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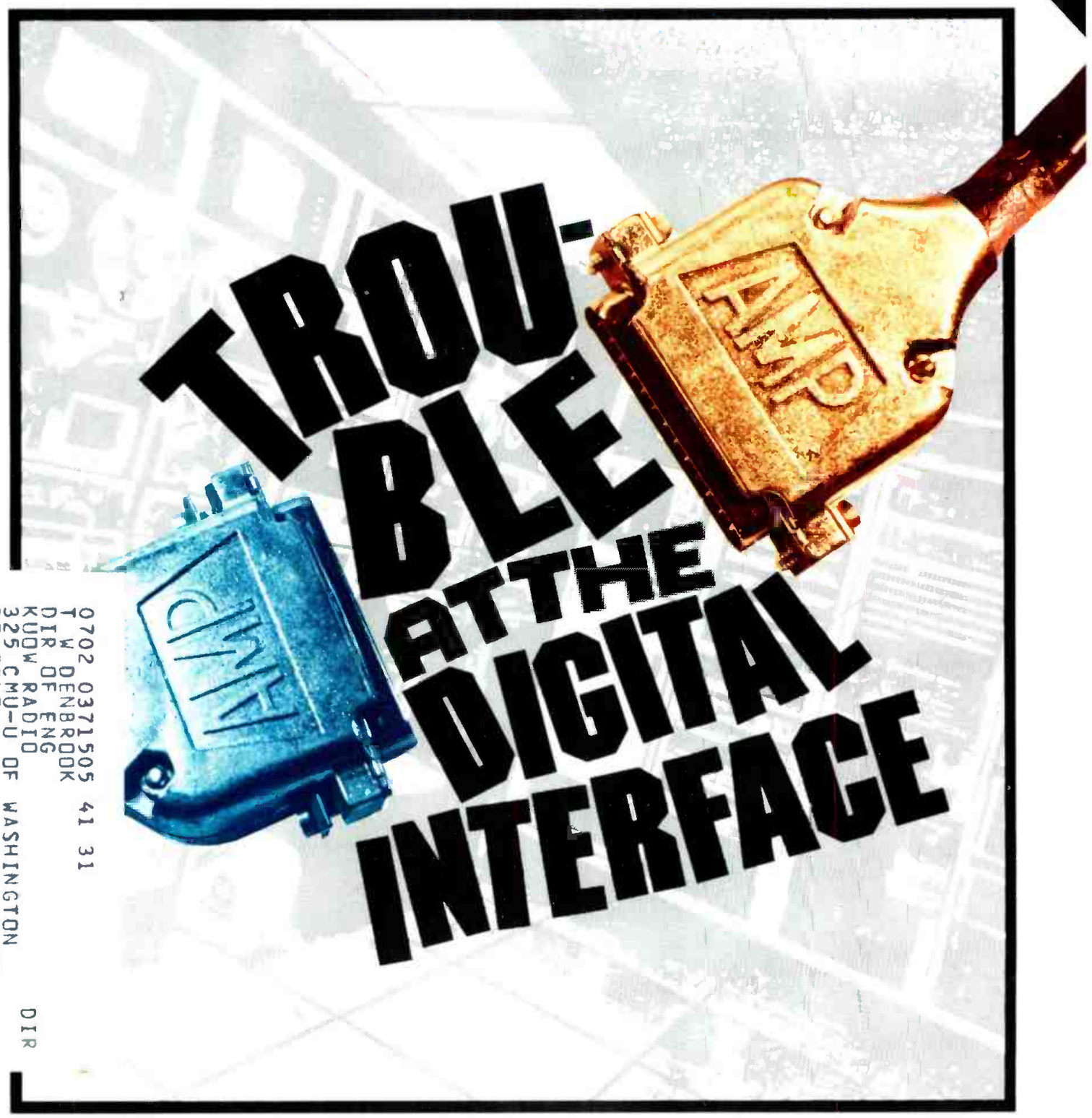

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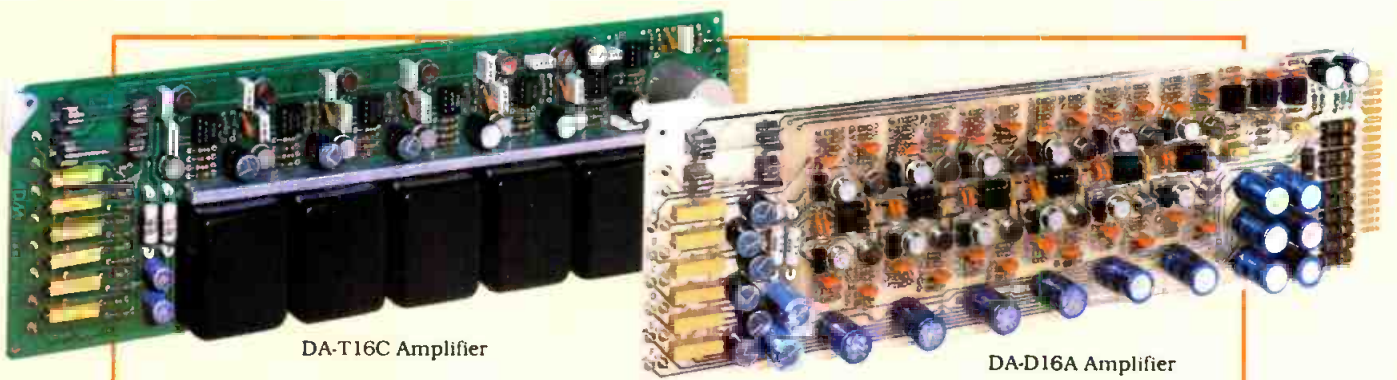

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HOW TO AVOID A FORMAT FAUX PAS.

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LOOK FOR EVOLUTION. NOT REVOLUTION.

Apparently, many manufacturers feel it's in their best interest to have you replace your existing U-matic™ equipment with their new stand-alone systems.

At Sony, we think it's foolhardy to leave you no option but to make a 180° turn and orphan your existing editing suite. So we designed Betacam™ as an evolutionary system. One that easily and efficiently plugs into what's come before.

This Sony theory of peaceful coexistence allows you to enter the world of one-piece camera/recorders at your own pace. And in this way you not only protect your existing U-matic investment. You gain field equipment that's more compact and portable, and a dramatic improvement in technical performance. Furthermore, dramatic improvements are also on the horizon for Sony U-matic. The evolution of both these formats is planned and it's total.

FIND A ½" SYSTEM THAT'S WHOLE.

For those of you who want to capitalize on the outstanding technical performance of an overall ½" system, scrutinize carefully the complete system from Sony.

