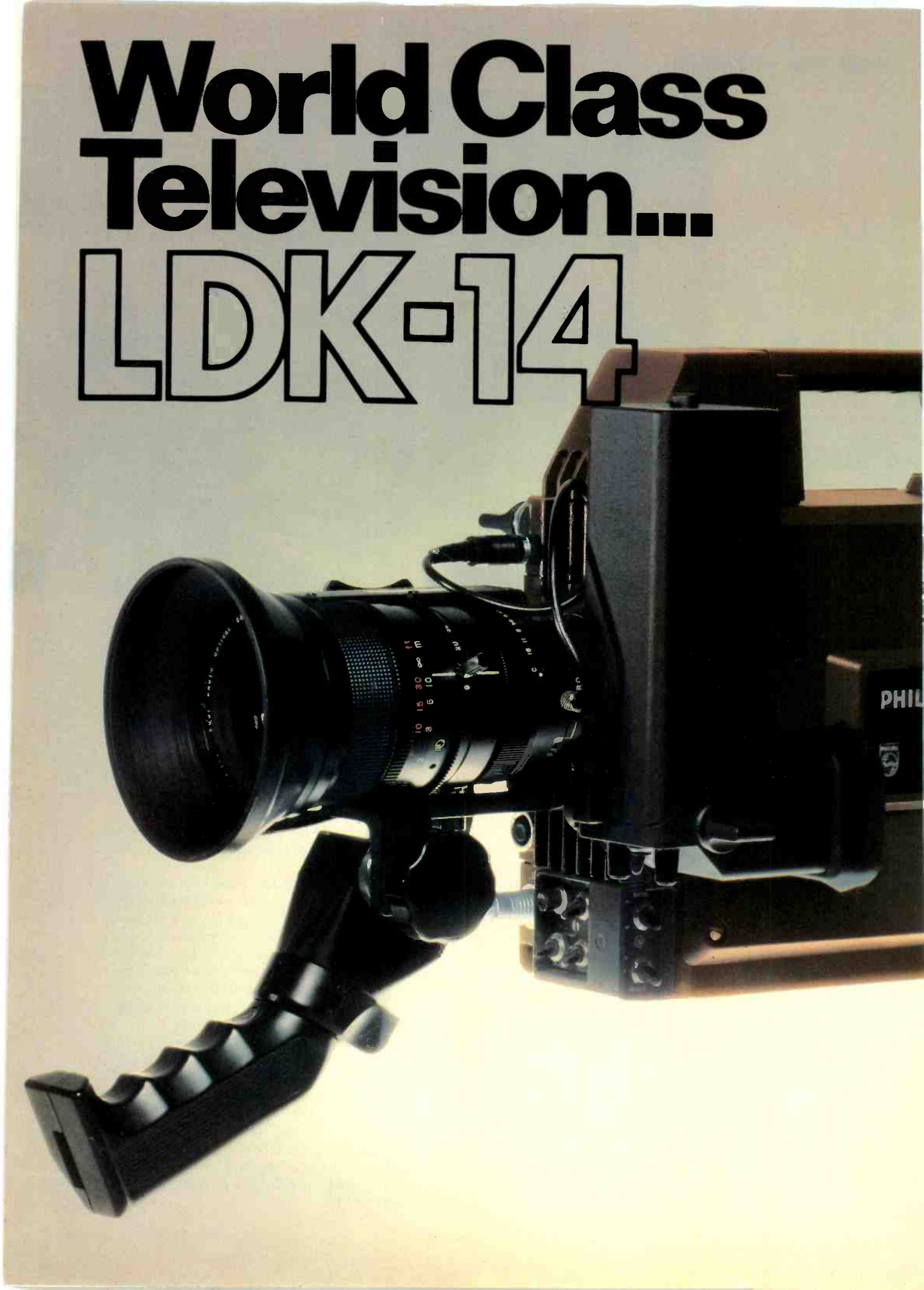
LDK-14



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

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

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

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

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

Evolving from this long history of portable equipment leadership, Philips' engineers have created a new concept in portable and field equipment . . . the LDK-14 Broadcast Systems Camera.

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

1. **ENG**—studio quality portable; self-contained, one piece; film camera handling; weighing less than 15.5 lbs. (7 Kg) lens included; less than 12 lbs. (5.5 Kg) without lens.
2. **EFP**—studio quality portable, with remote control; timing and phase adjustable gen lock; instant convertibility to studio camera use by simple change of viewfinders.
3. **TRIAX**—cable operation eliminates equilization problems on long cable runs.

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

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

- Viewfinder displays include: contour enhanced camera picture or external video signal; status monitors for video level, color balance, bars on, battery discharge, VTR functioning, intercom call and camera tally.
- Automatics include: color balance; white and black level; centering; noise reduction when operating with extra gain; auto iris with set and hold facility.
- Externally switchable black stretch and contrast expansion.
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STILL STORES MAKE A GREAT LEAP FORWARD FOR BROADCAST GRAPHICS

By Pamela W. Peterson

Still stores, with their great potential for enlivening on-air graphics, are now beginning to deliver on their promise. As artists, producers, and operators begin to get comfortable with the technology they are finding whole new ways to bring verve and excitement to television stills.

LET'S CONSIDER a common piece of graphic production: the 6:00 p.m. news needs a head shot of a suddenly prominent congressman over a black background. A red strip below his face will serve as background for his title, "Congressman Obscure — R-Neb," in white lettering. The shot must be correctly placed for chromakeying behind the news anchor.

First, get a facsimile picture of the congressman, and mount it on a black background. Second, hot press his title over a red strip and center it under his name. Lettering size not quite right? Back to the hot press. Ahh, that's it! Now shoot the slide, develop it, mount it, get it into the slide tray, and have it checked in for video levels. Total time: anywhere from one to three hours depending on the efficiency of the graphics department and the number of people working.

That's the way most video graphics were produced until recently. The advent of digital still storage devices has brought the time for producing the graphic just discussed down to 10 minutes . . . with a good production team, of course.

The first still stores might be considered to have been slow-motion devices that stored single frames of video and could be halted in their playback at one frame out of the many in a recorded sequence. But still stores with the capability to locate one and only one frame, then move to another track on the storage medium for the storage or playback of another frame, date back only about six years.

At first these machines were not used for much more than replacement of slide chains. The original configuration usually called for a video camera input and one or perhaps two channels of output.

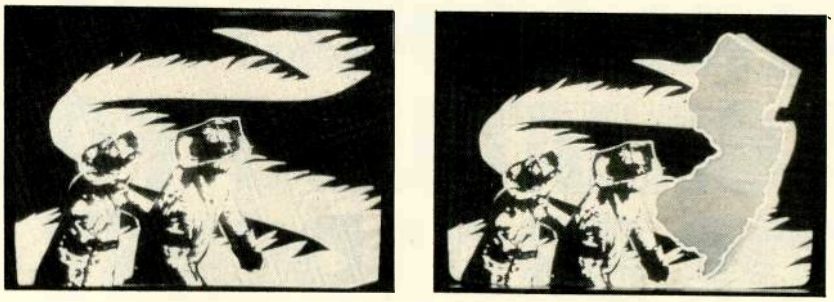
The use of computer-type magnetic disc packs with large storage capabilities (one frame of video sampled at 10.7 MHz creates approximately 2½ million bits of information) yielded about 750 "on-line" stills. Despite some difference in access time from unit to unit, these stills can be considered immediately accessible. Doubling the number of disc drives doubled the number of on-line stills, and off-line pack storage meant that the thousands of non-current stills accumulated in a busy news year did not have to be erased to make way for the most recent additions.

News4 New York's *dynamic new logo is partly attributable to the new freedom graphic designers are finding in still store use*

The first major advance in graphic production techniques occurred when store operators and production staff realized that a small amount of video effects gear (garden-variety faders and keyers, for instance) and the loop-back of output channels to the input would make possible an economical (and fast!) production/storage operation

Let's consider how, with this setup, one might do the production mentioned before. Start with the facsimile picture on a dull black surface. With remote camera controls the still store operator can make sure that the color and video level are right before he stores the basic picture. Next, play back this first still through one output channel to a production studio, which wipes in a red titling background below the head shot. A character generator supplies the titling and the shot is stored again. This still is

Pamela W. Peterson is employed by CBS, and is a frequent author of articles dealing with broadcast technology. She wishes to thank Lee Levy of the CBS Television Network and Beverly Littlewood of WNBC-TV for their information and assistance in the preparation of this article. Photographs courtesy of *News4 New York*.



By utilizing the twin output channels of a modern still store, semianimated sequences are possible

now "taken," "developed," and "mounted." In addition, it has an inventory number and its video levels have been checked.

Can't spare a character generator? You could still store after the red title background has been wiped in and have the graphics people run up a set of hot-press lettering. Size is no problem . . . you can zoom in or out to make the lettering match the space available, key it over your second pass still and get precisely what you want.

Centering is the next step. Most news shows use one standard shot of an anchorperson for hard news stories, and the chromakey area behind him or her is the same from day to day. Using a "template still" that can be faded over the camera input to allow precise positioning makes proper placement of the main interest area in a still easy. You must pay attention to system timing when feeding back a still for use as a positioning guide, of course. Incidentally, one can avoid using an output channel for this purpose entirely by providing a modified "safe area" generator as a "template still input." Whatever method is used, the template still can be fed through the studio to the camera operator before air time to make sure that the stills and chromakey area match perfectly.

Advantages of still storage

Stills stored in the manner just described are very accessible (two seconds to enter the address and recall the still to the screen). They will not jam; they don't have to be loaded in trays or carrousels; and they don't fade, crack, or get inserted backwards or upside down. The time to get from one to the next is usually less than a tenth of a second (sometimes as low as 30 ms). These advantages alone make still stores worth considering.

In live news production, a frequent problem is the need for a last-minute change to the lineup — the order in which the news stories are to be aired. Using slide trays makes the accompanying graphics change awkward, at the very least — it may even be necessary to totally abandon a carefully prepared graphic in order to avoid jeopardizing the rest of the slide sequence. With digital still storage, especially with two output channels, the access time for an out-of-order still — and the time to return to a previously programmed sequence — is so short that last minute changes can be made. (In fact, there is some danger of having last-minute lineup changes become a way of life with a still store, according to experienced operators. Beware the dragon of indecision!)

Digital still storage offers more than simply the advantages of speed and flexibility. Some other production advantages include frame grab capability, graphic sequence production, artistic effects, and on-air recording for breaking news stories.

Frame grabs and graphic sequences

Still stores record a video frame using true vertical switching techniques. Some machines offer a feature wherein the microprocessor control will generate a "next available" address, automatically freeing the operator from having to specify an address. In such a case, using an erased disc pack, an operator can "grab frames" just about as fast as he or she can hit the TAKE button. Stations not using still-frameable VTRs, or without freeze-frame capabilities on a frame synchronizer, can use this feature for graphics work. Any kind of input video can be used to generate a possible graphics still. Even if the station does have VTR or frame-sync still capability, one fast run of still-store frame grabs frees up the VTR or frame sync for other work.

Aside from the simple "sequence," the electronic equivalent of loading a slide tray, certain kinds of effects can be easily produced with still sequences. Charts or graphs that build, colors that change, maps highlighted in stages to show geographic or political information — the production of these animations is rendered simpler and faster by the use of still storage devices.

Two ways of achieving an effect that looks like photographic solarization take advantage of the still store. The first method uses a colorizing insert keyer with the luminance set low, and the original still fed back over itself. Simpler still, a switch in the output D/A converter that switches off the second most significant bit will create strange hue and level shifts. Either method can be used, the still being produced, stored, and titling set over it on a second pass.

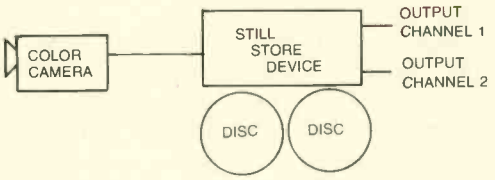
Digital feedback is also an option. Analog feedback is unstable; it "crawls" on the screen, resembling a lava lamp in aspect ratio. Digital feedback locks up. The effect has been compared by some to a "waterfall" of images, by others to multiple exposure photography. More control over it is obtainable by running it through an input keyer. Because of the nature of feedback the image trail will be white. This can be colorized on a second pass — or the original form can be insert keyed on top of its starting or ending position.

Most kinds of graphics will benefit from this "second pass" treatment. Need a dropshadow on lettering? Store the still once, move it, change luminance, key it, and store again. Colored borders? Store once, zoom out, insert key in white, store again. The effects are endless, and once the store operator and graphics department get their creative juices flowing together, you'll be amazed at what they come up with, not the speed with which news producers' demands can be met.

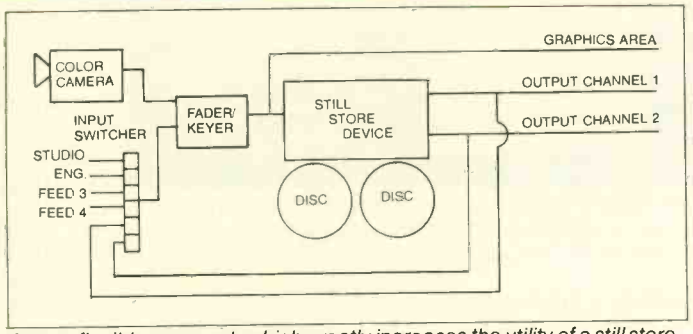
One final benefit worth considering: the more complex still store devices can actually be used to store stills while

one channel of output is being played back to air. If the story of the century breaks 12 minutes into the 6:00 p.m. news, you can use the machine to still store some kind of graphic. Even a title in the chromakey area looks better than having your announcer read the story completely dry with no graphic at all.

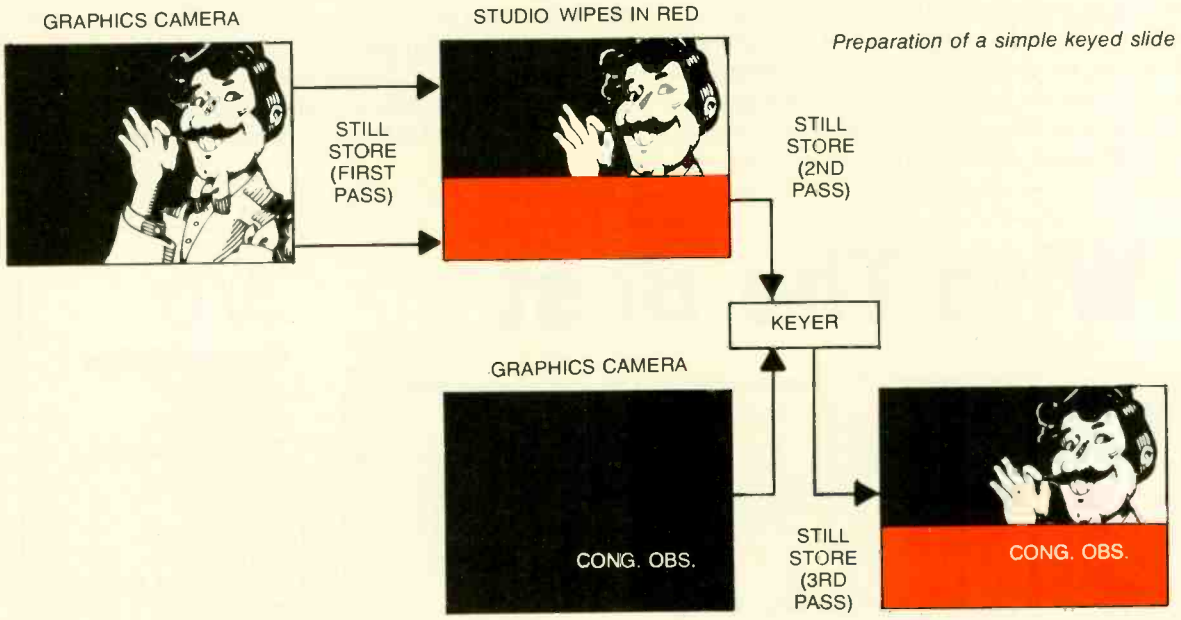
Currently several manufacturers, including Ampex, ADDA, Arvin/Echo, Eigen, Harris, MCI/Quantel, NEC, Oktel, and US JVC, offer electronic still stores. All of the current systems use some type of disc store, though not all are digital. Arvin's disc recorders, for example, are analog and an outgrowth of its slow motion recording systems. Ampex and ADDA are currently the most common of the digital still store systems in the market, though they have been joined recently by MCI/Quantel and Harris's IRIS system in the offering of very high-capacity digital still storage. Established systems like Eigen's and Oktel's are gaining greater acceptance in the marketplace, and as



Basic block diagram of typical still store layout



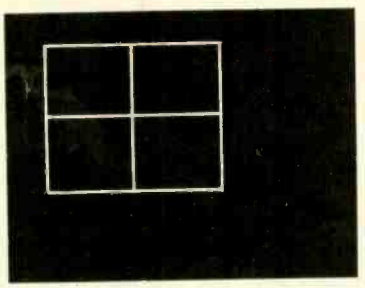
A more flexible approach which greatly increases the utility of a still store system



Preparation of a simple keyed slide

Preparation of standard stills for use within the news format

"STANDARD" NEWS SHOW SHOT



"TEMPLATE STILL" (USES CENTER CROSS FOR ALIGNMENT OF GRAPHICS MATERIAL)

Still Stores

Modern graphics systems are offering news directors and producers the opportunity to provide visual appeal in stories which were at one time visually dull

disc recording becomes a standard design of other manufacturers, more systems will come on line like US JVC's NAB introduction of yet another electronic still storage system.

The available systems tend to be configured as large-scale library and production systems intended for use where greater capacity is needed, or smaller systems where size and cost are more important than the number of stills stored. The larger systems tend to have a greater variety of effects available and more sophisticated search routines. Quantel's DLS-6000 (Digital Library Store), for instance, has focused a great deal of attention on methods of searching and content management. Costs of the various systems tend to be directly proportional to storage capacity, list management, and effects capabilities. Thus the larger systems tend to run between $160,000 to $200,000, while smaller, basic still stores with capacity in the 200-still range cost upwards of $50,000.

Since the output of these still stores is NTSC video, their combination with production switchers can lead to the creation of extremely complex effects sequences. With the new microprocessor-controlled effects memory systems available on the more modern production switchers, a world of otherwise unthinkable graphic sequences can be produced quickly and economically. Generally, however, extensive use of effects switchers will require either multiple still stores, or at least still stores with multi-channel outputs.

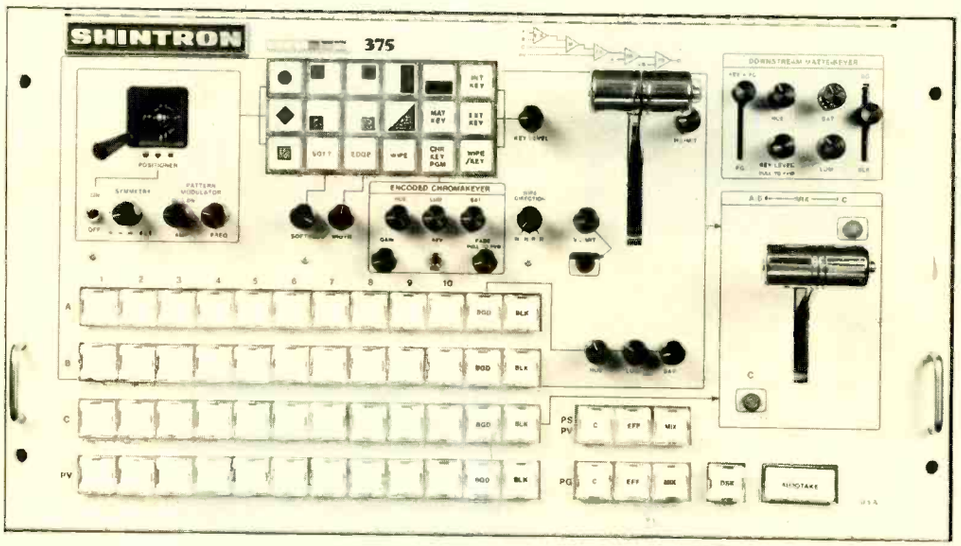
Although it is highly unlikely that any station would go to the expense of acquiring a production switcher specifically for use with a still store, allocation of time on existing switchers to the graphics department will pay dividends in the graphic quality available to news programs and commercial clients.