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The Sony Betacam system has proven itself on both the

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THERE'S SAFETY IN NUMBERS.

With over 1,000 Betacams already sold to key end users, Betacam is virtually the worldwide de facto standard now.

We believe Betacam is outselling all the others by such a wide margin because it's better than all the others by such a wide margin. It's the only camera/recorder that focuses on the big picture. A picture that includes your existing investment; your need for both ENG and EFP; your desire for light weight and high quality; and a total system approach.

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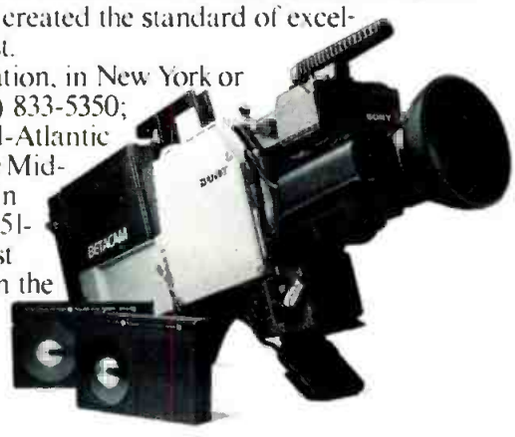

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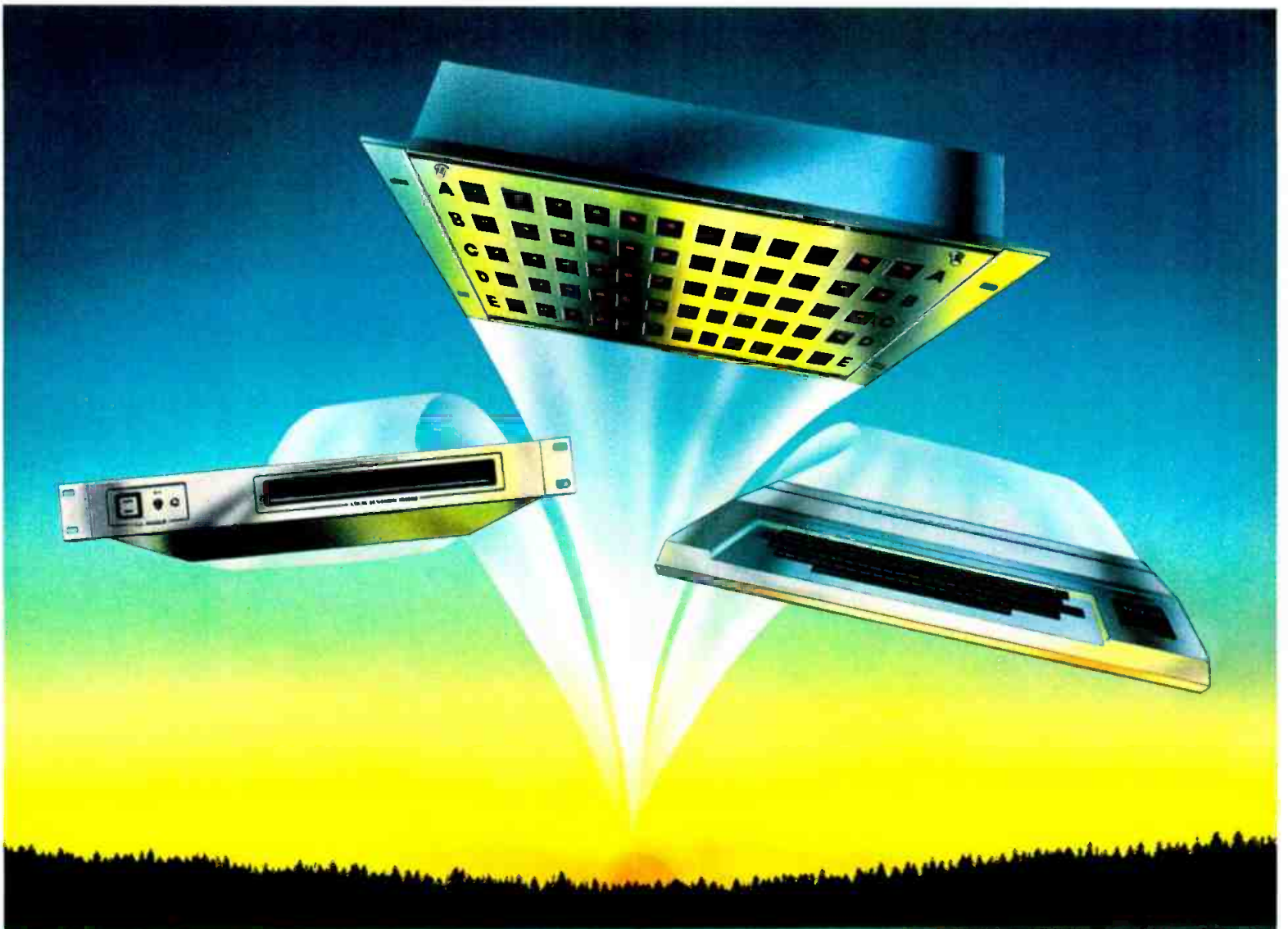

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NOVEMBER 1983 VOLUME 19/NUMBER 11

FEATURES

DEPARTMENTS

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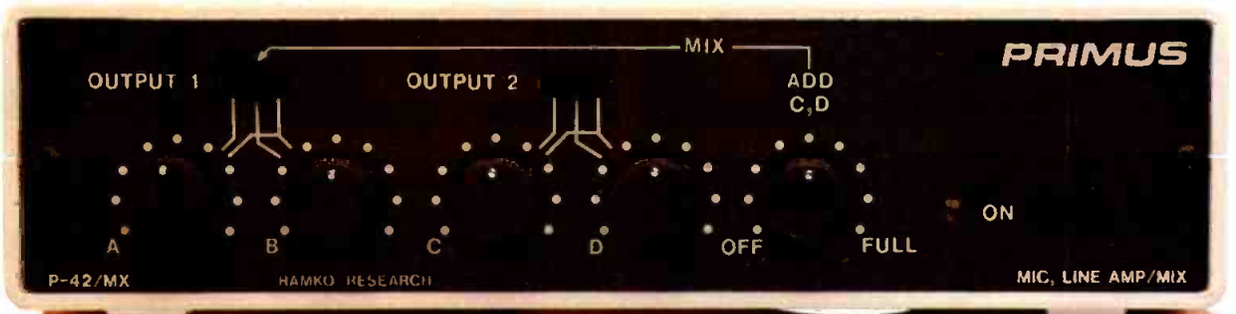

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- Lab standard mono or stereo turntable preamplifiers.
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- Audio distribution amps from three (3) stereo/six (6) mono up to eight (8) stereo/sixteen (16) mono outputs. All models feature individual recessed front panel adjustments or optional high resolution, conductive plastic potentiometers.
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- Signal processing VCA's with six (6) independently controlled channels. DC remote control with balanced outputs.
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Whichever combination of precision PRIMUS audio components you choose, you're guaranteed outstanding specifications. For example, our stereo turntable preamplifier measures:

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Total Harmonic Distortion: Below .0018%
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Stereo Separation: −70 dB @ 1 kHz
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PRIMUS audio components are an array of compact, performance-engineered rack mounting or tabletop packages.