While the cost/benefit analysis of electronic still storage should consider production time savings, cash realized in the sale of slide chains, savings associated with the reallocation of space formerly devoted to slide storage, art material and photo developing savings like any other production tool, the proof will be in the ability of the technology to generate revenue. This ability in turn is dependent upon the creative potential of the people who operate it. **BM/E**

Mix With The Best

375

SuperSwitcher



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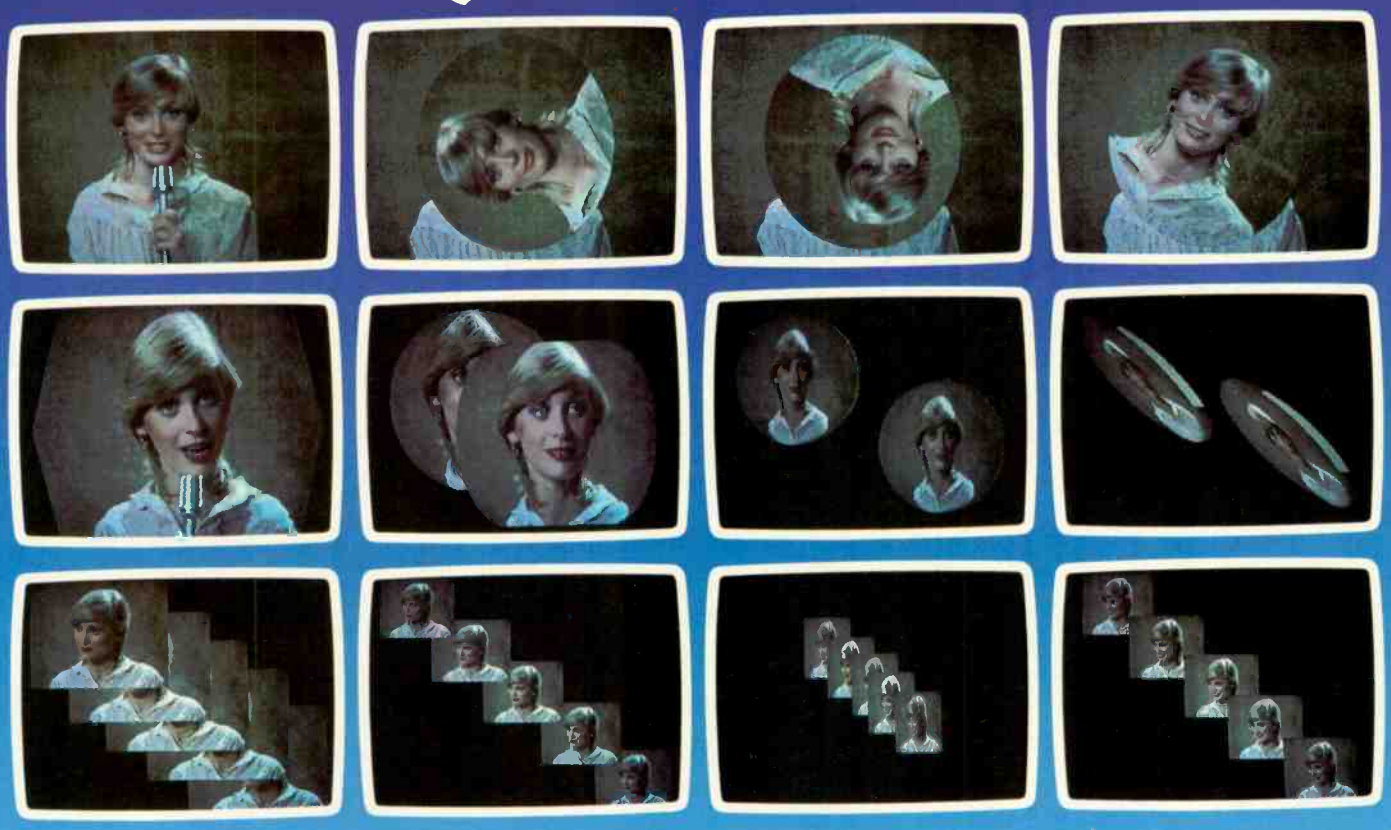
The Quantel DPE 5000.



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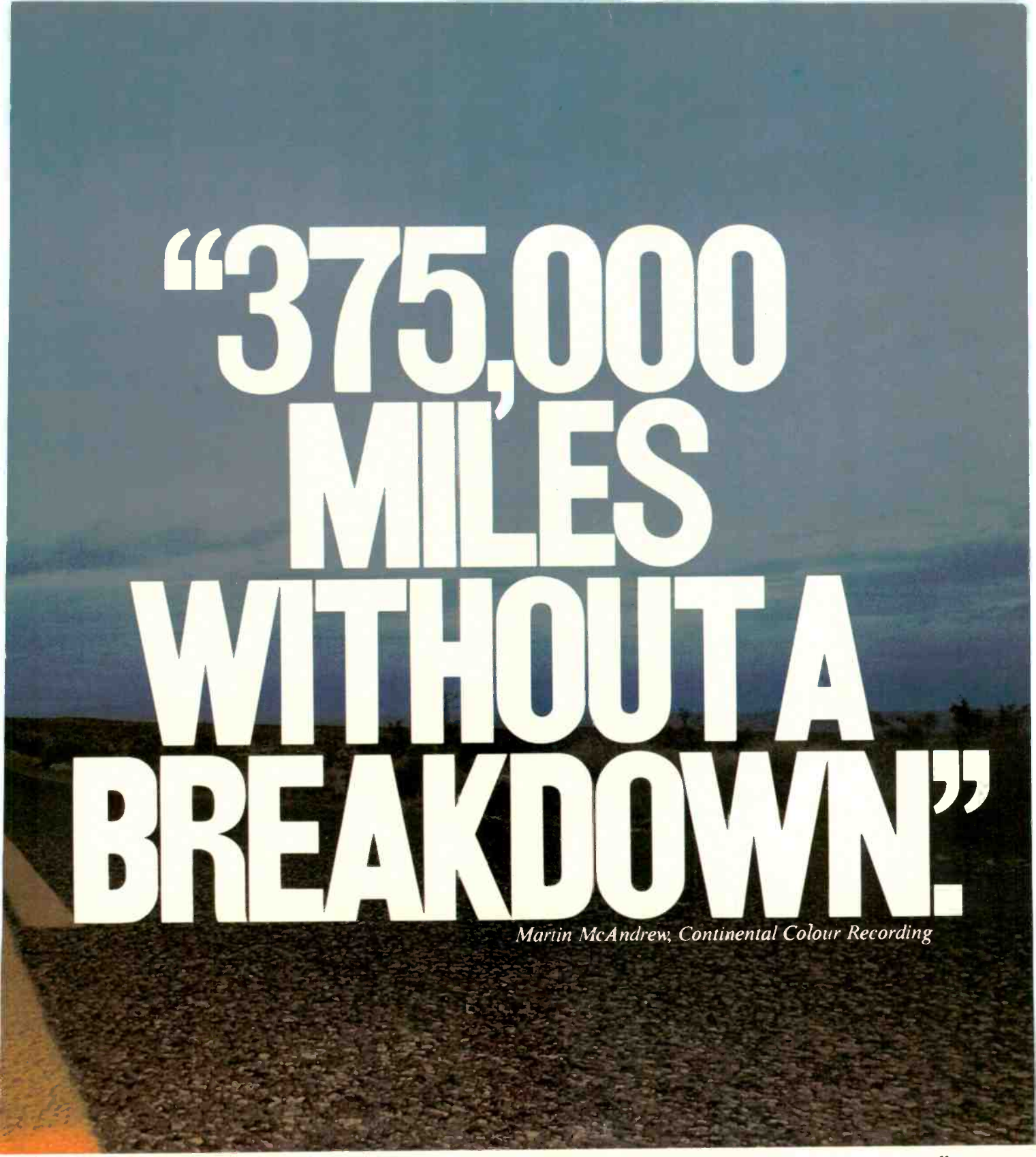
Continental Colour, the country's largest video equipment rental company, has specially built trucks and trailer trucks that are virtually television stations on wheels. Two of these trucks are equipped with one-inch equipment, including a total of two BVH-1100 and four BVH-1000 one-inch high-band video recorders. Continental has also purchased additional Sony recorders for its brand-new post-production facility.

"Sony picture quality is excellent," says McAndrew,



"much better than its main competitor. And the slow-motion capability of the BVH-1100's means that each can do the work of two separate machines, in less space, at less expense. No one else's equipment can match these 1100's.

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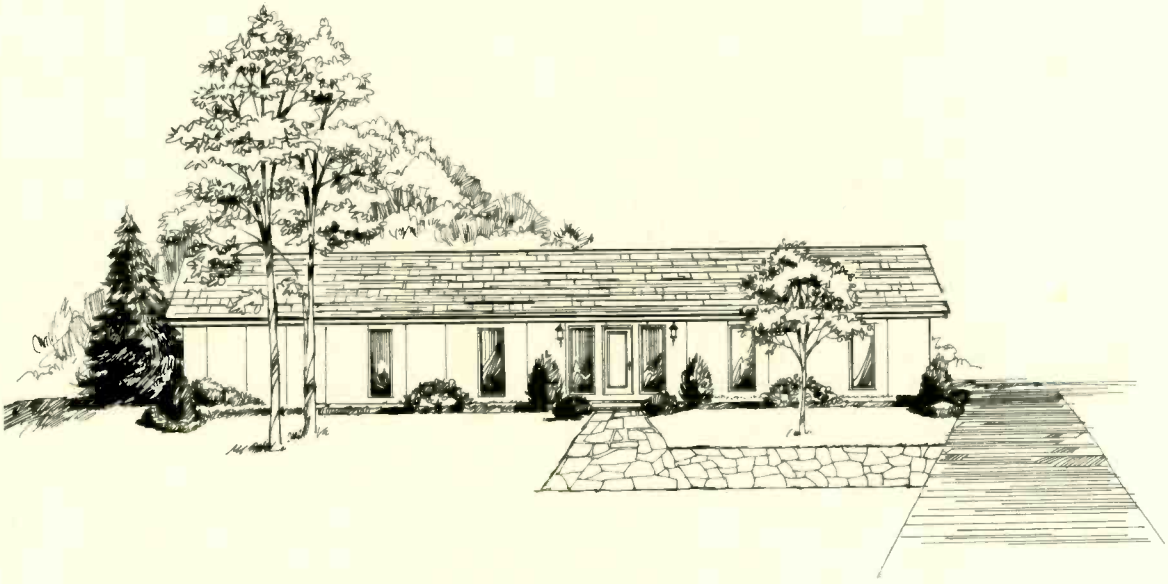
YOU CAN PUT UP A BROADCAST STATION IN ONE DAY

The broadcast station "kit" developed by Grinnan Fixture Company arrives at the site on three large trucks with all equipment prewired, along with finished cabinets and a modular building specifically designed to hold it. If your foundation is ready, you can fire up and go on the air a few days later.

BY COMBINING EXPERT USE of prefabrication with complete wiring and technical assembly before delivery, the Grinnan Fixture Company of Minerva, Ohio, has come up with something really new: a broadcast station that can be erected on a ready foundation in one or two days after arriving at the side on three flat-bed trucks. John Grinnan, owner, a veteran of interior cabinet design for broadcast stations and the wiring together of studio systems, says that the entire period from his receipt of an order to completion of the building will ordinarily be 30 days or less.

He therefore has a point to make with his assertion that the buyer of one of his "kits" gets his broadcast station "absolutely free." He means that the saving in time, compared with the four months or more usually needed to put up a broadcast station from scratch, will save more money than the station costs.

Grinnan has built and installed a large number of studio



One of exteriors available with standard Grinnan prefabricated broadcast station building is shown in the drawing above. The exterior walls can be lapped siding, brick veneer, brick, stucco, plywood panels, or others. The roof can be gabled (as shown) or flat, with one side of the roof covered with acrylic plastic if solar heating is chosen

systems for broadcasters over many years. The firm manufactures every kind of cabinet needed in a broadcast station, including those for storage of records, tapes, carts, etc., and those for holding turntables, cart machines, consoles, and all the other units of a studio system. Grinnan is also a distributor for about 65 lines of broadcast equipment.

Modular construction saves building time

The Grinnan-designed buildings are constructed in modular form by the American Coach Company of Lordstown, Ohio. With a project in hand, Grinnan first builds the interior cabinetry, assembles the equipment chosen by the buyer to go into it, prepares all the wiring, and tests the studio system "in place." Meanwhile, American Coach has prepared the building.

The two "packages" are combined into one on three trucks for transport to the site. There Grinnan's assembly team puts up the building and connects all the equipment. All internal power and telephone wiring (along with all telephone instruments) are in place, so only the local utility drop lines are needed to make the station a going concern.

A Grinnan station is thus a "package deal" in every sense of the word. Everything above ground in the main building comes from one supplier. This can include, at the buyer's option, all the office furniture (supplied by General Fireproofing Company of Youngstown, Ohio), copying machines, a Radio Shack computer for automated bookkeeping wired in place, with a program supplied.

Grinnan recommends in most cases that the transmitter be installed in a small accessory building (which can also be supplied), largely to reduce the chance of RF interference in the studio equipment.

The standard building is 75 by 33 feet, and comes with a variety of floor plans (see sample floor plans). Grinnan says that talks with many prospective buyers indicate that about 50 percent will use the standard building; the rest will want more or less custom design, which he is fully prepared to supply. The firm has staff competence in architectural, mechanical, and electrical design of buildings.

For example, a large university discussing a station with Grinnan wants four wings added to the standard building for additional office and operational space. The modular scheme allows for many variations of this kind.

The basic building material is wood framing. The buyer gets a wide choice of exteriors: lapped siding, plywood panels, brick veneer, brick walls, stucco, and others. The interior walls are ½-inch dry material. Between the interior and exterior are two four-inch thicknesses of fiber glass insulation, with a ½-inch air space between.

Solar heating, if you want it

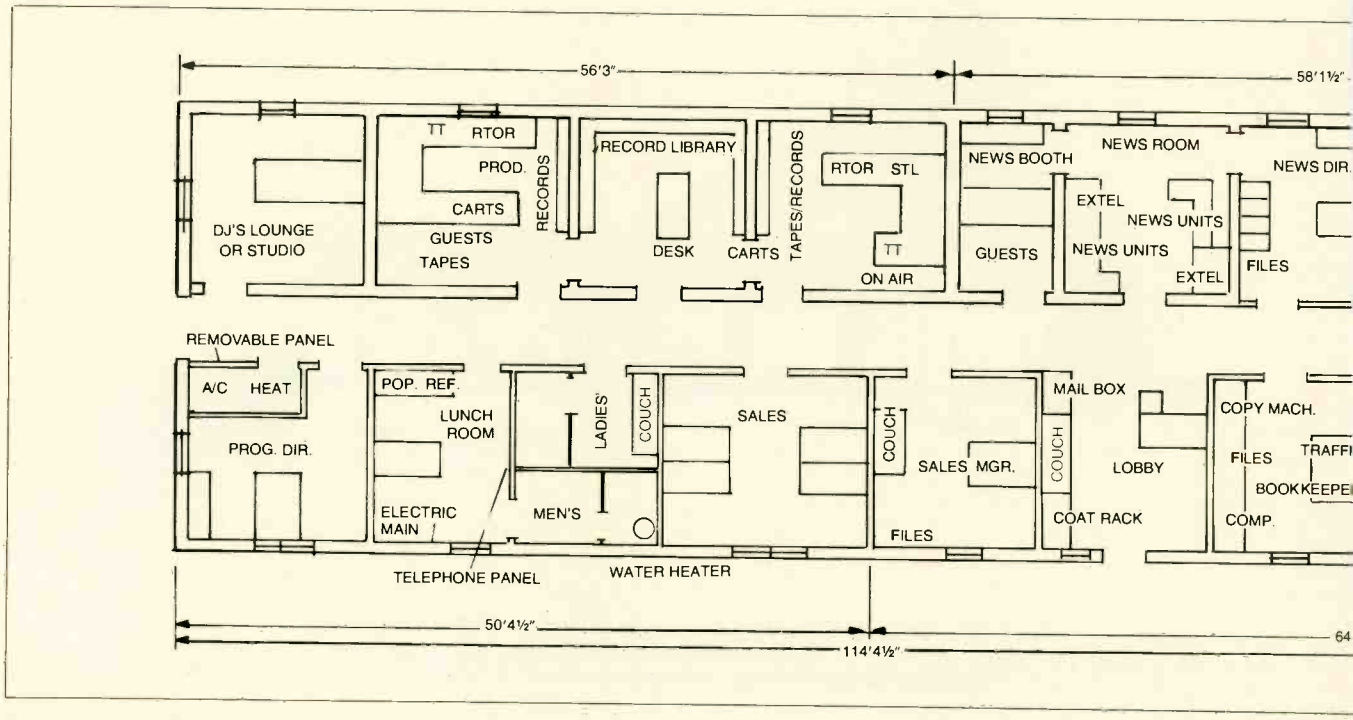
The roof can be gabled or flat, with one side shingled. The other side can be the site of an optional solar heating system worked out by Grinnan and undergoing final tests as this was written. The roof section for the solar heating system is ¼-inch acrylic plastic that lets the radiant heat into radiator-core heat collectors. Heat-transfer oil carries the heat to a depth of gravel in the basement for storage. A pump system circulates the heat to finned radiators in the building.

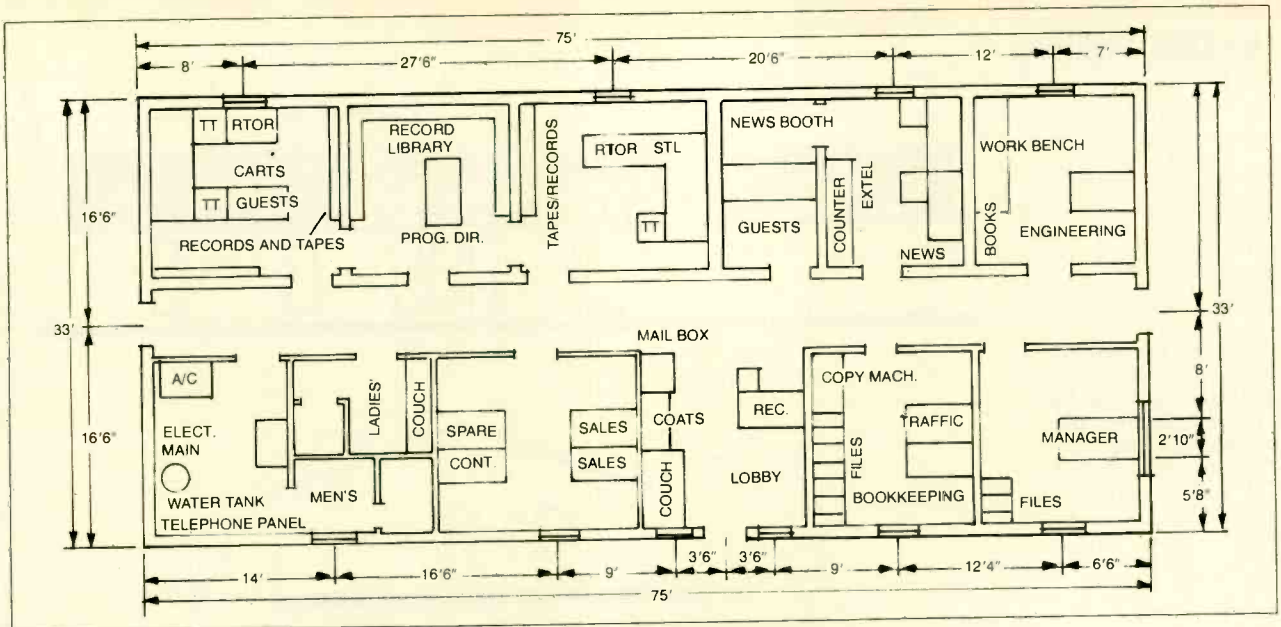
Heating choices

The buyer, however, gets a choice of heating arrangements. For example, if the station is part of a university plant that has a central steam heating system, the steam can be brought into the circulating equipment in the station building and the heat delivered by the radiators.

The buildings are designed so that they are well within the local building code requirements of virtually all areas. Grinnan believes that problems on this score will be extremely rare; if any such appear based on the drawings and specifications, he can make the necessary adjustments before the building is delivered.

For the interior the buyer can choose wall colors, carpeting designs, draperies, and cabinet finishes. The office furniture is available in a variety of styles.



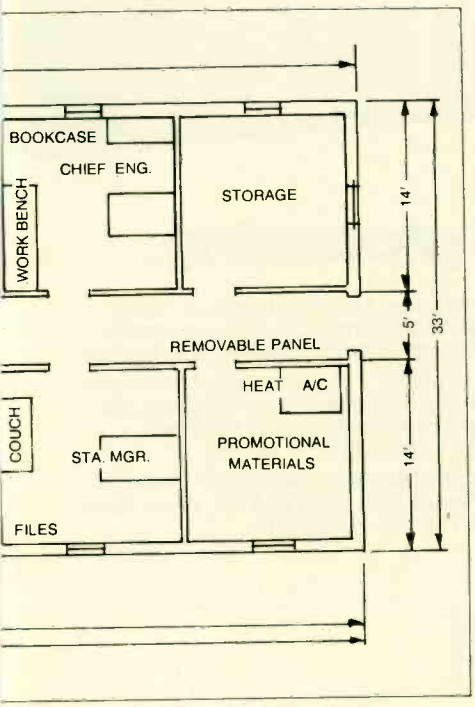


Standard floor plan is 75 feet by 33 feet, and provides space for all operational needs of a small to medium-sized radio station. The transmitter will be in an adjoining accessory building or at a remote location. The standard plan can be enlarged by adding length (see plan below) or by adding one or more wings. Interior, too, can be altered

Technical design of the station

On the design of the broadcast plant itself, John Grinnan told *BM/E:* "We are prepared to work with any technical design developed by a buyer's engineering staff or an engineering consultant, getting together the equipment specified, building the furniture to hold it, and preparing the wiring to carry out the plan. The only requirement from our side is that the sections do not exceed the legal limits on size for transport over the highways. We are experienced in making adjustments in the design that will accomplish this objective.

"Aside from that, our long experience in assembling studio systems for many broadcast stations has equipped us to work out standard studio technical plans which the buyer may find adequate to his requirements."



Enlarged floor plan is 114 feet long, against standard 75 feet, and allows space for additional offices and operation areas

The proof of performance required by the FCC is, of course, the responsibility of the engineering staff of the station. As to any faults that might develop in the station because of the assembly or equipment supplied, Grinnan says that his standard guarantees will protect the buyer adequately.

The cost of the "instant station"

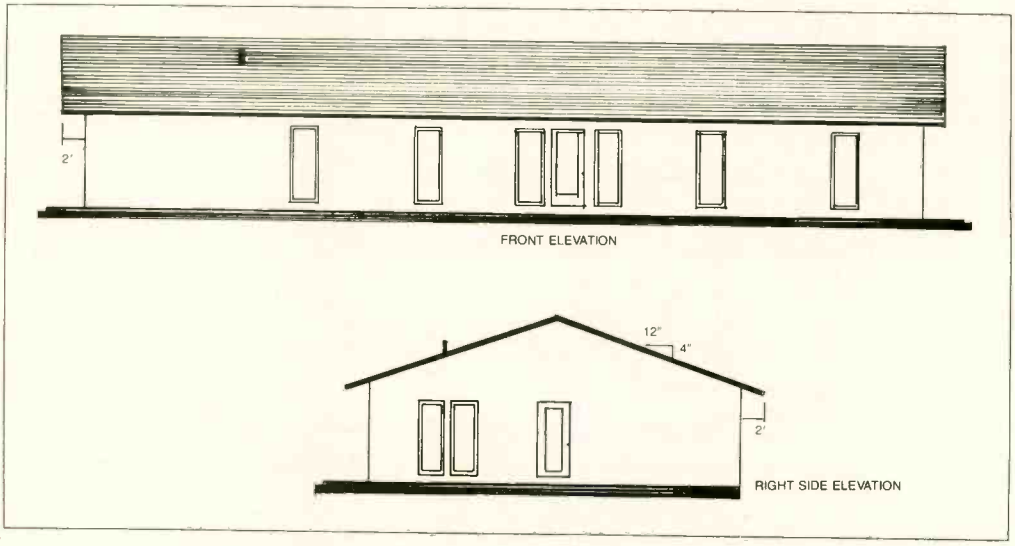
Grinnan told *BM/E* that the price of the standard building, plus all studio equipment wired and in place, averages around $160,000. This does not include the transmitter, transmission line, tower, and tower erection. Changes in the basic plan of the building, such as adding one or more wings, will naturally increase the price.

A significant factor in establishing the cost of the station is the investment credit allowed under the present Federal tax law. The whole package rates as capital equipment and thus entitles the buyer to the investment credit. He also gets double declining depreciation the first year, which can save a large amount of income tax. Ron Henn, chairman of the board of American Coach Company, pointed out to *BM/E* that this can greatly increase the financial advantages of buying a modular station.

John Grinnan's own involvement with radio broadcasting covers the whole history of the industry in this country. He told *BM/E* that as a small boy he was taken by his father to see the inauguration of Westinghouse station KDKA in Pittsburgh, which was the first broadcast station regularly on the air. He remembers the room full of gear, on the floor and on a table, the "squirrel" antenna on the roof. Later the same day his father bought him a kit for a crystal receiver (the early form of solid-state radio) which he assembled when he got home.

This led to a ham ticket at 14, a job as instructor in radio in his high school. In 1946 with two others he started the Cardinal Corporation to build storage cabinets. In 1950 this became Grinnan Fixture, with himself as sole owner.

Grinnan Fixture expanded from record storage cabinets to those for tapes and film, and then to cabinets to hold every kind of broadcast station equipment. Complete



Elevation shows front and end views of alternative exterior plan. Other variations are available for the building exterior

studio design became a specialty of the firm.

Grinnan says that he had been looking for some time for an outfit that could make the buildings on a modular basis, in order to increase greatly the speed of broadcast station erection and reduce its cost. American Coach emerged from this search because of a major position in the construction of modular buildings of every kind. Among them are house trailers, large buses with interiors converted into business offices, restaurants, and motels. American Coach has made buildings for MacDonalds, for the Holiday Inn chain, and for other firms of national scope.

As this issue went to press, Grinnan reported that he had made the choice of Stromberg-Carlson telephone equipment for his stations. The telephone wiring will include a telephone patch for connecting phones for on-the-air talk programs, as well as for intercom use within the building.

BM/E interviewed the managements of some stations for which Grinnan has recently installed studio systems. All testified to excellent performance. **BM/E**

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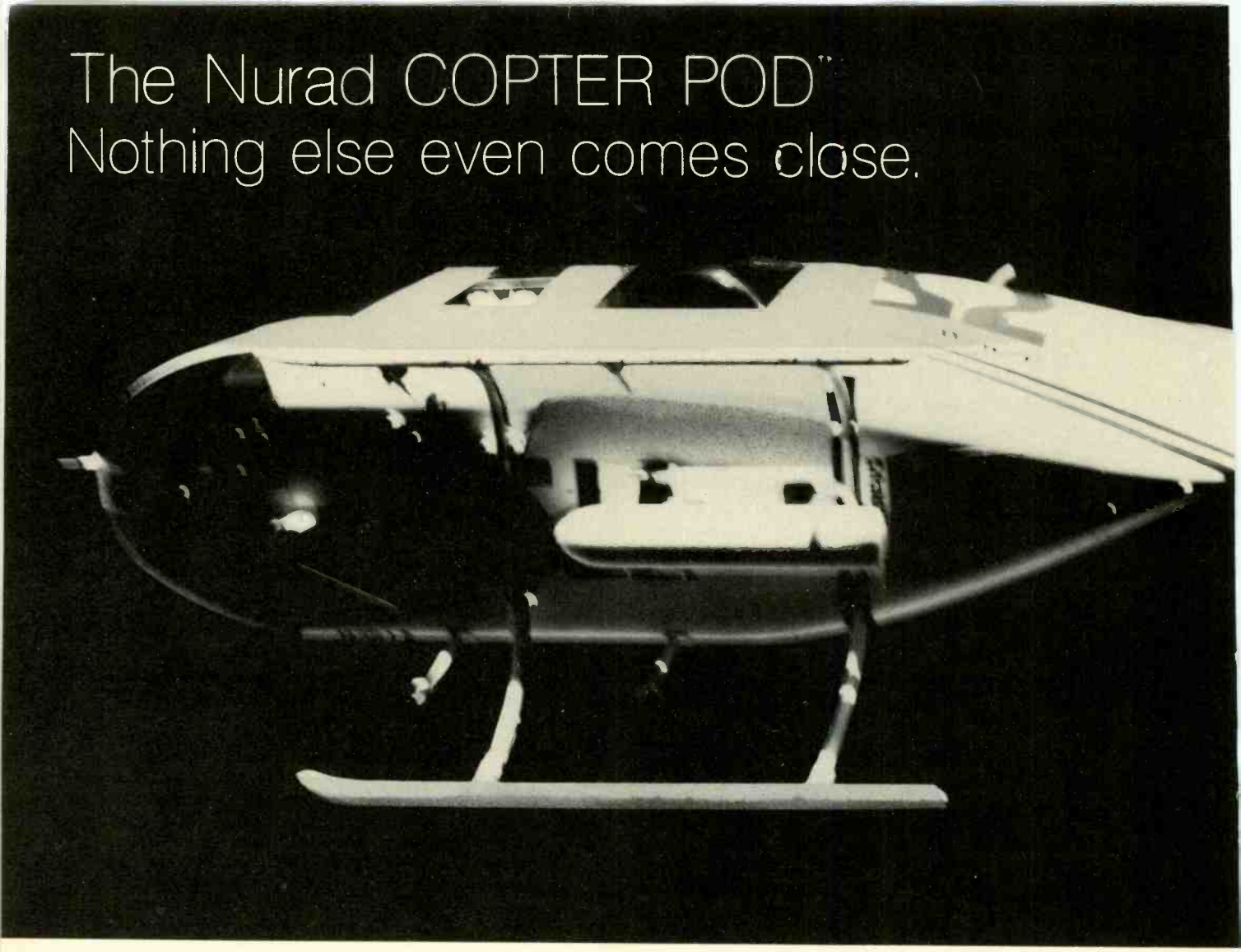

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NEGATIVE TOWERS

By Grant Bingeman

A proper understanding of negative towers (those with a negative operating resistance) and how they come about can help radio engineers lessen their impact or avoid them altogether.

WHAT IS A NEGATIVE TOWER, how does it behave, and what can you do to make it behave better?

In a phased array, a negative tower is defined as a tower having a negative operating resistance. The negative tower accepts power radiated from the positive towers in the array. Thus, the power flow is from the negative tower back to the power divider (Figure 1). In order to obtain the desired phase relation between tower currents, Equation 1 must be used when tower 2 is negative. (For simplicity, networks between the power divider and transmission line have been left out; their phase shift can be considered as part of θ.) This insures that the power returned by the negative tower to the power divider input will be in phase with the generator. When both towers are positive, Equation 2 should be used.

Equation 1:

$$\alpha_1 + \beta_1 + \theta_1 - \varphi_1 + \varphi_2 + \theta_2 + \beta_2 + \alpha_2 = \pm 180°$$

Equation 2:

$$\alpha_1 + \beta_1 + \theta_1 - \varphi_1 + \varphi_2 - \theta_2 - \beta_2 - \alpha_2 = 0$$

α = phase shift across power divider
β = phase shift across transmission line
θ = phase shift across antenna coupler
φ = phase of tower current

It is important to understand that the negative tower's coupler must present the negative of the operating base impedance to the tower. In the case of Figure 2, tower 2 wants to see 2 + j10.9 looking into the 1.06 μH coil. In theory, the coupler could be replaced by a resistor and a coil (Figure 3), and the transmitter power increased to compensate for the power lost in the resistor (0.8 dB); if the tower were parasitic (i.e., if its operating resistance were zero), no power would be lost and a single terminating coil from the tower base to ground would suffice. Although this arrangement appears economically attractive, it also reduces adjustability and pattern maintainability, and would be difficult to justify to the FCC (although this approach has been used successfully in other countries).

For those disturbed by the fact that the power in a single tower appears larger than the input power to the system (Figure 2), or that the powers do not appear to add up properly (Figure 3), I have included Figures 4 and 5. The impedance model of the towers shows that the law of conservation of energy is not being violated. Remember that radiation resistance is an equivalent resistance, not an actual resistor. The power in the radiation resistance is not being dissipated as heat, but is being transformed into electromagnetic radiation, some of which is being returned via the negative tower.

Coil and transmission line losses were set to zero to

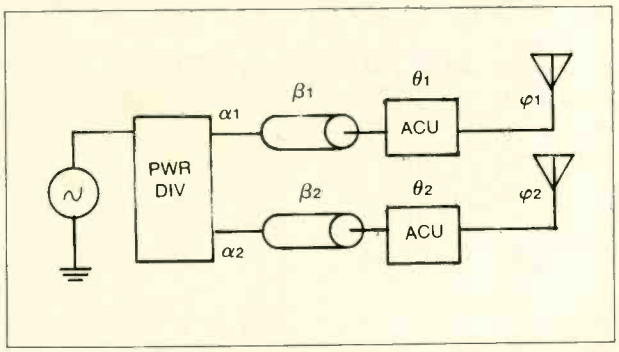

Fig. 1. Power flow is from the negative tower back to the power divider

Grant Bingeman is with the Broadcast Products Department of Continental Electronics.

Negative Towers

simplify this portion of the analysis. The system input power for Figure 4 was 1002 W and 1015 W for Figure 5. Since the original design (Figure 2) included the loss resistances, the operating impedances differ in Figure 4.

During the initial design of a phaser, when a low resistance tower is indicated, the designer knows that there is a possibility of the tower changing sign. This can be caused by environmental factors or design tolerances. If the design phase shifts are based on a negative tower (Equation 1), and the tower wants to be positive, there may be an adjustment problem. But if we solve Equations 1 and 2 for θ_2 and equate the results, we find the condition where θ_2 is the same for the tower being either negative or positive. This occurs when Equation 3 is true.

Equation 3:

$$\alpha_1 + \beta_1 + \theta_1 - \varphi_1 + \varphi_2 = \pm 90°$$

Another approach used in the past has been to insert resistors at the base of a negative or an ambivalent tower. At first glance, it may appear that a negative tower can be made to look positive by placing a series resistor between the tower and the coupler. For example, if the tower base operating resistance were −2 ohms and a four ohm resistor were used, then it might appear that the coupler would see 4 − 2 = 2 ohms. This is not the case because the *tower* would not see two ohms. Consequently the whole system would be mismatched, and adjustment would prove to be more difficult than anticipated.

If a one ohm resistor were placed between the tower and the coupler, however, and the coupler were adjusted to transform to one ohm instead of two ohms, then the tower would see the one ohm resistor in series with the one ohm of the coupler, or two ohms. But half of the negative tower's power would then be lost in the resistor, which cuts the power returned to the power divider in half, thereby forcing readjustment of the power divider. This in turn changes the phase shift across the power divider, which would require a compensating change in the coupler's phase shift. So the adjustment appears to be more complicated and the RMS of the pattern reduced. When it is considered that the resistor is not really doing what it was intended to do, it seems the idea needs further clarification by its proponents since the emphasis is placed on what the negative tower sees, not what its coupler sees. With the whole phasing system interconnected through the mutual impedance of the towers, any mismatch at the negative tower will appear as a sympathetic mismatch

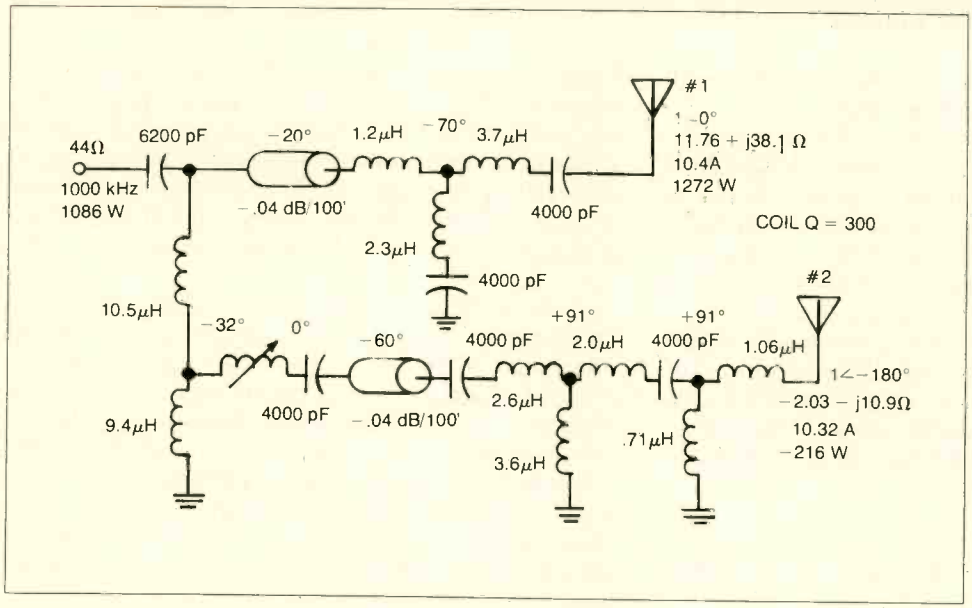

Fig. 2. The negative tower's coupler must present the negative of the operating base impedance to the tower

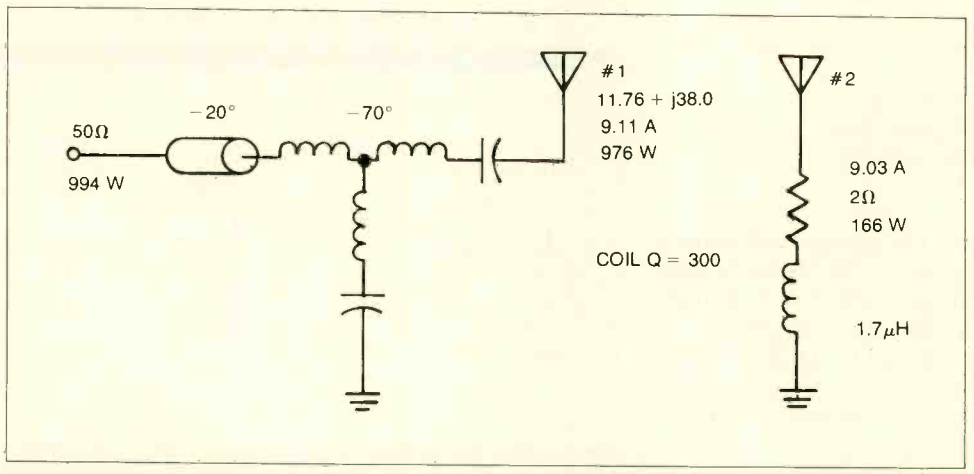

Fig. 3. In theory, the coupler could be replaced by a resistor and a coil

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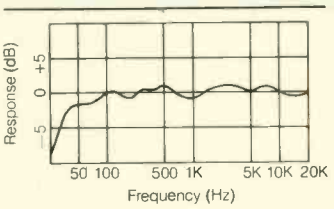

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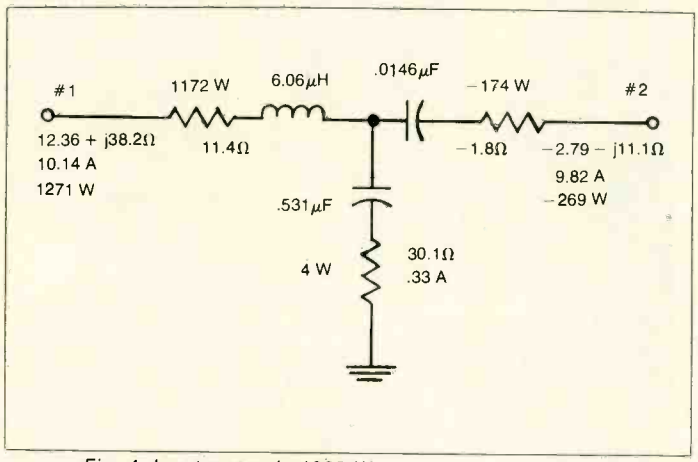

Fig. 4. Input power is 1002 W

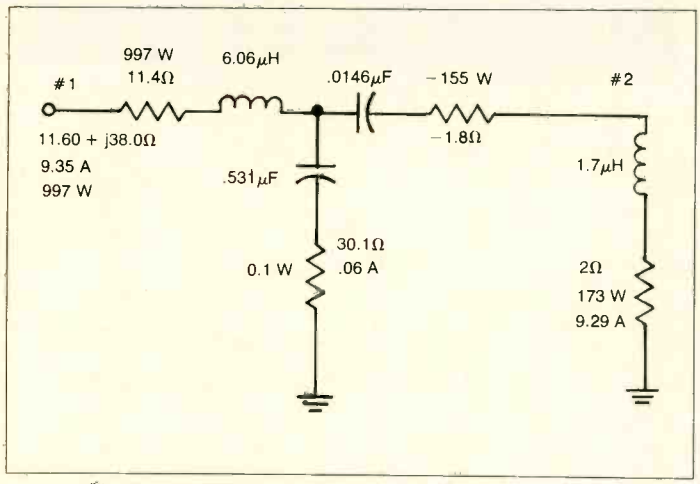

Fig. 5. Input power is 1015 W

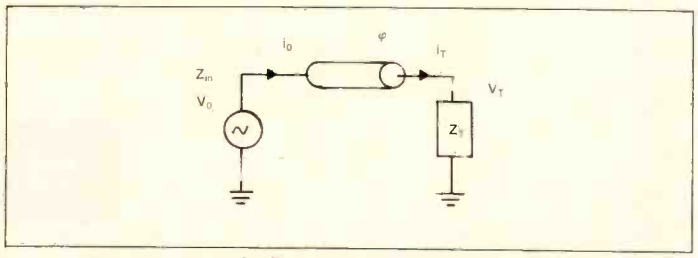

Fig. 7. A physical representation of Equations 4, 5, and 6

everywhere else in the system.

With regard to bandwidth, a negative tower produces regenerative feedback if its power is brought back in phase at the power divider. That is, the negative tower acts like a Q multiplier, unless it is terminated in a resistor. During the initial pattern design, it is necessary to calculate the loop operating resistances. Thus, from the start, the designer is aware of any negative towers and can use the technique of "moding" to obtain the best overall operating impedances for a given pattern, perhaps avoiding negative towers altogether.

Figure 6 provides a simple example of three designs which produce the same pattern at carrier, but have significantly different operating impedances. This array consists of three 90 degree towers spaced 45 degrees in-line. Each of these three designs will have different impedance and pattern bandwidths and different adjustability characteristics. In order to determine which design is best, computer analysis of the entire phasing and coupling network and the tower impedance model is required.

Figure 6:

Design	I_1	I_2	I_3	Z_1 (Ω)	Z_2 (Ω)	Z_3 (Ω)
1	1/0	1/135	.25/270	10.4 + j38.4	8.2 + j3.8	2.4 + j11.6
2	1/0	4/135	4/270	−111 + j30.0	8.2 + j37.8	17.4 + j3.2
3	1/0	2.5/135	1/270	−34.3 + j57.1	18.4 + j20.8	−6.0 + j15.6

If Equation 1 is used in the initial phase shift selection for antenna couplers, there is less need for using transmission line VSWR as an adjustment aid. When coax VSWR is greater than 1.0, the current and voltage phase shifts across the line are no longer equal to each other, nor are they equal to the electrical length of the line as it is normally defined (Equations 4 and 5). Thus by changing the load impedance, the phase shift across a transmission line can be made to change. Unfortunately, the impedance seen looking into the line also changes, requiring a further adjustment iteration (Equation 6). It would therefore be easier to use Equation 1 in the first place, since it holds true for all cases (even when transmission line VSWRs are much greater than 1.0).