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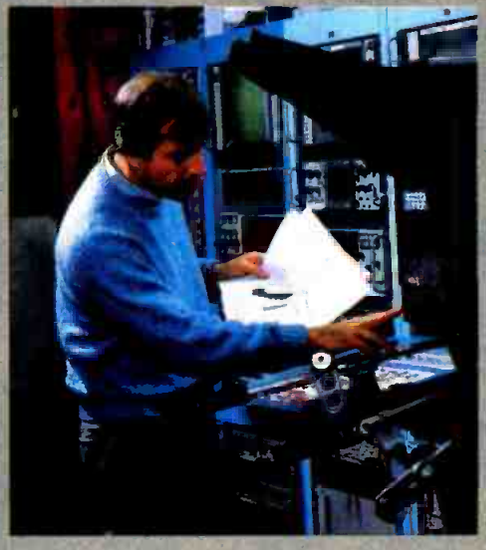

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Equipment proofs, troubleshooting and maintenance are all ANSWER-easy. It provides quick, conclusive verification that new equipment is up to a manufacturer's specifications. And testing current equipment can be accomplished on a regular basis in much less time and with much less trouble than it takes to make the same measurements manually. Highly skilled personnel are freed for more productive activities, and the risk of interpretive errors is lessened considerably. You can have complete confidence in measurement results because of the repeatability you get with ANSWER over long periods of time.

WORKING HARD FOR
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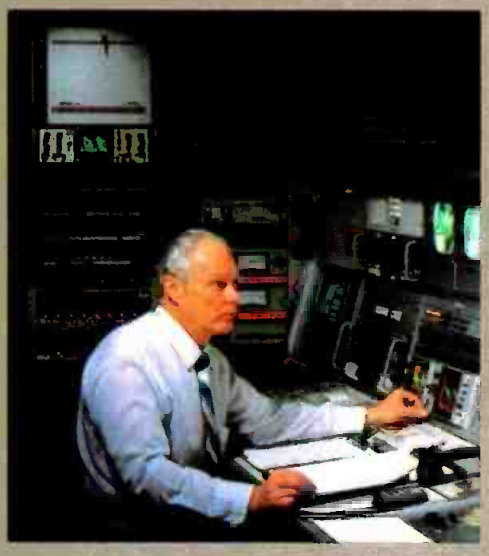

System testing and maintenance

ANSWER is the time-saving approach to systems evaluation. Major signal sources and critical points in each transmission path can be checked automatically. Testing an entire system takes much less time than it would to make the same measurements manually; personnel workloads and constraints of time need no longer be an obstacle. In addition, graphs and hard copies provide a permanent technical record that serves as an accurate basis for trend analysis and reference for future maintenance.

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Automated testing of production line output is a cost-effective way for video equipment manufacturers to ensure absolute product quality. ANSWER eliminates all chance of operator errors, at the same time that it increases productivity by making better use of personnel. Equally useful in research and development, ANSWER provides thoroughly accurate, repeatable test results, plus authoritative verification documentation to include with shipments.

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EDITORIAL

Hope for AM Stereo

On the broadcast industry's journey along the winding road to deregulation, perhaps no technical issue has had a bumpier trip than AM Stereo. Despite the confusion surrounding a possible single standard, at the recent NRBA Convention in New Orleans it was among the most widely discussed topics and, in fact, received a resounding vote of approval from many broadcasters.

It seemed as though stations couldn't wait to sign up. Significantly, an announcement was made at the show that Broad Street Communications had dumped its successful news/talk format on WGSO (New Orleans) during convention week, changed the call letters to WQUE, and set plans to be broadcasting in AM Stereo by January.

The vote of confidence by broadcasters was clear on the exhibit floor at the NRBA with Broadcast Electronics, Harris, and Motorola receiving very heavy traffic at their AM Stereo exhibits. If there was one obvious center of attention for AM Stereo, it was the multi-system receiver demonstrated in the jam-packed Sony booth. The set-maker's solution to the "marketplace" decision seems to be to forget trying to pick a single standard and get on with selling radios, an outcome far different than expected.

The impetus for the flurry of interest at NRBA did not come about as a result of a marketplace decision. Most of the present excitement can be traced to the availability of quality consumer radios capable of receiving multiple AM Stereo signals, and not as a result of broadcasters choosing a de facto standard by purchasing one of the available systems due to its merits.

Among the problems still to be addressed is the all-important automobile market. Since the Delco division of GM committed to the Motorola system, at least for its Buick radio installations, problems are created for both the consumer and the broadcaster. In the automobile, the AM radio has definite advantages over FM. AM Stereo would be even more effective. But there does not seem to be much inclination to put a multi-standard receiver in the car.

Thus, the question remains as to whether or not the industry has really moved closer to a concensus. Even though the receiver manufacturers have stepped in and made the radio station's situation easier, we wonder if all this activity has really answered the crucial questions. Is the public being served? Will AM Stereo be a boon or a bust for AM radio? We shall, in time, find out. Broadcasters at the NRBA were impressed with the quality of the AM Stereo audio at the Sony demonstration. Even engineers who had just about written off AM Stereo as a dead issue are now on the bandwagon. The next and crucial phase will be how the radio audience accepts it. Eventually the industry is going to find that elusive marketplace standard.

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Your audio needs, however, are probably *not unique*.

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LETTERS

PRO AM STEREO

To the Editor:
When WQXR's president and general manager, Warren Bodow, recently suggested that we adopt AM stereo with the new AM transmitter we're buying, I was frankly reluctant. It seemed that marketplace conditions had killed all initiative by set manufacturers to produce receivers, and AM stations were thoroughly confused as to which system to buy. It looked like a no-win proposition.