Equation 4:

$$i_T = \frac{V_0}{Z_T \cos \varphi + jZ_0 \sin \varphi}$$

Equation 5:

$$i_0 = \frac{V_T (Z_0 \cos \varphi + jZ_T \sin \varphi)}{Z_0^2}$$

Equation 6:

$$Z_{in} = \frac{Z_T + jZ_0 \tan \varphi}{1 + j\left[\frac{Z_T}{Z_0}\right] \tan \varphi}$$

φ = electrical length of transmission line
Z_0 = characteristic impedance of transmission line
V_0 = input voltage
V_T = output voltage
i_0 = input current
i_T = output current

Negative towers need not be considered mysterious and unpredictable. Equation 1 and a proper impedance match are all that are required. Negative towers can sometimes be avoided or at least ameliorated by use of the "moding" technique. **BM/E**

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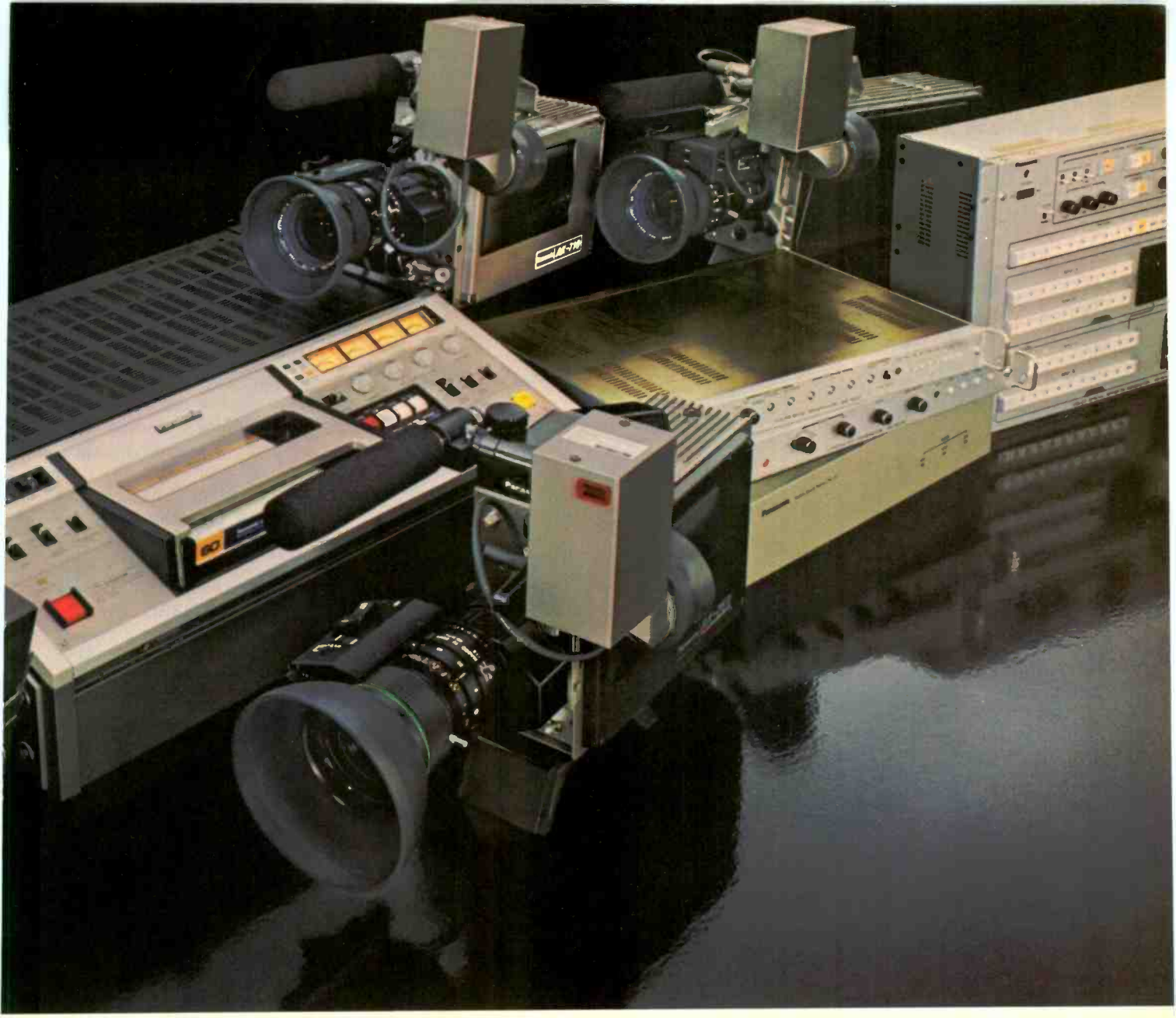

back beam control, the AK-760 has the necessary beam current to stabilize scene highlights to the point where comet tailing is greatly reduced.

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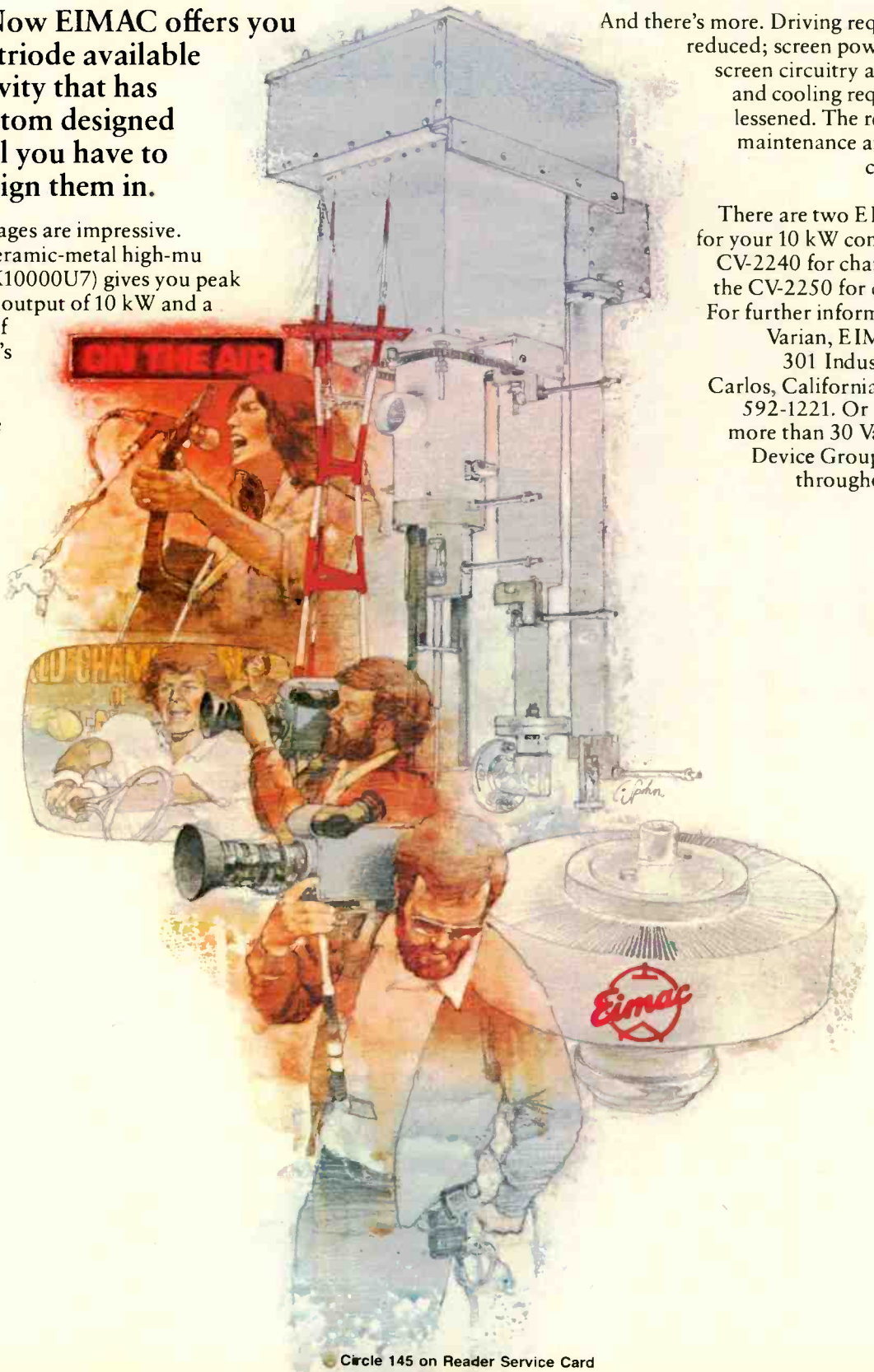

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ATTENTION TO AUDIO: A PRIMARY TELEVISION CONCERN

By Pat Hitchens

Despite a history of neglect, producers and engineers are beginning to do something about improving their audio techniques. With greater consciousness and very little additional hardware, better audio can make the difference between a good show and a great one.

TELEVISION IS COMPRISED of images and sounds, and videotape records both. The bulk of the technique that has grown up around videotape production gives its greatest effort over to the eyes and pays attention to audio largely as an afterthought.

As Frank Herold, vice president of post-production at Unitel Production Services in New York City, put it: "During a shoot, audio is all too often the bastard step-child of video." That's because producers feel that sound is not their responsibility; that the technical folk can always fix it up later in post-production (or, as the argot has it, "fix it in the mix").

"There's no way, however," adds Herold, "of putting quality in that didn't exist in the first place. If you've got a good recording, you can change the feeling, for example, with EQ, but a poor recording offers you far less flexibility in the mix."

We all, of course, want to do good work. And with the prospect of much greater aural fidelity just ahead through the development of videodisc technology, the demand for better audio is emerging not only as a matter of professional pride but as a practical demand.

Organizing to get the best sound

Depending upon the message, as well as on the money and time available, there are two basic approaches to videotape sound: the sync sound shoot slated for later sweetening with effects, music, and audience response, and the post-sync mix.

In television, be it commercial or program production, by far the most common approach is the lip sync shoot cleaned up and mixed later. It is often, of course, cost that influences the decision to go one way or the other. Tape carries with it the expectation that it will be cheaper because it is faster, so producers often start out with a concept of economy that leads them to seek out the most economical options, such as the lip sync shoot. There is nothing fundamentally wrong with that choice except that after it is made, we often fall into the trap of neglecting audio considerations altogether or deferring them to post-production where we hope it can all be fixed. (As a producer myself, I often think that no one should ever have told me about audio filters.)

Cooperation in the interest of good-quality audio must start before production and be carried through all stages

"People spend all kinds of time lighting, rehearsing, blocking," said Herold, "thinking the techs can balance the audio in the mix. Yes and no." There is a definite limit to what they can do about bad levels, EQ, and ambience once they're a part of the lip sync track. While good mic placement for the purpose of capturing good sound often seems to be a nuisance because it gets in the way of capturing some visual, bad mic placement is often one of those things that lead to immense troubles in post-production. Careless lip sync productions planned for subsequent mixing present especially great headaches for post-production houses when the mix is to include quality audio such as music.

When editing lip sync material all day long, the ear may like the sound from the playback just fine — until the first piece of higher caliber audio is layed down. Abruptly, the ear picks up the difference. Herold compares the phenomenon to stereo salesmanship. "It's like the old technique they used in audio retail stores, when they drag you off to the little room with all the speakers and say, 'Listen to these.' You do, and they sound great until they

---

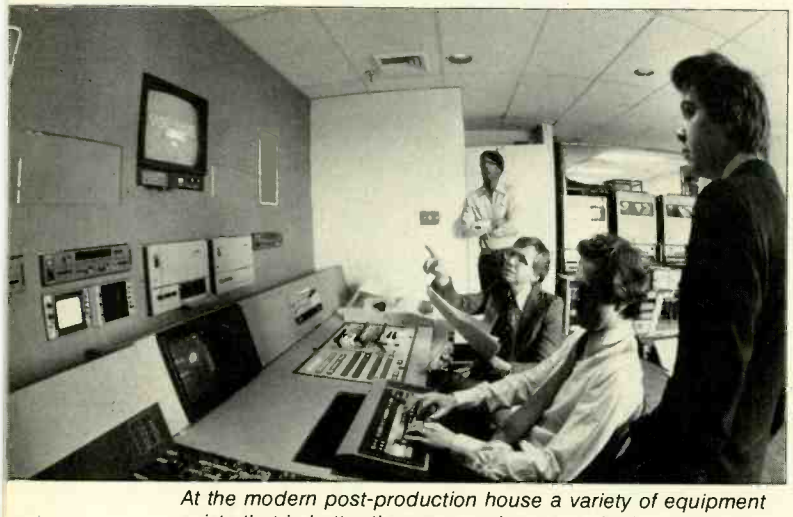
Pat Hitchens recently departed Unitel, after heading up their corporate production unit, Corporate Dynamics, as executive producer. She is now an independent producer and freelance writer.

switch to the ones that cost a thousand dollars more!''

Allowing vast quality differences to exist between different components of a mixed track is a travesty upon the audience. As Herold points out, ''I've been in situations where we've had to purposely deteriorate — distort — something like a voice-over, to make it more or less match the sync sound. So we put some hum and hiss into it,'' adds Herold with an air of disgust.

Obtaining good audio boils down to simply considering, *in advance*, the final message or effect of the production and how important good sound is to it, and what kinds of elements will be blended in the mix.

When the best quality sound is important, Herold advocates the post-sync approach despite the fact that it is a rarity in television production. ''Given the electronic interlock provided by SMPTE time code, the videotape post-sync can be accomplished far more easily on tape than on film,'' said Herold. ''And,'' he added, ''it's the only way to get 100 percent EQ across the whole production. When it is done right, it's good!''



At the modern post-production house a variety of equipment exists that is better than any we have ever had, yet close work between staff is still the most important aspect

The new Type C one-inch VTRs offer superior audio, but broadcasters and video producers often leave the question of audio quality until too late

When concerts are concerned and the best possible musical quality is the objective, then post-sync is the only way to go. There, the control is in the hands of the producers and engineers. The expense and hassle of trying to recreate the audio recording situation in a far different environment is saved. Is the objective to sound as close as possible to the artist's style and sound while seeking instead to highlight some aspect of his personality?

Two approaches to the post-sync

Herold has two favored approaches to the videotape post-sync session. In the first case, a quad master is used with a prerecorded time code track. The music track (timed accurately) is recorded several times on the tape at precise intervals (say at 0100, 0400, 0800, etc.). The videotape machine is put in the ''insert'' mode and the audio track is played back to the studio floor for the lip sync.

The alternative is to use an audio tape machine for the music track, with the same time code recorded on its second track. The videotape machine records the pictures of the group, the music, and time code from the audio machine. This method has one drawback, which is that both the video and audio recordings will have identical time code references, which can confuse the computer editing system. Should this happen, the audio recorder will have to be positioned manually for each take.

There is one way to minimize this drawback and another way to eliminate it. If a careful log is kept according to VTR counter times, the tapes can be positioned quickly. Better, however, is to use SMPTE time equipment capable of generating and reading user bits. User bit identifiers for either the VTR or ATR will clarify the situation for the computer.

Just as important, the production should be accomplished so that it conforms to the requirements of the post-production system to be used. Make certain of the method of synchronization used at the post-production facility. In some houses, pilot tone on a ¼-inch track will do nothing for the program except leak through to the other tracks. Ask whether the house uses time code and, of course, whether it is drop frame or non-drop frame. If elements of the program are on ½-inch media, find out whether the facility expects code on track 4 or somewhere else. It is true that with an element of 30 seconds or so, code will probably not be required at all as long as the in and out points are not crucial or if the facility has a variable speed audio playback unit in your format.

Variable playback speed units notwithstanding, it is sheer folly to assume that an entire show can be mixed without constant synchronous signal throughout. Occasionally people will expect that audio can be stripped off a videotape master onto ¼-inch tape and taken to a sound house for mixing and then back to the videotape facility for lay back. The very processes of stripping, mixing, and lay back are difficult enough without even attempting them in the absence of a common synchronous reference signal. Make certain that a sync signal is carried on all media at each step of the way.

Although, like many producers, I find all these concerns awesome, their value is incalculable. Paying such attention to audio will result in dividends in the quality of your program, and the satisfaction of audience and client alike. **BM/E**

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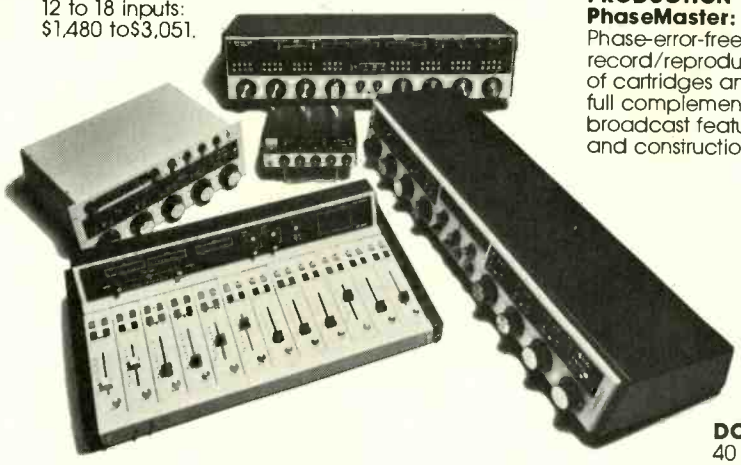

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BM/E NEWS FEATURE

International Broadcasting Conference Reflects Drive Towards Digital Era

BOASTING MORE THAN 5000 participants from 55 countries, the eighth International Broadcasting Conference held in Brighton, England, focused attention not only on the current technology viewed in its 114 exhibits but also on the technology of the future, discussed in its technical papers program.

Clearly, the technology of the future will be digital, but the discussion of digital video standards revealed the only fractious strain within the otherwise harmonious international broadcasting community. Boris Townsend of the Independent Broadcasting Authority (U.K.) set the stage for the conflict in his opening remarks to the conference on the first day. While Townsend said that it was unlikely that the Americans would ever accept the 12:4:4 sampling structure being talked about in the EBU, he also said he felt that 12:4:4 would be inadequate for European studio requirements by 1985. "The VTR is no longer the limiting factor on bit rates," said Townsend, "since it seems that 240 megabits a second is now feasible at normal tape speeds."

Townsend noted that high-definition television, videodiscs, and other media that did not have the bandwidth restrictions of broadcast may well require higher bit rates in order to reach their quality potential and that the work aimed at establishing digital video standards might well address itself to such future needs.

This concept of designing a video standard capable of meeting demands other than broadcasting was revisited several times throughout the conference and became the critical focus at the session on "Digital Television Coding Standards."

Representatives of the European Broadcast Union's digital standards committees and their counterpart, SMPTE, each showed progress towards agreement on the technical parameters of a digital video system. A panel discussion that followed the papers and included representatives of manufacturers, however, led to a series of warnings from Charles Ginsburg of Ampex and Hans Groll of Robert Bosch that quality demands now being envisioned by broadcasters were beginning to worry manufacturers. Ginsburg implied that the promulgation of standards and operating characteristics currently being discussed could lead to a

Brighton's famous Edwardian pier provides a dramatic backdrop for twentieth century technology

situation where broadcasters began to insist on having their cake and eating it too.

Ginsburg preceded his remarks with a statement that they would be his own opinions and not necessarily a reflection of the Ampex position.

According to Ginsburg, the attempt to establish standards for highest possible quality, low tape consumption, compact and lightweight design, operational features equivalent or superior to current one-inch VTRs, international standards compatibility, and low cost might prove unreasonable and self-defeating. Such uncompromising standards might mean, said Ginsburg, that manufacturers will be unable to develop a digital VTR with a price tag anywhere near a cost-effective level.

Bosch's Groll made similar statements indicating that the introduction of digital video recording might best involve the development of several generations of recorders before the ultimate machine could be produced. Keith Barratt of Sony Broadcast Ltd., U.K., on the other hand, said that it was up to broadcasters to determine their needs and manufacturers to fulfill them.

While the official positions of the EBU and the SMPTE seemed to be narrowing in on the issues of sampling frequency, the selection of component over composite encoding, and coding hierarchies, John Lowry of Digital Video Systems, Canada, took the floor at the close of the session to deliver a position paper that seemed to cast doubt on the direction that both the EBU and SMPTE are taking. In short, Lowry expressed concern that the standards being considered now failed to take into consideration distribution systems other than broadcast and as such might unnecessarily limit the quality potential of an ultimate digital video scheme.

Opposing views

Though Lowry welcomes the goal of international compatibility, recognizing the economies that he as a manufacturer might realize, he reminded the audience and panelists of a paper he presented at the fourteenth annual television conference of the SMPTE in Toronto. In that paper, Lowry wrote, "Digital television must not be considered a one-for-one analog television replacement and certainly should not be constrained by the NTSC color limitations." While an international broadcast television market is attractive, other nonbroadcast markets have an even greater potential and may require video quality well beyond that required by broadcast.