Then, in August, I heard of the new Sony AM/FM stereo (SRF A100) receiver that was just about to hit the market. I ordered several, but before delivery, I got a preview by borrowing one from Sony and took it along on a short vacation to Massachusetts. I spent a good deal of time listening across the AM band and was able to enjoy in full stereo WNBC, NY; CKLW, Windsor, ONT; WHAS, Louisville, KY; and WBT, Charlotte, NC (after midnight). I was very impressed by their stereo transmissions, which represented two of the four systems available.

Now, I'm eager to broadcast in AM stereo as soon as possible. With good listening equipment rolling into the marketplace, it is imperative for AM stations to start broadcasting in stereo. I'm convinced that as broadcasters commit to AM stereo, the consumer market will respond. These high-quality all-systems receivers will assure an audience with any of the four systems, but now is the time to be on the air. This new stereo service will also offer more reliable reception in moving vehicles, and long-distance sky-wave reception will reach out much further than FM.

Zaven Masoomian
Chief Engineer
WQXR-AM
New York, NY

FLAT-TOPS LIVE

To the Editor:
I read with interest John H. Battison's feature on AM antenna systems in the September 1983 issue. But I felt the need to make the following correction:

It is untrue that the flat-top abandoned many years ago at WOR New Jersey was the last. In fact, there are three stations in the United States still using this design. KXA-770 kHz in Seattle is still using its old rooftop wire antenna system, although it was recently granted a power increase to 50 kW and will be erecting a directional system. WSAJ-1340 kHz in Grove City, PA, still uses a long-wire cage antenna and wire counterpoise that was installed in the 1920s. They have no plans to change this system. KOTZ- 720 kHz in Kotzebue, AK, is transmitting with a long-wire antenna that was installed in 1973.

In addition, several stations have maintained their old flat-tops for standby purposes. KDKA-1020 kHz Pittsburgh has a center-fed T antenna at its transmitter site in Allison Park, PA, which is still in working order. Our neighbors in Canada still have a few of these relics on the air; CJAV-1240 kHz in Port Alberini, BC and CFRC-1490 kHz in Kingston, ONT, are both using wire antennas.

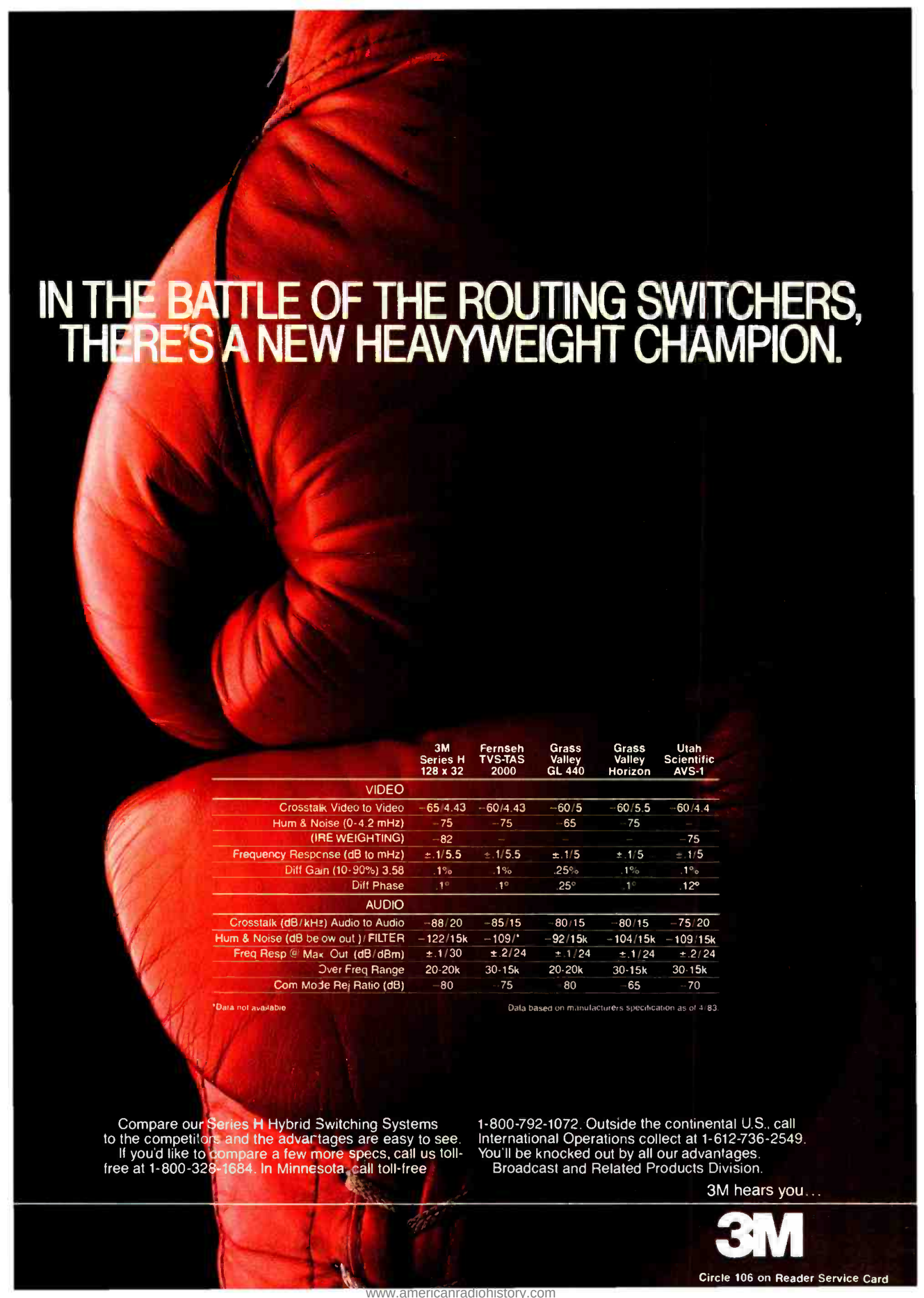
Old antenna systems are sort of a hobby of mine. If there are any others out there with a similar interest, I would like very much to hear from them.

Jerry Starr
WSRD Radio
Youngstown, OH

To the Editor:
Concerning the "untimely" report of the death of the flat-top antenna expressed in John Battison's article on AM antennas in the September *BM/E*, may I register a protest!

WTAG, Worcester, MA, has maintained a flat-top or "T" antenna for auxiliary use at our studio location since the 1930s. The wire is supported by taller buildings to either side of ours, with the downlead running to a penthouse on our roof. This antenna has always been an excellent performer, and we intend to keep it!

John K. Andrews
Chief Engineer
WTAG-AM
Worcester, MA



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VIDEO					
Crosstalk Video to Video	−65/4.43	−60/4.43	−60/5	−60/5.5	−60/4.4
Hum & Noise (0-4.2 mHz)	−75	−75	−65	−75	–
(IRE WEIGHTING)	−82	–	–	–	−75
Frequency Response (dB to mHz)	±.1/5.5	±.1/5.5	±.1/5	±.1/5	±.1/5
Diff Gain (10-90%) 3.58	.1%	.1%	.25%	.1%	.1%
Diff Phase	.1°	.1°	.25°	.1°	.12°
AUDIO					
Crosstalk (dB/kHz) Audio to Audio	−88/20	−85/15	−80/15	−80/15	−75/20
Hum & Noise (dB below out)/FILTER	−122/15k	−109/*	−92/15k	−104/15k	−109/15k
Freq Resp @ Max Out (dB/dBm)	±.1/30	±.2/24	±.1/24	±.1/24	±.2/24
Over Freq Range	20-20k	30-15k	20-20k	30-15k	30-15k
Com Mode Rej Ratio (dB)	−80	−75	80	−65	−70

*Data not available

Data based on manufacturers specification as of 4/83.

Compare our Series H Hybrid Switching Systems to the competitors and the advantages are easy to see. If you'd like to compare a few more specs, call us toll-free at 1-800-328-1684. In Minnesota, call toll-free 1-800-792-1072. Outside the continental U.S., call International Operations collect at 1-612-736-2549. You'll be knocked out by all our advantages.

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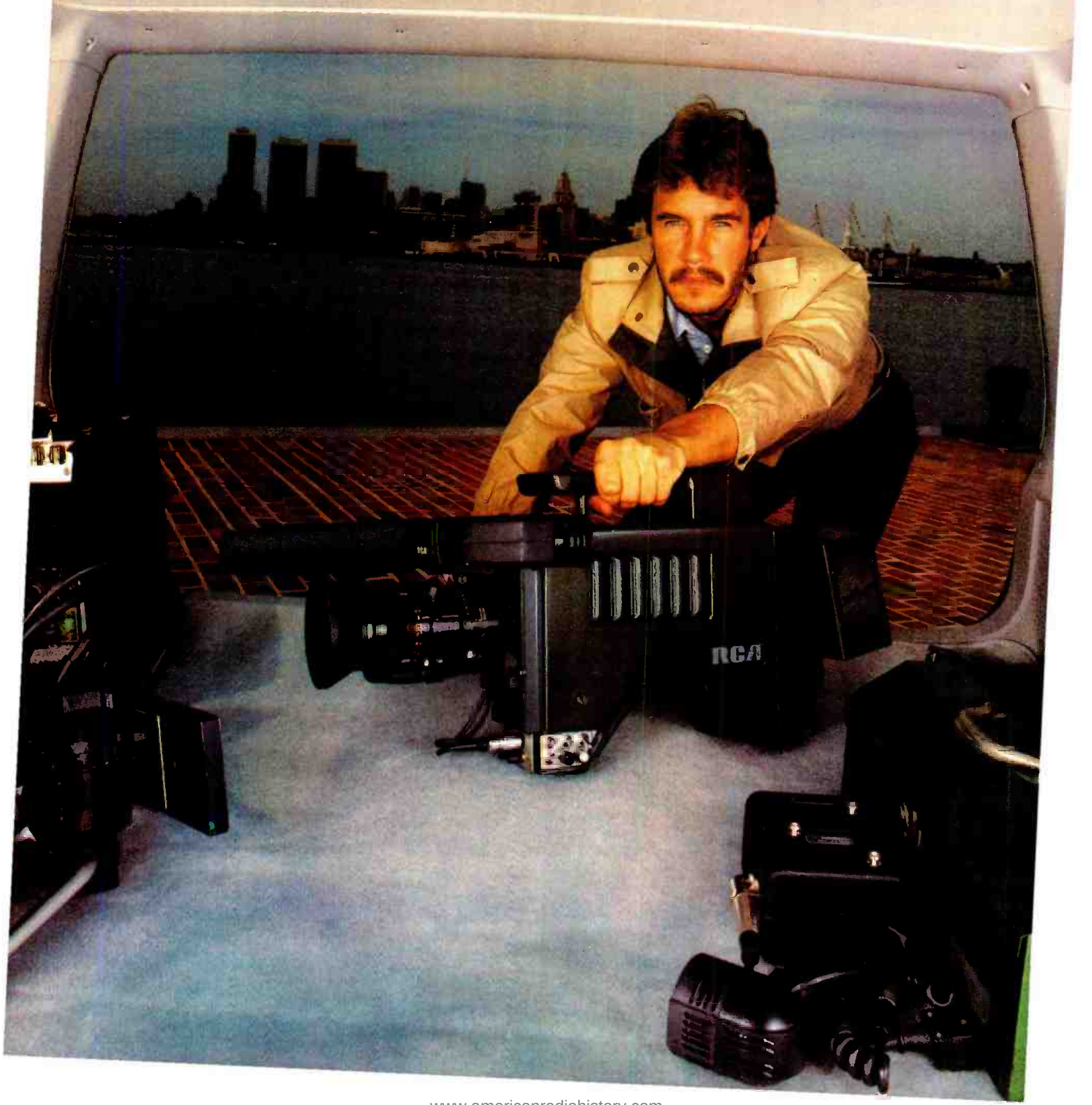

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It's built to take the day-in, day-out tortures that only a news or production crew can put it through. Rugged cast side covers that take a beating and still seal out moisture, dirt and RF interference. Convenient T-bar handle that makes it easy to get those tough low angle shots. A total design that looks and acts *tough*.

HAWKEYE II has been designed and built in the rugged TK-76 tradition. And when it comes to performance, it produces picture quality that's tough to beat. The camera is fully compatible with your present recorders, today's component recorders, and, of course, with the complete HAWKEYE family of camera accessories and recorders. It works with everything!

Get all the facts on HAWKEYE II. Ask your RCA Representative or write RCA, Bldg. 2-2, Camden, NJ 08102. Tell them you want to talk *tough*.

RCA

Circle 107 on Reader Service Card

Post-Sunset Operations Approved for Daytimers

Two thousand AM daytime-only stations will soon be authorized to extend operations up to two hours past sunset as the result of a recent FCC ruling. The action permits Class 3 daytimers to continue broadcasting at reduced power of 500 W until as late as two hours after the sun goes down locally; the power may be reduced yet further to avoid interference to full-time Class 3 stations.

Class 2-D stations would also have their evening hours extended, but only until 6:00 p.m. and only if they are located outside the 0.5 mV/m 50 percent contour of co-channel Class 1 stations. A class 2-D station inside that contour and to the east of a Class 1 station would have to sign off at 6:00 p.m. local time or sunset at the Class 1 station, whichever is earlier.