John L. E. Baldwin of the Independent Broadcasting Authority (U.K.) in

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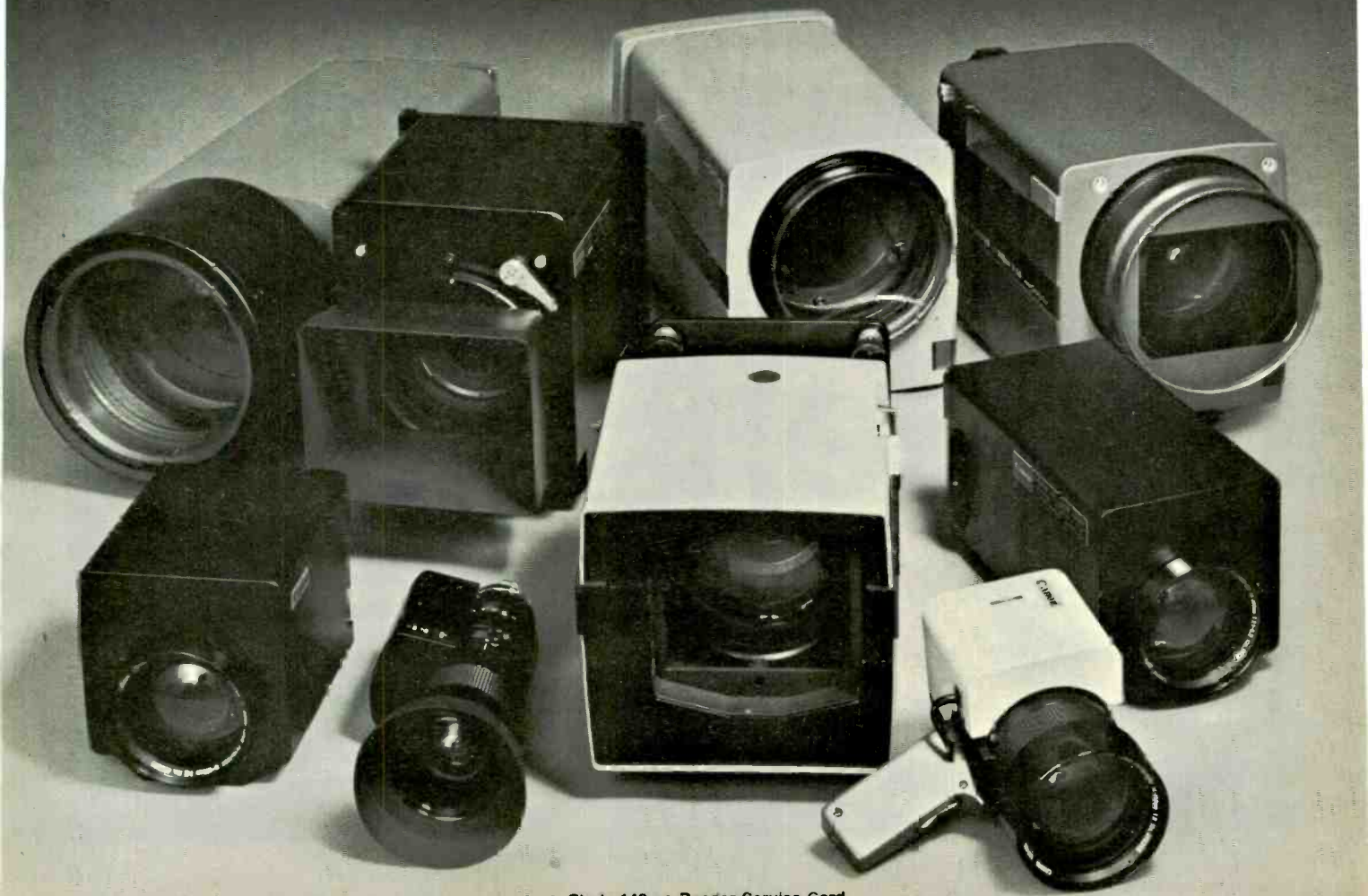

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his paper, "Digital Coding Standards for Television Studios," concluded that for effective chromakeying and other effects without costly filtering, "the number of samples per line for luminance should be between 896 and 921, that significant benefits will accrue in the range 906 to 912, and that the use of such numbers will be no more constraining than the number of lines in a field." Baldwin further refined his range to settle on 908 samples as his personal choice and stated, "The number of chrominance samples per line, to achieve good chromakey, would be one-half of that used for luminance if orthogonal sampling were used." Such numbers, said Baldwin, would be suitable for both 625 and 525-line standards.

CBS's William G. Connolly reported on a survey being conducted by the SMPTE Study Group's Digital Television Tape Recording Steering Committee. The survey stated seven needs of the broadcast and production community that might be fulfilled by a DVR. They were: tape interchangeability among different models and machines of different manufacture; low capital and operational costs; multi-

Many of the sessions, like this one on digital standards, played to SRO crowds

standard record and playback capability (525/625); comprehensive editing facilities; transparent multi-generational recording of video and several audio channels; easy operation and maintenance; and built-in test and diagnostic capability.

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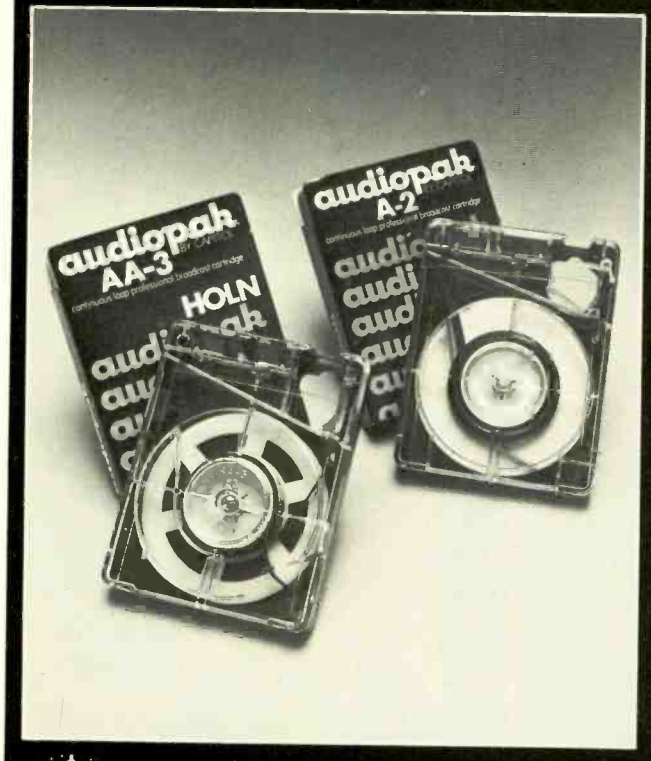

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the survey document, which stated current thinking on methods of digital recording and trends in the industry.

The principal results of the survey from 350 respondents included a demand for operational features equivalent to Type C or better, cost and tape consumption similar to current Type C machines, a demand for generational transparency through 10 generations, the ability to meet quality needs over the next 20 to 30 years, and a desire for a worldwide component standard suitable to the 525/625 standards. Connolly stressed that these were early results from an initial sort and that more detailed analysis could lead to specific implications for the design of a DVR.

EBU's current thinking on the subject was outlined by A.H. Jones of the BBC's research department. The bottleneck in their considerations seems to be related to the design of equipment for composite-to-component interface equipment with the stated desire being that of limiting the composite "footprint" noticeable in the video at any of its component stages and certainly in its final composite display. Throughout was a concern for the complexity and cost of filtering. What resulted was a recommendation by V1-VID for a standard as follows: Y sampling at 768 samples per line, or 12 MHz; B-Y sampling and R-Y sampling at 256 samples per line, or 4 MHz; multiplexed to 20 MHz, using eight-bit samples (allowing for some headroom) with a total bit rate of 160 Mbit/s.

CBS Television Network's vice president of engineering and development, Joseph Flaherty, shares a lighter moment with P.L. Mothersole of VG Electronics

It was against this backdrop that Lowry's position gained currency. Lowry's remarks, which followed those of the panel, took shots at manu-

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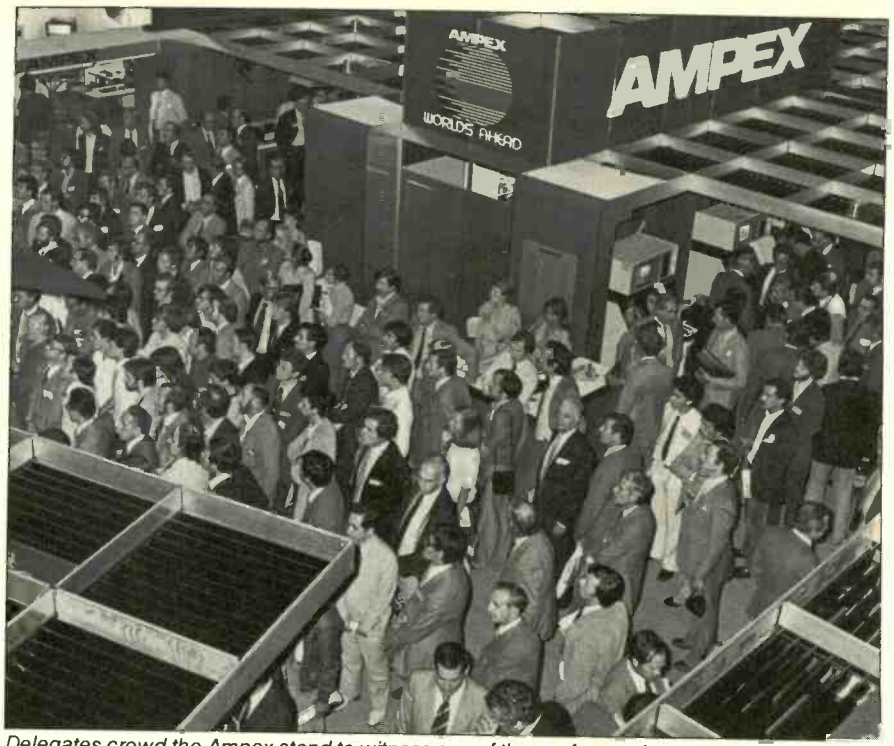
facturers for shortsightedness and at broadcasters for parochialism. By allowing the discussions of digital standards to focus on the need for transmission in the existing composite standards of NTSC, PAL, and SECAM, broadcasters were disregarding future audiences reached through alternative distribution systems and manufacturers were allowing current markets to define future markets. Primary evidence of this conundrum was exemplified by Lowry in the difficulty that current standards considerations would have in dealing with aliasing. Aliasing errors were being dealt with, according to Lowry, as if they were a *fait accompli* while in fact they were the result of constraining the design within the limits of current broadcast standards. If the translation of digitally encoded video to broadcastable signals were left to a single piece of equipment rather than being a requirement of each piece of equipment at every point in the chain, many problems could be solved, according to Lowry. At the same time a nonbroadcast scheme could open the future of digital video to a host of new nonbroadcast media with even higher quality potential.



Delegates crowd the Ampex stand to witness one of the conference's most dynamic exhibits

Sony demo raises questions

Sony Corp. managed to cast even more doubts on the practical limits of digital video technology by taking the opportunity at IBC to demonstrate its digital video recording prowess using both a U-matic tape transport and a one-inch Type C transport. According to Howard Steele of Sony Broadcast, U.K., the IBC demonstrations had two major goals: to show digital video re-

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cording using the 12:4:4 scheme of the EBU and to demonstrate yet another leap in packing density.

Steele pointed out that the demonstration machine was recording using four tracks, each with a packing density of greater than 70 Mbit per square inch. This was achieved while halving the tape speed so that a one-hour cassette, for instance, is capable of two hours' recording.

At this month's SMPTE meeting in New York, Sony will use an eight-track machine capable of even greater packing densities. While use of metal tape could lead to even further improvements, said Steele, head design seemed to be the single most constrictive element, offering no more than 100 Mbit/sec writing speeds given the current level of the art.

Nevertheless, Steele suggested that the high-definition television research currently being carried out in Japan demonstrates the possibility of a 1125 line picture and that such display resolution would require a recording capacity of 800 Mbit/s. This, felt Steele, was not unattainable given the rate of progress being made by Sony Corp.

While the feeling going into the IBC was that the digital video situation would be clarified at this meeting, the feeling coming out was that the situation was more clouded than ever. In fact, Townsend's quote of Einstein in his opening remarks proved prophetic. "Perfection of means and a confusion of goals seem — in my opinion — to characterize our age." So while any number of methods for recording video through digital means have proven effective, the absence of a clear objective justifying the transition from analog to digital remains elusive.

Other technical highlights

Though the search for digital video standards clearly stole the show, the achievements of other digital systems demonstrated why broadcasters were pursuing digital techniques. Increasingly, digital transmission techniques are being explored as viable approaches to direct-to-home broadcast satellites, short-haul ENG links, and other specific transmission aims where analog methods have proved inadequate or too restrictive.

Both in the papers and on the exhibit floor, the generation of graphics via digital video means drew great attention. The three systems receiving the most attention were Ampex's AVA system and ERIK and ICON, developed jointly between the BBC and Logica Ltd. (U.K.). At the conference it was announced that Logica will manufacture and market ERIK under license from the BBC.

Some confusion among the three profferred systems was bound to result since each, to varying degrees, was designed to produce extensive full-color graphics through traditional artist operation techniques under the control of extensive computer software and hardware. With the Logica announcement that ERIK would eventually sell for about half the price of AVA it quickly became apparent that the differences must be substantial.

While both AVA and ERIK permit the artist to exploit the color repertoire and electronic mimicry of different artist tools through the use of a stylus moved over a magnetostrictive tablet, there are concrete differences in the capacities and capabilities of the two systems. As with all computer-based systems, costs tend to relate directly to the amount of storage capacity, degree of intelligence, and speed. Moreover, these factors also tend to set the limits on the software capabilities of the systems.

AVA, for instance, uses a full PDP 11/34 computer with 128K words of MOS memory for operational programs, a framestore for active video, and an Ampex 900 series hard disc

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Boris Townsend, quoting Albert Einstein, said, "Perfection of means and a confusion of goals seem – in my opinion – to characterize our age."

drive for external memory. ERIK, on the other hand, is based on a single Intel 8085 microprocessor and stores pictures on floppy discs. While both systems offer an impressive array of color selections (each providing 256 on-line, though AVA's theoretical limits are vaster) and each offers the artist a wide variety of tools with which to paint, there are simply more artistic operations available on AVA.

A fair comparison of the quality of AVA's pictures to ERIK's could not be made since at the time of the exhibit, ERIK was still maturing. Whether it can ultimately match the truly high quality of AVA's pictures or not remains to be seen. AVA, after all, uses a complex series of software filter mimic programs to produce extremely smooth edges without aliasing errors. Since such software filters require considerable memory space accessible at very high speeds, there does seem to be a physical limitation to software enhancement for ERIK. Whether high-quality pictures will be obtained through the use of hardware-based filtering or other approaches is a matter to be resolved in further development, but hardware filters of adequate design will be expensive.

There are also significant operational differences in the way the two systems are used, but these deal largely with AVA's penchant for obtaining control over modes and functions through the stylus, while ERIK has made some modes and functions available through logic switches.

In terms of computer sophistication, AVA is really more comparable to the BBC/Logica ICON system. ICON is based on the use of two PDP-11/04 computers and offers as a result even more sophisticated graphics capability than does ERIK. ICON, however, was not conceived as principally a tool for artists but instead as a graphics center that could process statistical data, such as vote tallies, for inclusion in a graphic real-time display.

So, while the papers and the discussions at IBC presented a truly impressive cross-section of current technical development in the broadcast industry, as is the case with the best conferences, they raised almost as many questions as they answered. Development of a solid state camera has inched closer, direct-to-home satellite broadcasting holds great promise for new services, the inexorable march of the microprocessor continues bringing a greater degree of control over the process of broadcast. The review of the exhibits that follows shows that the near-term technical developments offer still greater advantages to today's broadcaster. Although the great issues were not resolved in Brighton, progress remained constant.

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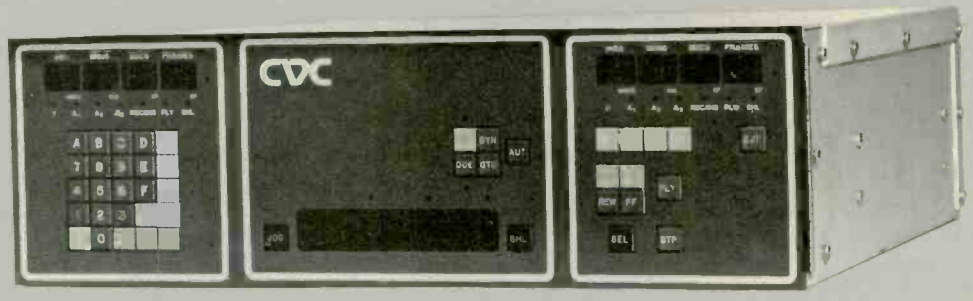

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BM/E NEWS FEATURE

IBC Exhibits Show Increased Acceptance Of ENG/EFP

FOR U.S. DELEGATES attending the IBC exhibits, what they saw was primarily a PAL version of NAB. Some 71 of the 144 exhibitors were companies well known to American broadcasters, while the remainder tended to produce equipment mostly for their own domestic markets and some portions of the international market.

Increasingly, however, the community of international broadcast manufacturers is cutting across national and continental borders. One main reason for this is the huge increases in the cost of R&D required for high technology and the need to offset these costs with the highest possible unit sales. Not only does this mean that more and more foreign manufacturers will be reaching out to the American market, but more and more American manufacturers are entering the international field. Hugh S. Boyd, group public relations officer of Quantel, pointed out that even though his firm is U.K.-based, many of its new products are first produced for the U.S. and other NTSC markets. Said Boyd, "Again, it's a matter of market economics."

Similarly, with the growing acceptance of U.S.-style ENG and EFP abroad, U.S. manufacturers are finding a growing share of their production runs dedicated to overseas clients. Nowhere is this clearer than in the area of electronic video editing systems. Nearly every major American computerized editing system was on hand. Fernseh had its Mach One; Datatron had its Tempo and Vanguard editors in the Paltex booth, as did Cezar; EMS showed its equipment in the Polar stand; CMX was represented with both its new Edge editing system and the 340X in the F.W.O. Bauch Ltd. stand as well as in the Thomson-CSF exhibit; Videomedia had nearly exclusive use of the Zoom TV booth; and Unimedia was represented by InterElectronics. Convergence saw fit to take on the international market in its own stand. Also representing their video editing systems were Sony, showing a range of controllers including the BVE-5000 super-editor, and JVC, represented by Bell & Howell, showing its U-type editing system.

Answering a demand of some strength in Europe, Convergence showed its ECS-103 controlling a mix of Type C and Type B VTRs. This type of interface capability is important in Europe since many broadcast organizations find themselves with such mixed-format inventories. Convergence also showed its low-cost ECS-90 with fade-to-black and LipLock™ features.

Videotape editors, like Sony's BVE-5000, were dominated by products designed for the U.S. market

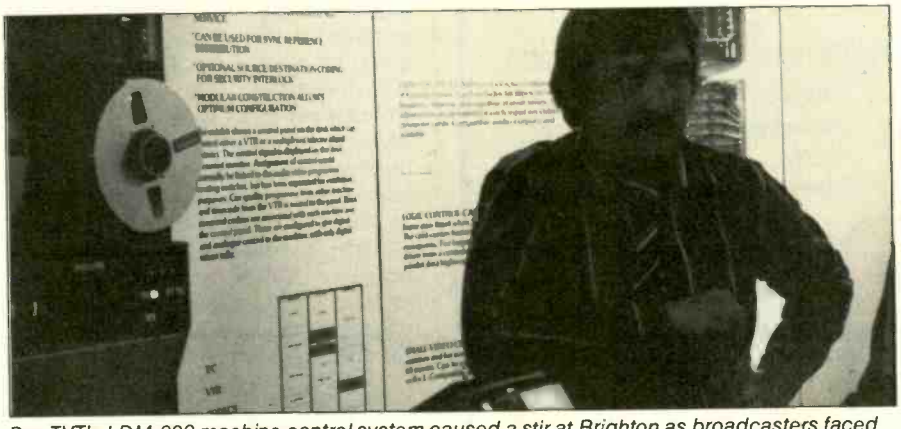
American-made products often appeared in the stands of their European agents, like these CEI cameras shown by Crow of Reading

Convergence now joins several other editor manufacturers, such as CMX, Fernseh, and HVS, who have established interfaces for both Type C and B VTRs. Other manufacturers at IBC expressed confidence that if such a demand were a requirement of the customer, they too, could meet it. CMX, though not showing a Type B interface at the conference, did show the 340X controlling a Studer A80 ATR in conjunction with a variety of VTRs.

The exhibit was largely a repeat of NAB in its flash of digital effects, its plethora of video switchers (or vision mixers as they call them over there), audio consoles, transmitters, and ENG/EFP cameras of every description. One area, however, that of machine control, did emerge as a distinct new trend.

Dynamic Technology Ltd.'s VIMACS system, which has been installed at ABC Television Network, and Fernseh's TCS-1 machine control system, used at KPIX, were joined by Pye TVT's LDM-600 Machine Control System.

Hitachi made its first entry into the European VTR market with its HR series



Pye TVT's LDM-600 machine control system caused a stir at Brighton as broadcasters faced the problem of plant automation

Machine control has begun to emerge as an important concept as stations and teleproduction facilities have laid on more numbers and types of equipment to meet the demands of modern television but have found the cost of labor and the management of such inventories more difficult to accomplish with traditional methods. Machine control is an attempt to extend the effectiveness of the competent engineer to a large number of equipments dispersed throughout the TV plant.