In addition, about 250 stations would receive permission to begin their broadcast days at 6:00 a.m., joining 2000 daytimers that already go on-air at 6:00 a.m.

The only remaining barrier to the expanded hours is pending agreements with Canada and Mexico. Agreement with Canada is considered imminent; accord with Mexico, while it will wait a few months longer, will not bar daytimers from broadcasting until 6:00 p.m.

Stations do not have to apply for the increased hours of operation. The FCC will individually notify each affected station of the permitted increase.

In other regulatory news, FCC has issued a notice of proposed rulemaking seeking to revise its ownership rules, including the "rule of sevens" limiting any one owner to seven AM, seven FM, and seven TV stations. Henry Rivera was the sole dissenter in the three-to-one action. The majority stated that relaxation of the rule could encourage formation of regional networks, resulting in increased diversity.

ABC Uses Ku-Band for Shuttle Coverage

ABC Television's coverage of the first nighttime launch of the space shuttle, late last summer, also marked the first use of a Ku-band satellite in the live pickup of a news event, according to the network. ABC relayed its signal from Cape Canaveral to New York via SBS-3, itself launched on an earlier shuttle mission.

VideoStar Connections of Atlanta, supplied the uplink for the event, a transportable Ku-band system built by Microdyne Corp. of Ocala, FL. VideoStar is leasing the system from Microdyne and plans to lease a second. Videostar also provided the New York downlink, using a Microdyne 10-foot transportable antenna.

ABC also used Nurad microwave links (see photos) at the Cape for its coverage of the launch.

ABC Television equipment and personnel prepare for the shuttle launch. Nurad microwave equipment seen in both photos was used for the operation.

Cable Lures Radio Stations

An unlikely alliance is forming between radio stations and cable TV operations thanks to the growing popularity of cable music. Aside from the "super stations" such as classical WFMT, Chicago, and all-jazz KKGO-FM, Los Angeles, a number of AM daytimers with various formats are hooking into local cable systems.

The advantage of this extended "on-air" time is a hoped-for increase in revenue as well as additional promotion to the cable subscribers. At a seminar that preceded this year's NAB Radio Programming Conference a number of stations reviewed their experiences with the cable connection.

The programming comes from various sources. For example, KXOJ-AM in Tulsa, OK made an arrangement to put Radiovision, which was running on the cable system, on the air. It is now being carried on AM in the daytime, 24 hours on a cable channel to 432,000 subscribers and available on an FM subcarrier to the cable households.

In Tallahassee, FL program director Joe Bullard already had a top-rated station with daytimer WANM-AM. Putting the station on the Group W cable system in January has helped make the urban contemporary station even stronger in the community and is already paying for itself in terms of nightime operation costs, according to Bullard.

WFEZ-AM, a daytimer in Meridian, MS has not taken the local approach. Running the automated Music of Your Life format, the station started to simulcast during the days and continued at night on an FM subcarrier over the local cable system.

Not all cable radio stations broadcast. Both KBLE in Des Moines, IA and COOL-FM in Ft. Wayne, IN only have cable outlets. KBLE got its start in 1975 by a group displaced when the local FM AOR station was sold and the format switched.

One of the major unsettled issues concerning cable radio is premium pay versus ad-supported revenue. A premium channel requires security, a problem for audio compared to video signals. Discrete channels, digital transmission and/or block converters like those of Pioneer-Wegener and

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Detroit, MI	Charlotte, NC
313-689-9730	704-399-6336
Indianapolis, IN	Atlanta, GA
317-251-5750	404-875-3753
Louisville, KY	Miami, FL
502-491-2888	305-592-5355
Lexington, KY	Tampa, FL
606-277-4994	813-885-9308

Circle 108 on Reader Service Card

CATEL may be the answer here. It was the consensus of the conference attendees that local origination channels will be advertiser supported and national programmers will provide the premium services.

WU, Visnews in Joint Satellite Venture

Announced recently at a New York City press conference is a brand-new co-venture between Western Union and Visnews, the British newsgathering organization. Known as BrightStar, the new business will provide both European and American broadcasters with fast, two-way transatlantic satellite delivery of video programming.

Headquartered in London, but with operations centers on both sides of the Atlantic, BrightStar will transmit video on a totally integrated transmission path using an Intelsat Atlantic satellite at 359 degrees east longitude. Visnews will provide uplinking and downlinking facilities and terrestrial lines through British Telecommunications International in the U.K., and Western Union will provide domestic distribution through its own satellite earth station network.

Initial users of the service will be the BBC for U.K.-bound signals and NBC, Visnew's principal associate in the U.S. Other broadcasters are expected to follow shortly.

Radio Surveys Reveal Changing Industry

Results from three recent surveys highlight the changes taking place in radio. An NAB survey of radio station profits shows 67 percent of responding radio stations earned a profit in 1982, compared with only 58 percent the year before. It was the first time radio profits were up after three years of decline. The 1618 participating stations reported an overall increase in ad revenues of 21 percent, with national/regional spot revenues up 37 percent and local sales up 19 percent.

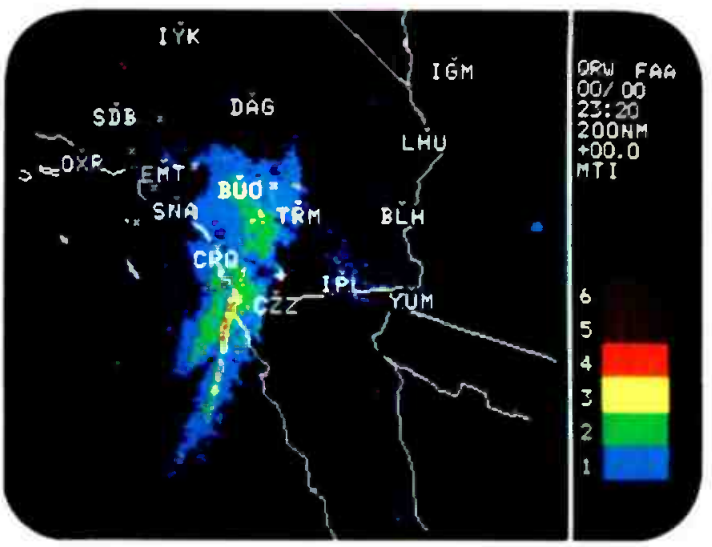
The latest in a series of studies for the AP found that the average U.S. radio station programs 125 minutes of news and information a day. AM stations lead with 154 minutes of news to FM's 85. Both management and listeners agree that local news is the most important segment, with 65 percent of listeners wanting local news more than anything else. Radio execs say they program 6.2 minutes of news per hour, and 71 percent reportedly broadcast their news at the top of the hour.

In a Torbet Radio nationwide survey, 90 percent of stations polled used syndicated programming in the past year. Besides such major reasons as inability to produce the programming locally, building audiences, and increasing revenue, 19 percent said they bought programming never aired just to keep it away from competing stations.

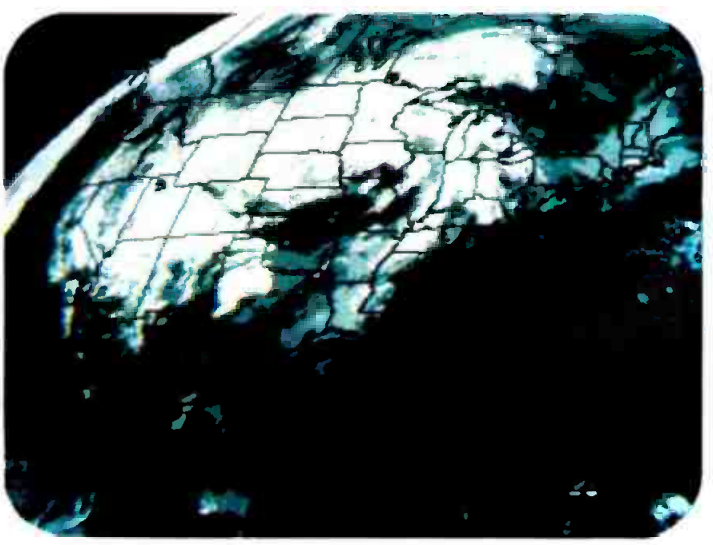
Joint Venture to Make Advanced Editing System

Marrying the film editing and graphics knowhow of Lucasfilm with the tape editing and computer hardware expertise of Convergence Corp. has produced a new joint venture that promises to have an advanced video editing system ready to demonstrate at the 1984 NAB show. If all goes according to

Make your weather forecast good for nothing.



Our Live Color Radar System accesses free government transmitters nationwide, with a simple phone modem.



Our Satellite/Weather Graphics System is compatible with private data bases, and can be combined with our Live Color Radar System.

NEW ALDEN LIVE WEATHER RADAR WITH FREE ACCESS

Live color radar adds drama to any weather report. Now you can have live color radar (with coast-to-coast coverage) without paying access fees, monthly charges or high equipment costs . . .

Because Alden Electronics is introducing a unique weather radar system. It can access the government's new network of live radar transmitters (RRWDS) using just a simple phone modem.

Your meteorologist can zoom in on local precipitation. And take his forecasts–and your audience–into hurricanes, tornados or blizzards nearby or anywhere in the country. Good for forecasting, great for exciting weathercasts.

But the best news is the price–the basic hardware is a fraction of the cost of comparably equipped private radar service products. And the RRWDS data is free.

The Alden Color Radar System is available as a stand-alone addition to whatever you may already be using for color weather display. Or it can be added to Alden's Satellite/Weather Graphics System, compatible with private weather data bases. Show surface weather, temperature contours, hourly national weather radar and satellite photos. Zoom in for local conditions, or loop satellite photos to illustrate frontal movement.

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Circle 110 on Reader Service Card

plan, the system will be sold soon after the NAB through a new marketing group organized by Convergence.

According to executives for both principals, the editing system will be for high-end users, will be videodisc-compatible, will be built around a 32-bit microcomputer, and will be priced in the neighborhood of $75,000. While few details are available, the system will likely be based on EdDroid, a prototype film-oriented videotape/disc system already under development at Lucasfilm when the joint venture evolved. Convergence, meanwhile, had been working on a similar film-oriented tape editor before the joint venture.

The system will be capable of immediate call-up of an edit and real-time previewing of edited sequences. It will probably have some features that can be tailored through software to individual user needs. The main goal is a tape editing system that requires no understanding of computers to run.

Production Gear Abounds at Video Expo New York

Top-quality video production equipment and a river view—what more could a video professional ask? The fourteenth annual Video Expo New York provided both in its new home at the New York Passenger Ship Terminal, overlooking the Hudson River. Exhibits were open for three days, September 27 through 29.

The exhibitors included many of the top names in the broadcast industry, bringing a large selection of broadcast-quality merchandise for viewing by the predominantly industrial and educational attendees. Well-known camera manufacturers included Ikegami, Sony, Sharp, JVC, Panasonic, Hitachi, and Harris; Canon and Fujinon displayed their lens lines. Other top makers of production and post-production equipment included Chyron, ADDA, CMX/Orrox (at the Laumic booth), Convergence, Grass Valley, ISI, Crosspoint Latch, Quanta, and Via Video.

Videotape was featured by Ampex, 3M, Agfa-Gavaert, and TDK. In addition to its usual line of video accessories, Comprehensive Video Supplies introduced two new computer programs, PowerScript and Associate Producer. Other familiar names included Winsted, Frezzolini, Cine 60, Anvil Cases, Perrott, Anton/Bauer, and K&H/Porta-Brace.

Harris AM Stereo Exciter Resubmitted to FCC

Claiming the whole incident involving FCC "recall" of its AM stereo system was a huge misunderstanding, Harris Corp. has resubmitted its AM stereo exciter to the FCC for type acceptance. FCC action is expected soon.

The problem developed, according to Harris, when a customer observed that the FCC was probably not aware that the Harris system employed variable frequencies when initialized, with an automatic switchover to fixed frequency once transmission begins. According to Harris, this feature was part of the design of the system and was in the original plans filed with the FCC. As a courtesy to the Commission, however, Harris notified the FCC about this aspect of the design in case it had been overlooked in the original type acceptance.

The Commission, however, thought otherwise, and decided that the Harris

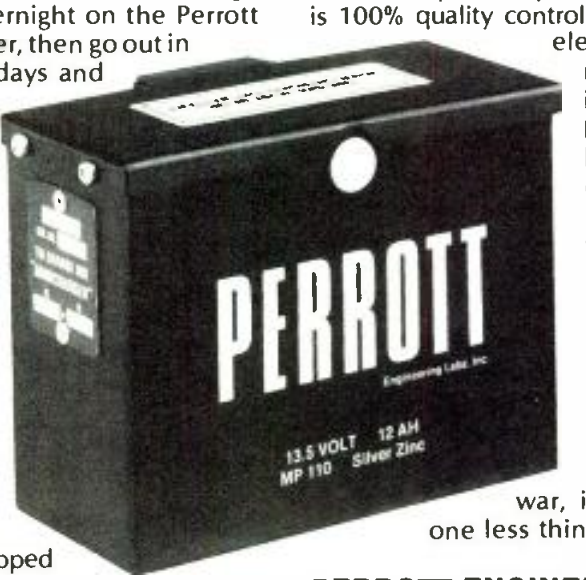
"I'm glad we had Perrott Silver 110s the last time we went to war."