Of the three systems shown at IBC, the LDM-600 is the newest. Its approach is to take control of each remote machine by establishing control signals tuned to the color black. In this way, interconnection is achieved via the existing video network without the addition of any new cabling. Alternate TV lines are used to send data in opposite directions. Control of eight analog functions, such as iris and painting, and some 46 one/off parameters are described by 720 bits. According to M. Cosgrove of Pye, the principal designer of the system, he found that using a pulse data width of 4 ms left him enough room during the period of active video when color black is transmitted that he could include three bidirectional channels of 6 kHz digital audio for intercom. So this capability has been included.

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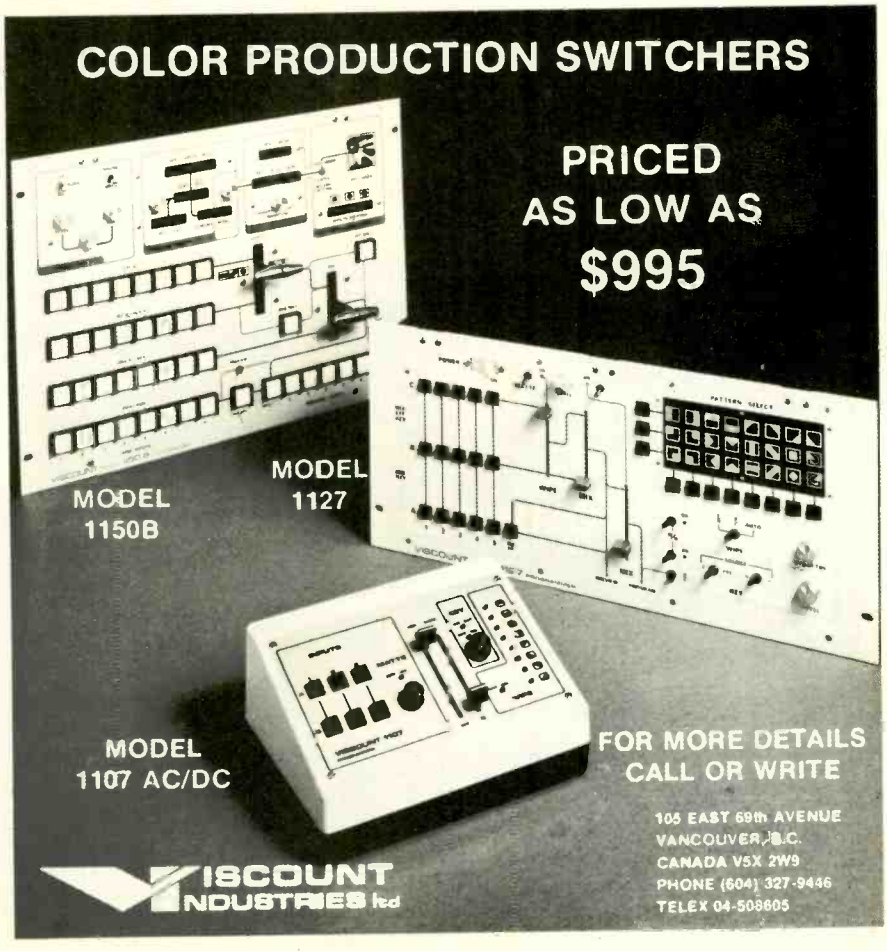

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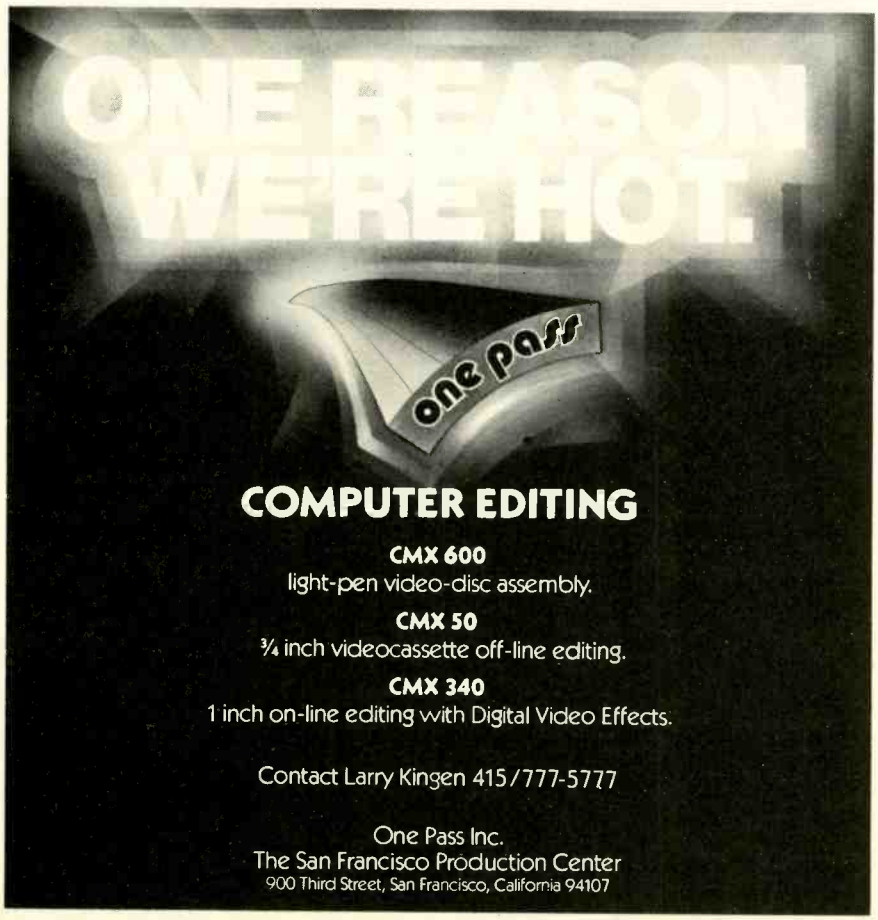

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NEWS FEATURE

Other news from Brighton

As mentioned earlier, some 71 companies familiar to Americans exhibited at IBC. Though many of their products are familiar to U.S. broadcasters, here is a brief summary of news from some of these firms:

Though its cameras, VTRs, DR switchers, and other equipment were familiar to Americans, the Ampex demonstration drew the largest crowds with its spectacular dance-routine floor show. Ampex's other big draw was its AVA system . . . CMC Technology announced that it was near agreement with the international news organization, Visnews, that would have the group work as its worldwide agents for delivery of its services to broadcasters outside North America . . . Delta Electronics gave Europeans their first look at the RCS-1 microprocessor remote control parameter monitoring system . . . Dolby announced that its audio noise reduction system for VTRs was gaining impressive acceptance in European markets.

Evershed Power-Optics showed a new microprocessor controller for 16 mm telecine projectors, aimed at the OEM market . . . IVC showed a new 2002S universal TBC for use with all types of VTRs . . . Nurad announced that it would begin deliveries in December of its Copterpod airborne microwave system, introduced at NAB . . . Vital has sold a two-channel SqueeZoom to Transvideo, one of Europe's largest teleproduction companies.

Quantel has taken a license to manufacture and distribute Teletrack from the BBC. Teletrack will be an option to the DPE-5000 package and produces effects similar to CBS's ActionTrak and NEC's DigiStrobe. Quantel also showed its new Shot Box, which allows the operator of a DPE-5000 to preprogram up to 70 effects for shot-by-shot recall . . . Rank Cintel announced that Pye TVT will take over marketing of its Mark III flying spot scanner . . . Rank Strand had a new computerized lighting control panel, the Galaxy.

Sony showed a new U-type portable, the BVU-110, which provides for field color playback while still reducing the weight of the VCR . . . System Concepts introduced a new subtitling option, the QST . . . Shintron showed a new character generator offering font capability in a number of alphabets.

While there were many more exhibitors at IBC, those that introduced new products appropriate to the U.S. market will be reviewed in upcoming editions of *BM/E's* Broadcast Equipment column. **BM/E**

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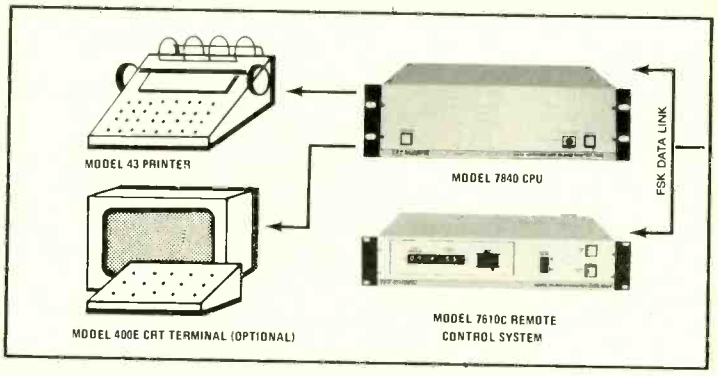

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INTERPRETING THE
FCC RULES & REGULATIONS

Nonentertainment Programming: Promise Vs. Performance

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

AT LICENSE RENEWAL TIME, does your sample weekly program schedule match the statement in your previous renewal application as to minimum percentages of news, public affairs, and "other" nonentertainment programming? If not, the FCC might designate your renewal for hearing on a "promise versus performance" issue. Broadcasters are supposed to develop news, public affairs, and "other" nonentertainment[1] programs to address community problems and needs disclosed by their ongoing ascertainment of the general public and community leaders. Without an explanation otherwise, the Commission might interpret a failure to meet nonentertainment programming commitments as a failure to address adequately those ascertained problems.

This article will review the question of "promise versus performance" as it applies to news, public affairs, and "other" nonentertainment programming, including a recent case denying license renewal for this very reason. In addition, a new Commission proposal to count public service announcements (PSAs) toward "other" programming will be examined.

Background

The Commission first set forth a definitive policy to require licensees to meet nonentertainment programming pledges in the *KORD*[2] case in 1961. The Commission acknowledged that applications were not "binding commitments" and that community needs change over time. These changed needs would require different nonentertainment programs.

> "As we make clear below considerable flexibility and discretion is not only permitted but [also] called for in the public interest. But it is just as well established that the licensee does have a duty to carry out substantially the programming policies embodied in its proposal."[3]

If programming policies do not match proposals on file with the Commission, broadcasters should report the changes and explain why they have occurred.

Such changes should be reported to the Commission by letter within 30 days after they become effective. Another problem arises if nonentertainment programming fails to meet certain minimum percentages. Since 1977, Section 0.281(a) (8) (i) of the Commission's rules has delegated authority to the Broadcast Bureau to designate for hearing commercial AM and FM applications which propose less than eight percent and six percent, respectively, of nonentertainment programming. The Broadcast Bureau has similar authority for commercial TV stations that propose less than five percent total local programming, five percent news and public affairs, or 10 percent total nonentertainment programming between 6:00 a.m. and 12:00 midnight. Section 0.281 (a) (10) specifically addresses promise versus performance. Any commercial renewal, transfer, or assignment application that varies substantially from nonentertainment programming proposals, without adequate justification in the public interest, can also be designated for hearing. *These rules do not set minimums for renewal.* However, they do allow the Commission to designate applications for hearing. This process involves considerable time and expense which could otherwise be avoided.

[1] In this article, "nonentertainment" will refer to all news, public affairs, and "other" programs, unless otherwise indicated.
[2] *KORD, Inc.*, 31 FCC 85, 21 RR 781 (1961).
[3] *Id.*, 31 FCC at 86, 21 RR at 783.

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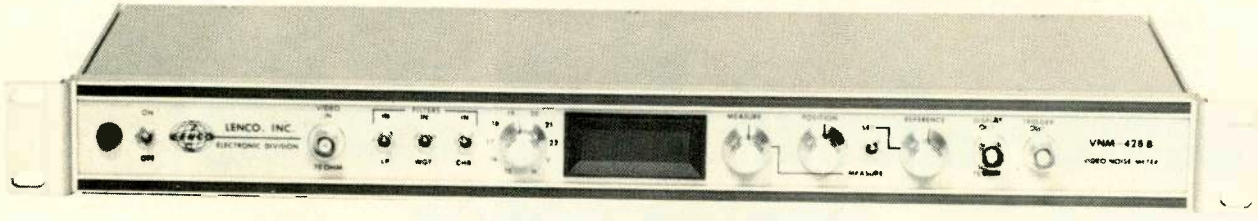

Some people think that video noise is a bore. They just couldn't care less about it. They figure that if they ignore it, it'll go away.

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Circle 167 on Reader Service Card

The *West Coast Media* case

In August, 1980, the Commission denied license renewal to West Coast Media, Inc. for a San Diego, Calif. FM because of its failure to disprove a "promise versus performance" issue.[4] According to the Commission, "In our view . . . West Coast's failure to comply with the spirit and letter of its programming promises is determinative of the outcome of the proceeding and, as a result, we shall not renew KDIG-FM's license."[5]

West Coast purchased the station in 1971. At the time, KDIG-FM was the only FM station with a monaural transmitter in the San Diego market. The station had been losing money prior to the purchase and continued to do so after West Coast took over the station. When the first renewal application was filed by West Coast, four months after acquisition, the licensee proposed 5.83 percent news, 1.53 percent public affairs, and 1.53 percent "other" nonentertainment programming. The station continued to lose money. In December, 1971, West Coast decided to reduce nonentertainment programming to 1.1 percent of public affairs programming until the station became financially viable. West Coast promised that "before the next renewal time, [the station] will be devoting more than just an adequate or minimum of time to news, public affairs, religious and instructional programs."[6]

When the next renewal application was filed in 1974, it developed that West Coast had not even met its minimal 1.1 percent public affairs pledge. Moreover, toward the end of the license period, in order to upgrade its performance, West Coast counted a clearly religious program towards its public affairs showing.

In its decision, the Commission explained that it had not set minimum programming requirements to qualify for renewal. However, the public interest standards, established by Section 309(a) of the Communications Act, obliged licensees to "comply substantially with its promise for future performance, or to justify any substantial variations."[7] The decision distinguished minor variations from original proposals, since "insubstantial variations do not raise a question of the licensee's ability to operate in the public interest."[8]

At the end of the license period, West Coast had sought to improve its meager nonentertainment showing with additional, albeit improperly labeled, nonentertainment programming. The Commission cautioned licensees not to rely on such upgrading to overcome nonentertainment programming deficiencies:

> "End-of-term upgrading does not mitigate a prolonged failure to provide the public service which has been promised for the license term . . . [A] favorable public interest finding cannot be made where the licensee has demonstrated blatant disregard of its prior programming commitments or where the licensee does not justify substantial variations from the programming promises contained in the prior renewal."[9]

New broadcasters should note that the Commission will

[4] *West Coast Media, Inc.*, 47 RR 2d 1709, FCC 80-446.
[5] *Id.*, 47 RR 2d at 1714.
[6] *Id.*, 47 RR 2d at 1712.
[7] *Id.*, 47 RR 2d at 1714.
[8] *Id.*
[9] *Id.*

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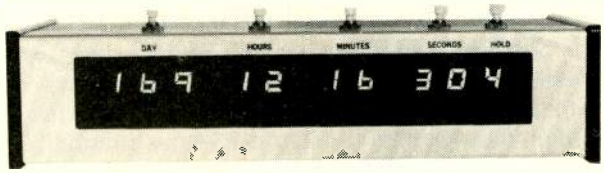

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not excuse failure to perform because of inexperience. The West Coast principals had offered this as a mitigating circumstance. The initial decision had minimized the sanction by imposing only a one-year renewal, because of the principal's broadcasting inexperience. Citing the Lowndes County[10] case, the Commission noted that:

> ". . . there is simply no justification to give inexperienced broadcasters the advantage of performing below minimal renewal standards for a license term without suffering the same consequences which experienced broadcasters would incur."[11]

For West Coast, the failure to meet its nonentertainment programming proposals meant loss of its license for KDIG-FM.

PSAs as "other" programming

Subsequent to issuance of this decision, the Commission has decided to give broadcast licensees more credit for public service announcements. The FCC decision will allow broadcasters to include PSAs as illustrative programming on the annual problems/programs list that broadcasters place in their public files and include PSAs in the "other" programming category of renewal applications. The decision applies to the Annual Programming Report of commercial TV licenses, as well as the renewal applications for commercial radio and TV licenses.

The Commission cautioned that PSAs should not be a primary method for responding to problems and needs that licensees have discovered in their ascertainment surveys. Most needs simply cannot be addressed by a spot as brief as a PSA.

By modifying reporting requirements, however, the Commission acknowledged the service provided to the public by broadcasters who air PSAs. As a result of the FCC study, "licensees are being provided with an optional system allowing them greater credit, if they seek it, for their PSA performance." The Commission determined, however, that it would not impose specific obligations on broadcast licensees as to "the number, duration, content, and source of PSAs which they should present."

Conclusion

The text of the Commission decision on PSAs is not yet available. Once it has been published, broadcasters should consult it carefully if they intend to credit PSAs towards "other" programming.

In the meantime, the significance of the "promise versus performance" issue cannot be stressed enough. The *West Coast Media* case shows that the Commission will revoke a license for similar failure to meet application promises, absent mitigating circumstances.

When filing a renewal application, be sure to check the previous renewal application (or Form 301 construction permit application for new licensees) to determine what amount of news, public affairs, and "other" nonentertainment programming was promised. If there are "substantial variations," consult communications counsel to prepare an adequate explanation. In such situations, the burden of proof is with the licensees if an issue is designated. The penalty could be severe. **BM/E**

[10] *Lowndes County Broadcasting*, 23 FCC 2d 91 (1976).
[11] *West Coast Media*, 47 RR 2d at 1720.

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The 2525 SP also includes operator cues such as video confidence indicators human engineered to minimize inadvertent switching to idle channels. A digital control port is provided to interface the system with existing broadcast computers for station automation application. In addition the light weight Engineering and Director's Control Panels may be located up to 1000 feet from the equipment area to permit installation in major broadcast system complexes.

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GREAT IDEA CONTEST

VOTE NOW!
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Editor's Note: Before attempting to implement any Great Idea involving the modification of equipment, station personnel should check with the equipment manufacturer to insure that no violation of warranty will occur.

If the Great Idea involves any technical standards governed by the FCC, stations should make sure that the idea will in no way cause a violation of FCC rules.

24. Two-Station EBS Test With One Encoder

Steve Ellis, Director of Engineering
KBCT-FM, Fairfield, Iowa

Problem: Last fall our Fairfield, Iowa stations, KMCD-AM and KBCT-FM, separated, with KBCT-FM going stereo. It became necessary to provide some method of performing EBS tests from both stations using only one Avcom EBS-100 encoder.

Solution: Since the Avcom EBS-100 has an external encode lamp circuit it became simply a matter of using this voltage to operate relays in such a manner as to switch the two-tone signal to the desired transmitter. This circuit should work equally well with any encoder with an external lamp circuit provided the encoder is capable of being activated remotely. I used 4RDT 12 V relays with LED indicators for my switching relays. Different encoders might require different operating voltages for these relays. The LED indicators would not be necessary and I found that with the EBS-100 they only light momentarily due to the low current lamp circuit. This does not detract from the usefulness of this circuit.

It should be noted that FCC rules require that remote activation switches for EBS two-tone encoders be guarded

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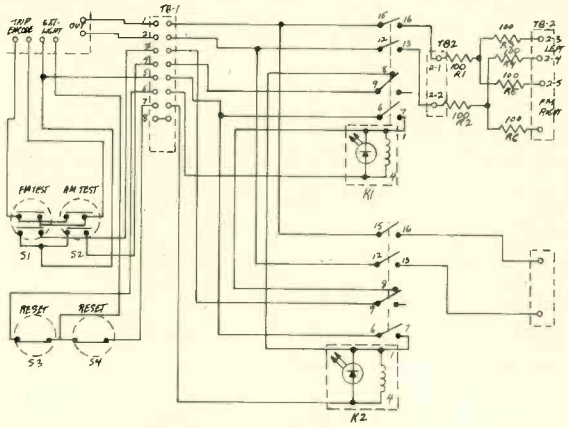


Schematic for Ellis's one-encoder EBS test

to prevent accidental activation. I felt it necessary to include reset switches in my circuit even though the remote switches are guarded.

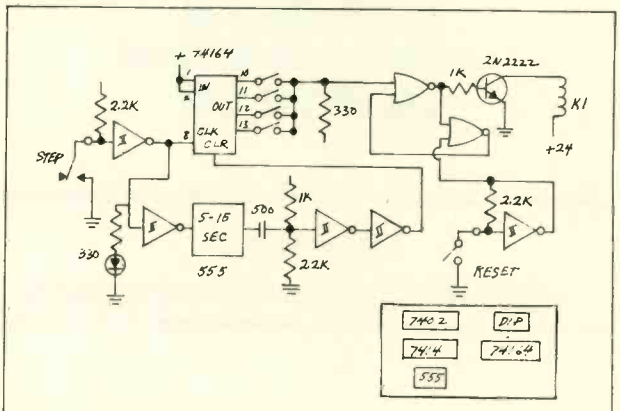
The circuit as I used it delivers approximately 6 dB more signal to the AM transmitter due to the splitting network used to get left and right signals for the FM transmitter. A 6 dB pad in the AM output will give both transmitters approximately equal inputs. The circuit as used will modulate the FM transmitter in excess of 40 percent (FCC rule) while modulating the AM transmitter less than 100 percent.

25. Teletype Alarm

Hollis W. Duncan, Engineer
KTNT, Tacoma, Wash.

Problem: To keep track of the number of bells issued by a teletype machine and indicate if five or more bells have occurred within a 10 second period, to mark alerts, bulletins, and EBS tests.

Solution: The teletype bell is detected by a microswitch mounted inside the machine. The input is conditioned and applied to both the clock input of a shift register and a 555 timer. Input pulses (bells) load the shift register with 1s, which appear on the output. The 555 times out for 10 seconds and resets the shift register. The number of bells detected is selected by a DIP switch, which routes the



Duncan's teletype alarm

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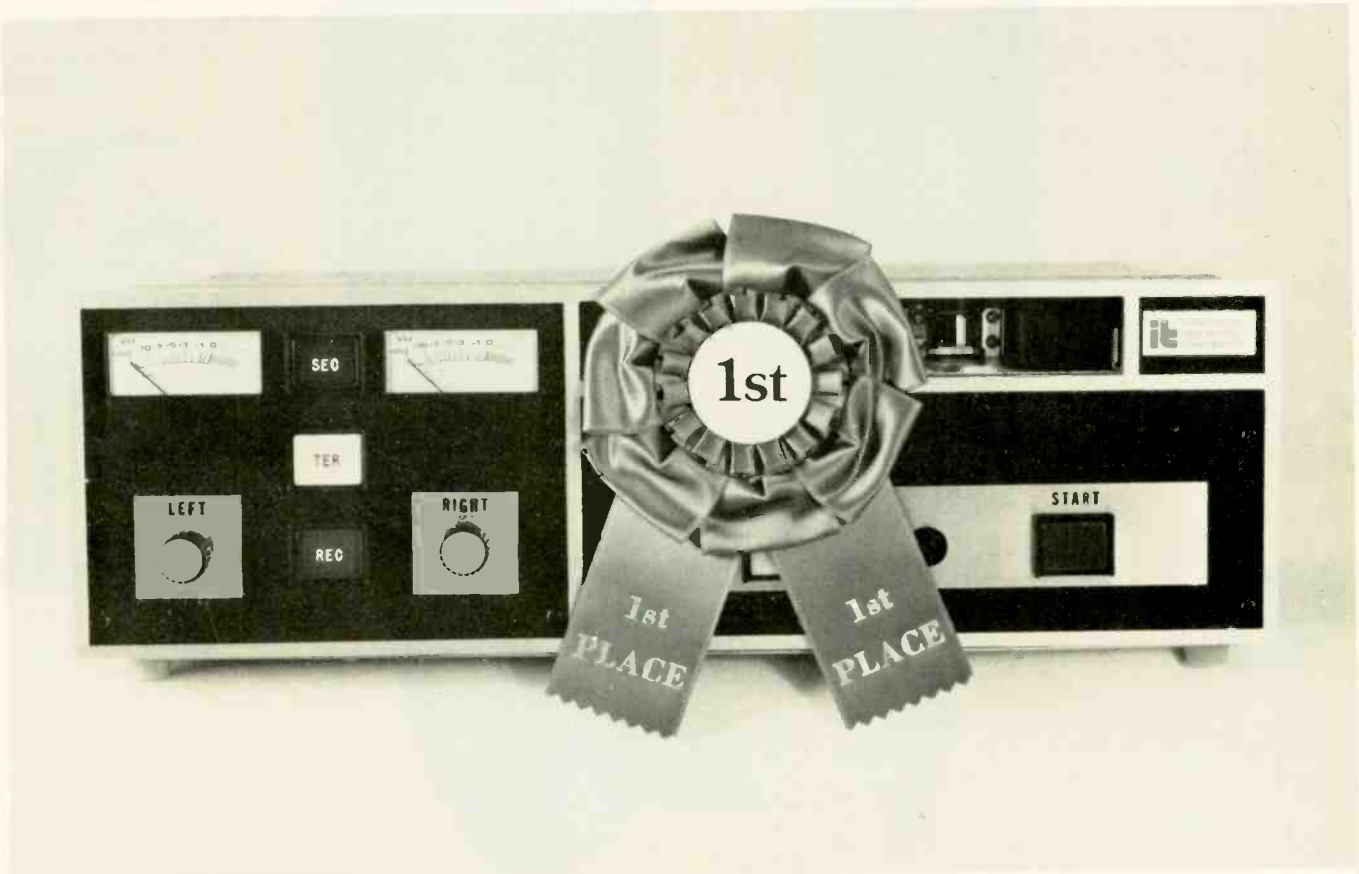

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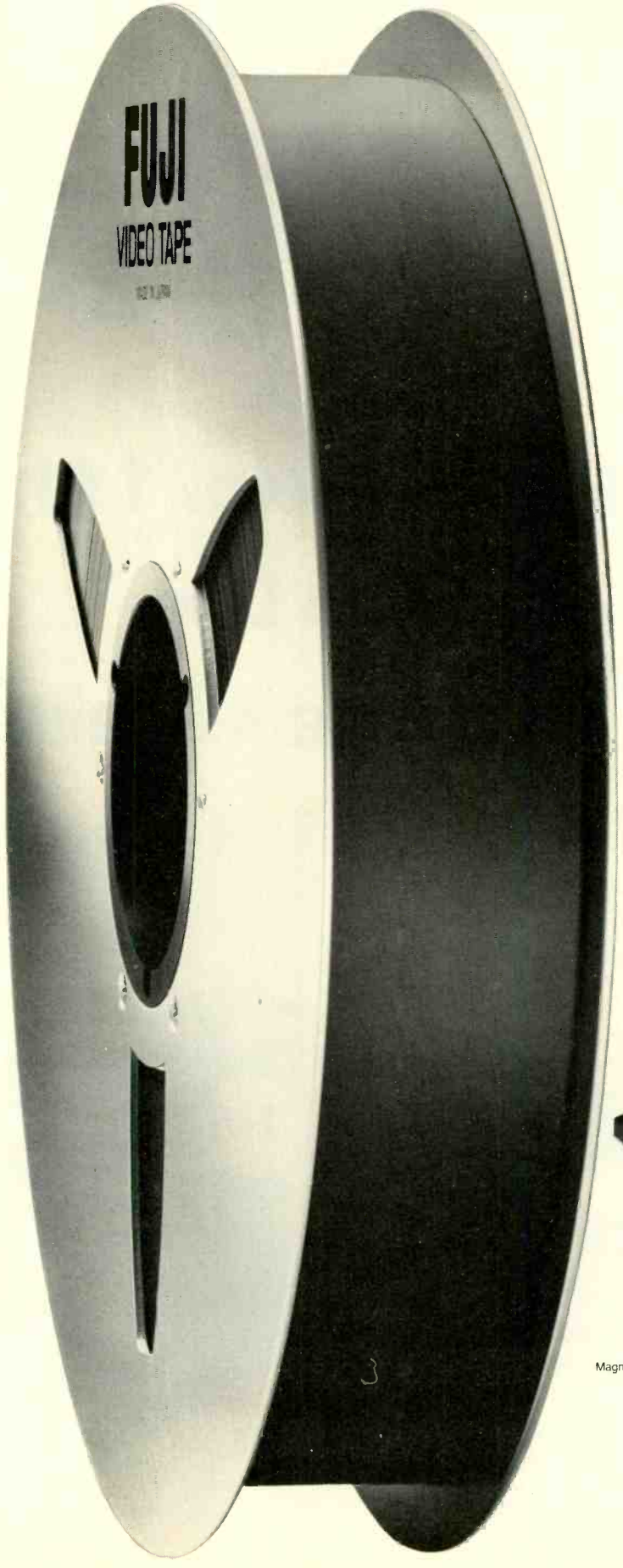

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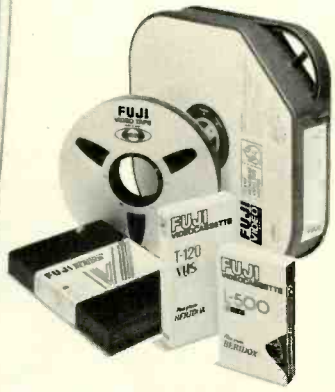

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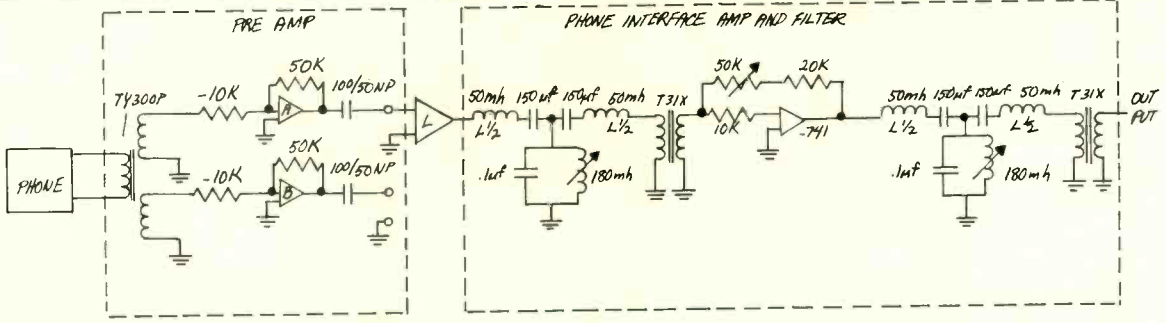
output to a NOR latch. An output before timer reset sets this latch, which engages a 24 V relay. The latch is reset by a switch located near the teletype.

26. Recorder Telephone Interface

Bruce Mattson, Chief Engineer
WWWW, Detroit, Mich.

Problem: To interface a telephone into a broadcast console so that the caller and personality are at an equal level, with broadcast quality.

Solution: I designed this circuit to fulfill the above need. The phone's tip and ring are connected to the pre-amp in order to boost the audio signal enough so the Shure SC-30 can work in its operating range. The caller's voice level goes through the limiter with very little processing. The personality's voice, however, is compressed to the same level as the caller's, providing an equal output to both the transmit and receive sides of the call. The output of the limiter is then fed into the phone interface amp and filter. You will notice that I used two low-pass filters, one in the input and one in the output (250 Hz to 4 kHz), to remove unwanted hissing and popping in the phone lines. This circuit works very well on the air and is great for recording actualities, especially since the interviewer can be heard at the same level as the person being interviewed. The circuit itself can be built for about $30; the Shure SC-30 lists for about $540. I must also note that I used a ham phone patch transmitter on the transmit side of the telephone hand SCT, giving me about 4 dB attenuation over the regular telephone transmitter provided.



Mattson's recorder telephone interface

GREAT IDEA ENTRY BLANK PAGE 112

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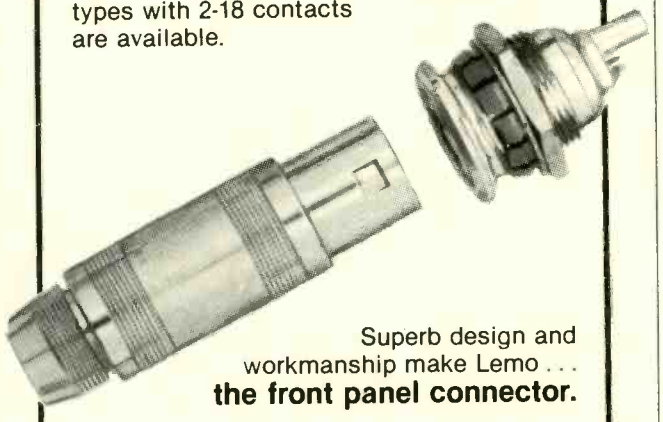

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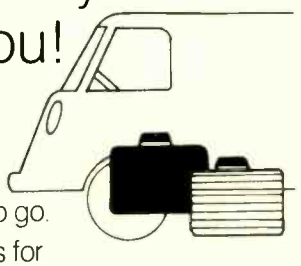

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Rules for BM/E's Great Idea Contest

Mail to:
Editors, BM/E
295 Madison Avenue
New York, New York 10017

1980 Entry Form

Name _____ Title _____
Station Call Letters _____ City _____
State _____ Zip _____
Telephone No. _____
Licensee _____
Class of Station at which idea is used (check one)
TV _____ FM _____ AM _____
Category: Audio ___ RF ___ Video ___ Control ___

Objective or Problem: *(In few words; use separate sheet for details)*

Solution: *(Use separate sheet—500 words max)*

I assert that, to the best of my knowledge, the idea submitted is original with this station; and I hereby give BM/E permission to publish the material.

Signed _____ *Date* _____

1. Eligibility: All station personnel are eligible. Consultants to the industry may enter if the entry indicates the specific station or stations using the idea or concept. Manufacturers of equipment or their representatives are not eligible.

2. How to Enter: Use the Official Entry Form on this page or simply send *BM/E* a description of your work. State the objective or problem and your solution. Include diagrams, drawings, or glossy photos, as appropriate. Artwork must be legible but need not be directly reproducible and not exceeding three in number. Camera reproducible material is preferred. Length can vary, but should not exceed 500 words. *BM/E* reserves the right to edit material. Entry should include: Name, title, station affiliation, and the class of station — TV, FM, AM. Indicate if idea is completely original with you.

3. Material Accepted for Publication: *BM/E* editors will make all decisions regarding acceptability for publication. If duplicative or similar ideas are received, *BM/E* editors will judge which entry or entries to accept. A $10 honorarium will be paid for each item published.

4. Voting: Every reader of *BM/E* is entitled to rank the ideas published. This can be done on the Reader Service Card in the magazine or by letters or cards sent to the *BM/E* office. To vote, readers should select the three ideas they like best and rank them 1, 2, or 3.

5. Winners: Top rated entries in the year-long tally will become winners in each of the three major categories (AM, FM, TV). Final winners will be picked in February, 1981, and announced in the March, 1981, issue of *BM/E*.

6. Prizes and Awards: Three top prizes will be awarded: a programmable electronic calculator will be awarded for the highest rated entry in the respective categories of AM, FM, and TV. Ten engineering slide rule calculators will be awarded as secondary prizes for the highest rated entries in the following additional categories (top three winners are not eligible for these prizes): audio (three prizes, one each in the AM, FM and TV categories); RF (three prizes, on each in the categories of AM, FM, TV); Control (three prizes, one each in the AM, FM and TV categories); Video (one prize in TV).

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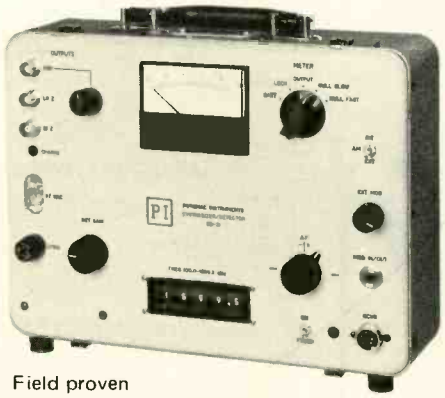

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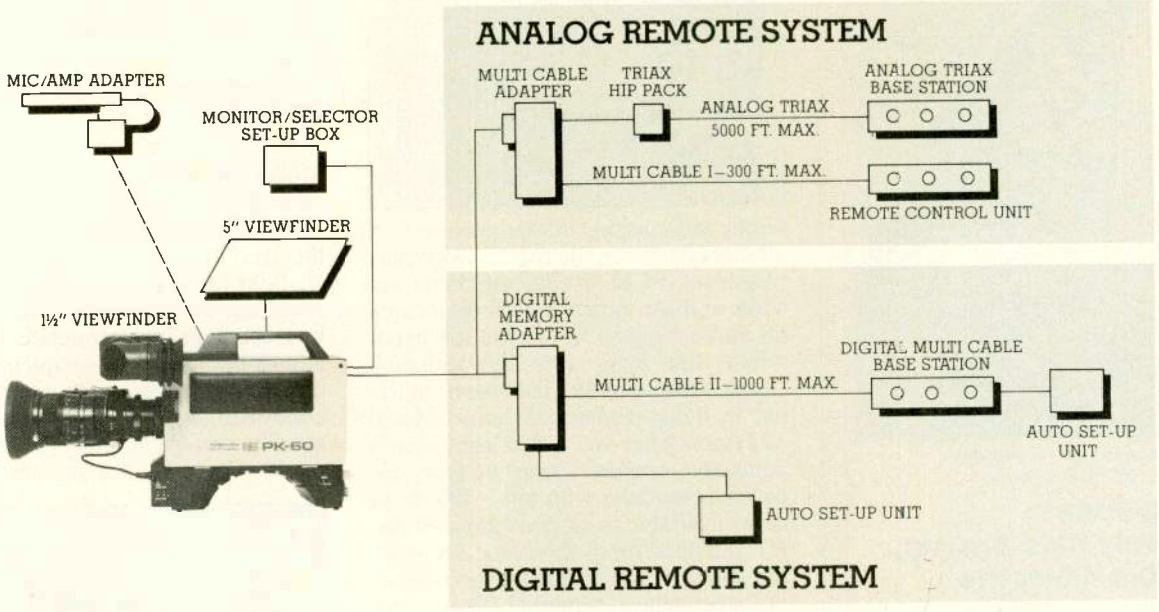

Introducing Toshiba's PK-60 ENG/EFP Color Camera. These drawings tell the story of the camera's digital and analog modularity. It features a separate digital memory with an internal microprocessor, an automatic setup unit with an 8-bit microprocessor, a digital base station and triax/wireless transmission with base station. The monitors also detail the PK-60's very modest dimensions.

But what the drawings and monitors don't tell you is that on top of all this you get a camera that offers amazing stability thanks to some advanced new circuitry plus unbeatable overall performance and Toshiba's unsurpassed quality.

And with all these new digital features, along with dimensions and weight that beat them all, the PK-60 is priced with ENG/EFP cameras offering fewer features. Even better, it's available now.

11.0" long
9.0" high
3.7" wide

9.4 lbs.

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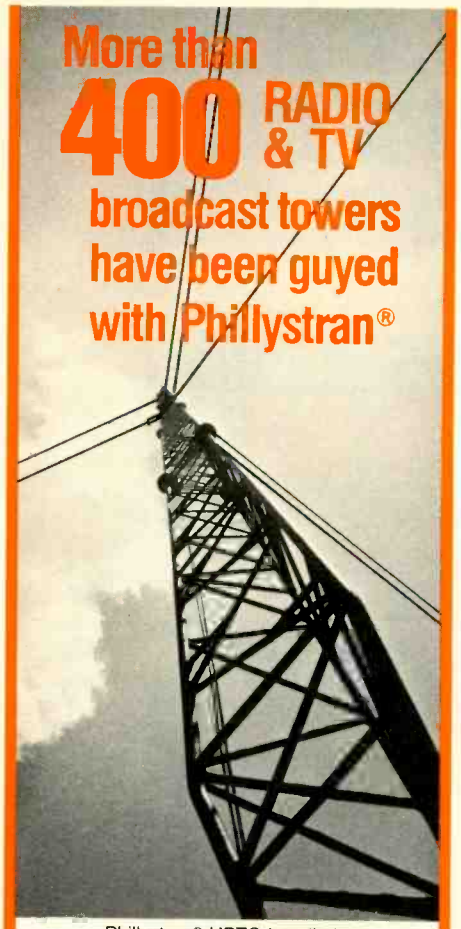

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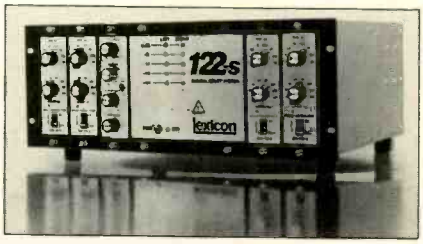
BROADCAST EQUIPMENT

Digital Delay System 252

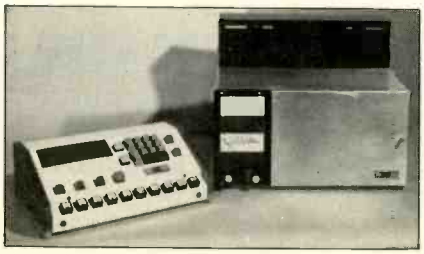
The 122 Series audio digital delay replaces the manufacturer's 102 Series. It features 14-bit floating point digital encoding with 6 dB gain steps for wide dynamic range free from noise pumping and artifacts. Nine-pole Butter-



worth anti-aliasing filters are used on all inputs and outputs for flat frequency response. PCM digital encoding insures uniform superior performance on all audio frequencies within the bandwidth, free from slew rate and high frequency/amplitude distortion inherent in delta modulation units. Model 122 (mono) has one to five individually adjustable outputs. Delay memory capacity is modular with up to 320 ms of delay available in increments of 40 ms. It is intended for professional audio applications requiring many delay outputs or longer delays. Model 122-S (stereo), for studio applications, has two independent delay lines, each with one or two outputs. It contains a VCO module as standard for time modulation and other special time-based studio effects. Delay memory is 160 ms per channel in 40 ms modules. LEXICON.

Automation Controller 253

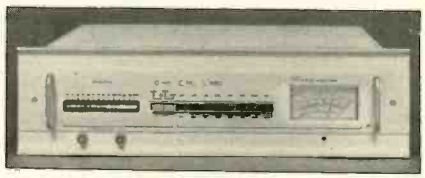
Mini Pro-1 is a small automation system controller that allows up to 99 events to be programmed in advance. Events can be time-updated or run in blocks with the SOZ (stop on zero) command. Up to 50 real-time instructions may be stored. A user-designated flag for delay network recording or other uses is standard. The unit gives the operator hours of walkaway time and full manual remote control of up to



10 audio sources. The 10 source START buttons are lighted as long as that source is on the air. Other features include adjustable monitoring facilities, simple user installation via terminal strips for each channel connection, low-cost optional relay, and adjustable time delay silence sense action, which allows for automatic program advance if desired. Frequency response is ±1 dB 50 Hz to 16 kHz; THD is under one percent at +8 dBm. $3995. SONO-MAG CORP.

FM Exciter 254

Model FX-30 synthesized FM exciter is capable of more than 30 W output, with a digitally programmed frequency synthesizer that permits field frequency changes in 10 kHz increments without requiring new crystals. The temperature-compensated reference oscillator allows immediate on-frequency operation of the exciter without temperature controlled oven warmup; reference frequency can be directly compared to worldwide frequency standards. Ultra-



linear modulated oscillator design provides minimum IM of baseband frequency components for superior stereo and SCA performance, according to the manufacturer. THD or IMD is less than 0.08 percent and transient IM distortion is under 0.1 percent. Completely broadband, the solid state exciter requires no tuning adjustments for a conservative 30 W output. Other features include advanced dual-speed phase-locked loop synthesizer and modular slide-out construction. BROADCAST ELECTRONICS.

Distribution Amplifier 255

Model DA 1521 audio distribution amplifier can provide up to 14 simultaneous 600 ohm outputs from a single source at +20 dBm maximum per channel. It is fully self-contained with built-in regulated power supply. Fea-

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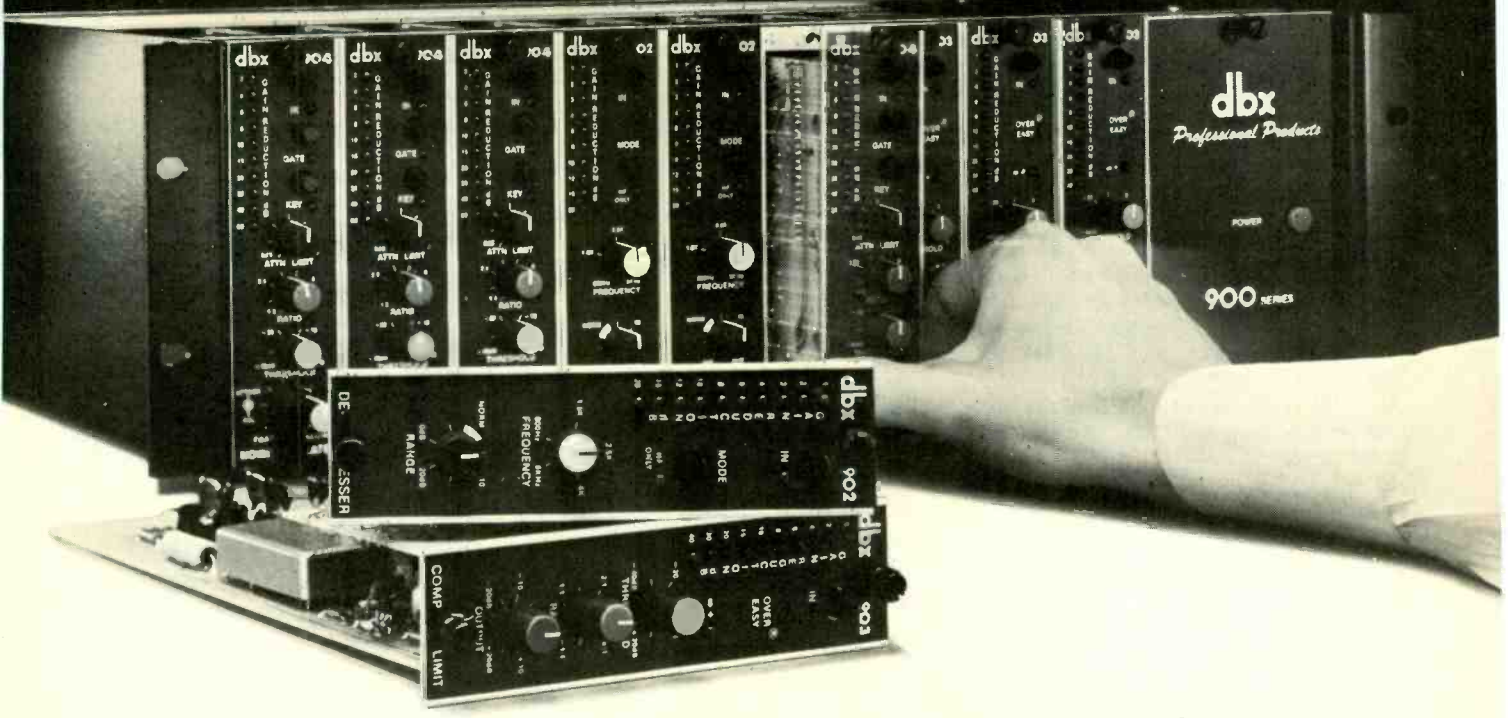

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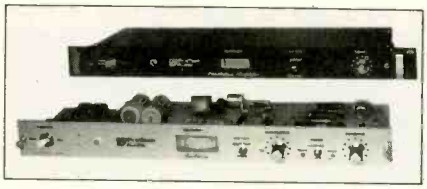
Broadcast Equipment

tures include up to 30 dB of adjustable gain; built-in VU meter, switchable to monitor input or output levels; combination power ON/OFF switch/circuit breaker that protects 115 V ac, 60 Hz



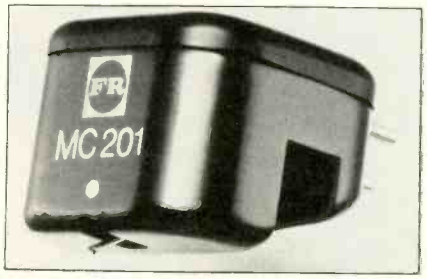
(230 V ac, 50 Hz available); and a new packaging concept, based on PC direct-to-barrier strip screw terminal blocks, that eliminates nearly all internal wiring. The entire active electronics are mounted on a single circuit board attached to the front panel and may be quickly detached. Frequency response is 30 Hz to 20 kHz, ±0.5 dB; THD is less than 0.25 percent at +20 dBm output; S/N is 85 dB at maximum gain; channel isolation is 70 dB. $375. PROTECH AUDIO.

Cardioid Vocal Mic 256

Model PL91A dynamic cardioid mic is the successor to the maker's PL91 and boasts a brighter high end than its predecessor. Its finish has been changed to snow gray with a contrasting charcoal Memraflex grille. A shock suspension design reduces handling and cable noise. $115.50. ELECTRO-VOICE.

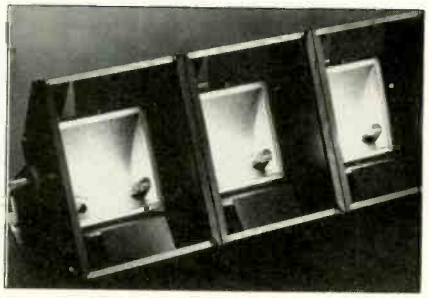
Phono Cartridge 257

Model MC-201 is a moving coil phono cartridge with no magnetic material in the coil core, so that only the coil moves. This design eliminates the distortion found in magnetic core, transducer mics, according to the manufacturer, who says that this mic tracks lighter and has a tracking cantilever that is lighter and only two-thirds the size of other MC cartridges. Specs include a 0.3 by two mil line contact solid diamond stylus, with a 0.16 mV rms at 5 cm/sec/1 kHz and 0.12 mV peak at 3.54 cm/sec/1 kHz output voltage. Coil impedance is 8 ohms ±1.3 ohms at 1 kHz, load impedance is 10 ohms or higher, and total cartridge weight is 7.5 gm ±0.3 gm. $325. FIDELITY RESEARCH.



Cyclorama Strips 258

These new redesigned cyclorama lighting strips, for theatrical, photographic, or TV studio applications, are manufactured of steel and aluminum with a



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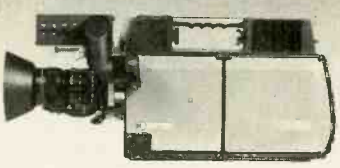
BEFORE YOU
RENT
a Toshiba PK-39



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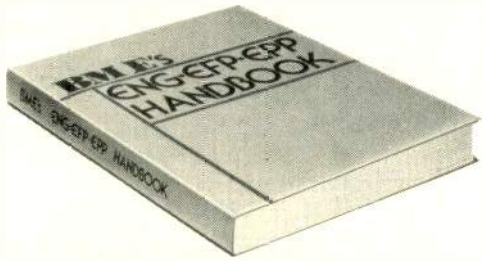

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Part III/Electronic Post Production: Chapter 7, Editing Systems & Controllers; Chapter 8, Video Switchers; Chapter 9, Digital Video—TBC's; Chapter 10, Television Audio; Chapter 11, Post-Production System Accessories.

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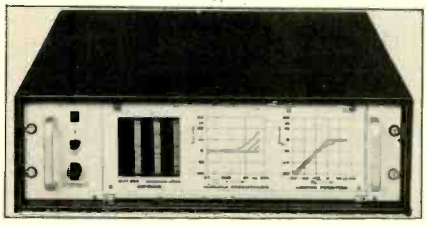
one-piece formed reflector that provides excellent uniform illumination over cyclorama surfaces, according to the maker. They accept 500, 750, and 1000 W 120 V lamps in both long-life low temperature and 500 hour 3200 K versions. A 625 and 800 W 220/240 V series of lamps is available for high-voltage applications. The strips come in one, two, three, four, six, eight, nine, 10, and 12-light versions; a 12-light strip weighs about 76 pounds. BERKEY COLORTRAN.

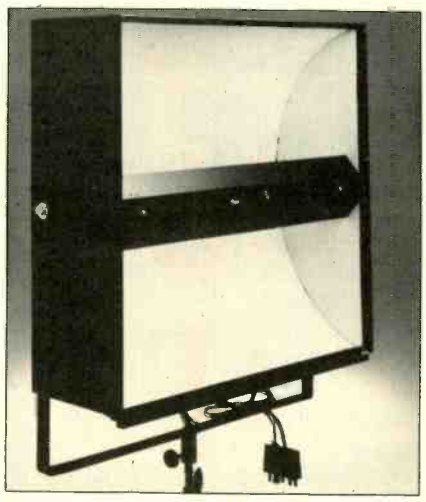
Transient Limiter 259

The EMT 266 audio frequency limiter controls signal transients in FM broadcast transmitters and disc cutting systems by means of feed-forward and variable preemphasis techniques. A 300 μs analog delay line in the signal path enables the limiter's control circuitry to calculate the gain reduction required for each transient before it arrives, eliminating transient overshoots. The unit's "adaptive preemphasis" circuit further processes this limited signal via a variable time constant filter to control high-frequency signals that would otherwise cause overmodulation. Rack-mountable, the limiter is intended for hands-off operation. GOTHAM AUDIO CORP.



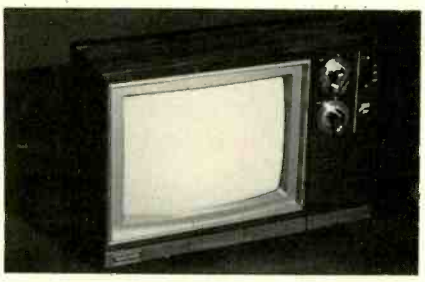
Softlight 260

This new portable lightweight 2000/4000 softlight, made of a high-strength aluminum alloy, weighs 21 pounds including yoke. It incorporates a special switch guard that fully protects the switches during shipping and rough location handling. Accessories available include gel/diffusion frame, scrim, safety cable, c-clamp, and stand mount. The light accommodates the following lamps: 3200 K, FFW 2000 W; FDB 1500 W; FFT 1000 W. PANOAK LIGHTING SYSTEMS.



Video Receiver/Monitor 261

Model RM-13B is a 13-inch receiver/monitor. Features include: TV-line-VTR selection; dc restoration; eight-pin VTR connector; E to E for videotaping; completely solid state electronics; complete ac chassis isolation (transformer); and slot-mask in-line gun picture tube. $712; immediate availability. VIDEOTEK.



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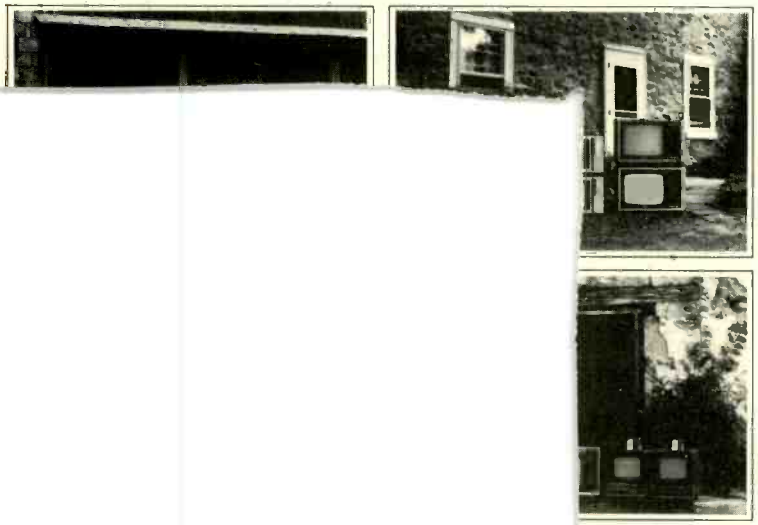

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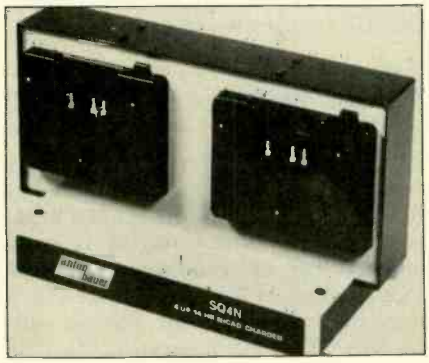
Compact Battery Charger 262

Model SQ-4N is a compact charger that can charge one to four snap-on Ni-cad batteries simultaneously. Designed for shelf or table-top operation, the charger



can be used singly or as multiple units for charging eight, 12, or more batteries at once. The lightweight, compact unit incorporates solid state technology and the manufacturer's snap-on system that eliminates interconnecting cables and plugs. It also features an LED for each battery position as positive indication of charge. ANTON/BAUER.

Multi-Channel Controller 263

Autoswitch is a multi-channel controller that can switch tower lights, perform transmitter power changes, and program network events accurately, reliably, and automatically. It can control up to 16 different functions and can switch up to 960 times in one week. Each day can be programmed independently to control heating, air conditioning, and outdoor lighting as well. The unit features ultra-low power CMOS circuitry, microprocessor design, digital readout, and automatic battery standby. It is rugged and environmentally resistant. Power requirements are 90–120 V ac at 11 mA maximum; a 12 V gel-cell rechargeable battery gives up to 50 hours of battery standby. Clock accuracy to 30 seconds per year. ROTHENBUHLER ENGINEERING.

Endless Tape Cartridge 264

The Stereo 300-S endless tape stereo cartridge reproduces frequencies with the same quality as reel-to-reel equipment, according to the manufacturer. It has been specially developed to maintain absolute alignment of the tape as it travels past the recording heads and capstan drive, permitting each cartridge

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Broadcast Equipment

to be in exact alignment with every other. Phase performance up to 10 kHz ±10 degrees is guaranteed by the maker. A stereo phase alignment cartridge, Model 304 S, which enables broadcasters to align their cart machines to conform to the factory-aligned cartridges, is also available. A differential hub and ring prevent jamming. Fast forward speeds up to 30 ips are possible, and the cartridges will interface with any cart machine. MARATHON PRODUCTS CORP.

Lighting Dimmer 265

Model D2400 is a lightweight dimmer pack offering eight 2.4 kW channels, remote controllable via scene lighting controllers. Incorporating heavy RFI shielding, the unit is ideal for television studios as well as theatrical applications. It is portable and rack-mountable, will accept "hot patching" without damage, and will dim loads as small as 15 W. TELAUDIO CENTRE.

Distribution Amplifier 266

Model DA 1-5 is a new distribution amplifier intended for limited budget applications. The "table-top" unit has one transformer-coupled input and five direct-coupled balance outputs. Specifications include frequency response of 50 Hz to 15 kHz (±0.5 dB), harmonic and IM distortion under 0.15 percent, and +15 dBm maximum output level. Maximum gain is 20 dB. This amp is aimed at small-market stations for use on production console outputs, network lines, and so forth. $120. EXCALIBUR ELECTRONICS.

Signal Generator 267

Model 8656A is a programmable 0.1 to 990 MHz signal generator with absolute level accuracy of ±1.5 dB. The manufacturer claims that this unit lowers test times by reducing the time required to set up desired signal conditions. Frequency switches in less than

two seconds (within 100 Hz). Frequency, AM or FM, and output level are keyed in directly in units desired, such as MHz or dBm. The μp control also handles nontraditional units, including dB referenced to a microvolt. The store and recall function remembers 10 complete front-panel signal setups and recalls each at the touch of two keys. Also featured are keyboard-entry flexibility and remote HP-IB programming. Resolution is 100 Hz or 250 Hz; SSB phase noise is less than −122 dBc/Hz at a 20 kHz offset at 225 MHz. $6250. HEWLETT-PACKARD.

Broadcast/Production Mixer 268

The Series 24A stereo mixer offers a wide range of input, monitoring, communications, metering, and other modules. These modules may be fitted in any number or combination without modification of the mainframe, which may be expanded with bolt-on subframes. The configuration can be user-modified at any time. The mixer may be mounted in a wraparound console or be free-standing. Main features include special input modules for mic or line input, stereo equipment with remote starts, telephones, outside sources; sophisticated intercom and talkback to studios; automated prefade listen monitoring and metering; expandable number of monitor rings; visual cue of all major functions; EQ option on all mono and stereo inputs; and others. Each outside source input module generates its own independent clean

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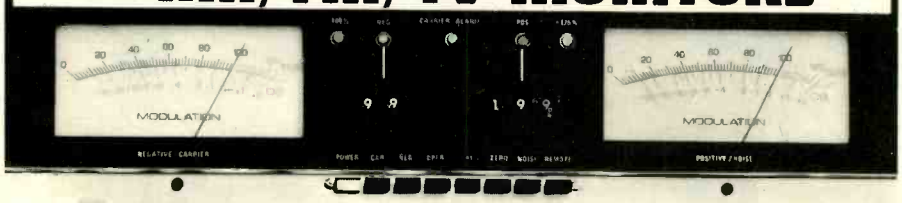

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The Grass Valley Group, Inc. a leading manufacturer of television broadcast equipment, is looking for people who want challenging professional positions PLUS the added attraction of working in a small town nestled in the Sierra foothills.

These challenging positions combine chances for U.S. travel plus marketing and engineering career opportunities. Individuals with experience designing and/or maintaining television broadcast systems are required to provide after-sales support for our wide variety of complex systems.

Interested and qualified candidates are invited to send a resume in confidence to Sylvia Smith, The Grass Valley Group, Inc, P.O. Box 114, Grass Valley, CA 95945. An Equal Opportunity Employer M/F/H.

The Grass Valley Group
A Tektronix Company

feed, permitting any number of outside sources to be aired simultaneously in conference while supplying each contributor with cue program. MBI BROADCAST SYSTEMS LTD.

Cassette Timer/Rewinder 269

Model 200-9 is a two-station cassette rewinder/exerciser/timer that rewinds two 60-minute cassettes in under 17 seconds. Used in conjunction with the maker's cassette loader, the timer allows a cassette duplicator to precisely measure the master and make the duplicating blank tapes to the exact length required. A unique leader sensing element shuts the unit down before the leader runs out, permitting the rewinder to run tapes at very high speed. In the exerciser mode, the unit winds and rewinds a cassette at the same high speed and counts the cycles up to 9999 before starting over. The maker claims a through-put of over 400 cassettes per hour in rewind mode. AUDICO LTD.

Lightweight Mic 270

The SM63-CN lightweight mic is less than six inches long and weighs 2.8 ounces. The dynamic, omnidirectional model has an output about 6 dB higher than larger, comparable units, according to the manufacturer. It features a controlled low-frequency rolloff for natural-sounding voice and music pickup and smooth high frequency response. Other features include a hum bucking coil, a mechanical-elastomer isolation system for resistance to handling noise, and a built-in breath and pop filter. $100. SHURE BROTHERS.

Production Switcher 271

The 200 Series video production switcher features the maker's PolyKey Effects (PKE) system. It may be ordered with one to three PKE units, each with the following standard features: four input buses; manual or auto transitions; internal RGB chroma key and quad split; title key over/under; video key; key edging with black/white/color edges; and rotary and spin wipes. The downstream transition unit includes flip-flop mixer with cut bar, downstream keyer with edging and colorizer, fade to black, pulse processor, and pointer generator. An option is A.P.E., an automated production effects unit that features auto event storage and recall of manually executed control panel functions. It is available with a standard 64-event memory or optional dual floppy system with vertical interval recall of 3840 events per disc. ISI.

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

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- Sequential Controller
- Random Selector
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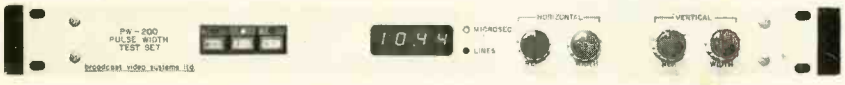

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broadcast video systems ltd.

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