—Bernie Nudelman
Video News, Inc.
Miami, Florida

ideo producer Bernie Nudelman and ımeraman Steve Born have spent the ɛtter part of the last four years covering ıe battlefields of Latin America—with a ımera, a recorder and two Perrott MP-10 batteries.

"Nicaragua. El Salvador. Honduras. uatemala. They're all routine assign-ıents to us," explains Steve. "And when ıe networks hire us to cover these hot ɔots, they expect us to come back with ıe story every time. That's why we use ıe MP-110s. They're the most reliable ıtteries we've ever worked with."

"And that's why we took only two MP-110s with us to cover the war in the Faulklands," adds Bernie. "We'd charge them both up overnight on the Perrott PE-100 dual charger, then go out in the field for two days and leave the charger behind. We did this for six weeks straight—all over Chili, Argentina and Uruguay. And the MP-110s came through every time—even in 30° below temperatures off Antarctica. You can't beat that."



With that kind of record, it's no wonder Video News, Inc. has equipped all four of its camera crews with Perrott MP-110 batteries. And no wonder the Perrott MP-110 silver zinc on camera battery is the high performance choice with news teams throughout the country.

After all, the Perrott MP-110 has the highest capacity of any on camera battery—three times the running time of Nicads*. This top-of-the-line favorite fits in your hand and weighs only 4.5 pounds. And it can be used with either Kwik-Klip® or Snap-On™ mounts.

More importantly, the Perrott MP-110 is 100% quality control inspected—both electronically and manually—before it ever leaves our hands. And it's backed by the industry's only silver-zinc manufacturer's warranty.**

Which means that the next MP-110 Steve and Bernie take into the field will be as reliable as their last one. And in the middle of a war, it's nice to have one less thing to worry about.

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* Based on use of 4AH Ni-cad.
** The Perrott Silver Zinc Warranty on 12AH silver zinc batteries. Perrott guarantees that for 6 months, the capacity will not fall below 10AH in standard use.

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STX-1 AM exciter, which had been already shipped to some 70 AM stations (65 had already begun on-air operations with it), differed from the system given type acceptance. Harris was ordered on August 17 to stop marketing and to cease use of the system by September 1.

According to John A. Reed, acting chief of the FCC's Technical Services Branch, "the differences were beyond those which would be allowed as permissive changes. Because of the extent of these differences, it was determined that the previously issued grant of type acceptance does not apply to the Harris equipment. The exciter marketed by the Harris Corp. is, therefore, not type-accepted."

Harris complied with the FCC directive, but maintains that the FCC should have been aware all along that the variable sweep was part of its design. It has therefore resubmitted the original STX-1 exciter for new type acceptance, "emphasizing the automatic switch between variable angle and fixed operation," according to Harris director of corporate communications Peter Carney, who adds, "It's difficult to understand their attitude at this point, particularly since we have supplied more stations with the exciter than all the other manufacturers combined. The concern over our exciter is not a market-oriented complaint . . . . We honestly believe that, despite the fact that this has caused a hiccup in our marketing, we will be a leader in this field."

Video Graphics Via SCA Undergoing On-Air Tests

In a joint experiment being conducted by Modulation Sciences and Broadway Video, a method for transmitting teletext-like video graphics via SCA technology is currently being developed. Over-the-air testing has been under way since September using two New York area radio stations, WPAT and WBAI. The detailed tests will determine signal strength and quality of reception in a city which has inherently bad multipath problems.

Using a 4800 bit/s baud rate on a direct FSK channel, the graphics behave, in effect, like a utility. "At that speed and with a direct FSK channel for the SCA transmission, the graphics handle just like data. Also because of the speed, we can work at a lesser signal-to-noise ratio without causing signal problems," claims Eric Small of Modulation Sciences. Small totally re-engineered the company's SCA generator in order to produce the data rates and injection rates deemed necessary to achieve successful transmission of teletext graphics.

Is this yet another way for radio broadcasters to increase revenues by optimal use of available technologies? Time and further testing will tell. Small plans to produce a comprehensive report revealing the results some time in November.

Group W Newsfeed Plans '84 Convention Coverage

In an expansion of previous years' convention coverage, Group W, through its Newsfeed network, will offer a custom satellite support service for a limited number of Newsfeed member stations at both the Democratic and Republican 1984 conventions.

According to Newsfeed news director Terry O'Riley, stations buying the

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service will receive full technical support for their live convention coverage, including interconnect, uplink, transponder time, dedicated IFB system, and full control room facilities. Newsfeed will provide satellite prefeeds of taped material prior to the live broadcasts, and will maintain technicians on site for engineering repairs. In addition, it will offer a full newsroom support facility, including work areas, typewriters, copier, telephones, secretaries, messenger services, communications equipment, and wire services.

"In 1980, Group W was the first group to form a cooperative to provide live coverage for local stations, to my knowledge," O'Riley notes. "This is the first time we've offered that service to non-Group W stations, and the first convention for Newsfeed." He said that Group W might also consider selling any spare satellite time to stations not members of Newsfeed. Finally, Newsfeed is arranging for all press credentials for those taking the service.

A particular advantage for stations covering the Democratic convention, in San Francisco, is Group W's fixed uplink at KPIX-TV. The uplink will give the Newsfeed stations a reliable way to get their signals out of San Francisco, where the heavy microwave saturation is already causing some concern to broadcasters looking ahead to the convention.

Automatic Ad Monitoring Demonstrated by Audicom

An electronic, over-the-air system for verifying the broadcast of commercials and other material by radio and television stations has been demonstrated by Audicom Corp. of New York and is presently awaiting FCC approval. The system works by encoding the audio portion of the signal with an identifying code. The code, which consists of eight-bit ASCII characters, is broadcast in the regular audio spectrum but at an extremely low level. Central receiving stations for each city will decode the information and provided detailed lists of date, time, and the station that played the material.

Audicom expects the primary buyers of the service to be broadcast stations themselves. Company president Robert P. Engelke cited three advantages for broadcasters: speedier payment of accounts receivable, quicker resolution of make-goods, and personnel savings. He said that charges for the service had not been determined, but that they "would be low enough to result in substantial savings for those using the system."

To insure FCC approval for the service, Audicom has conducted Commission-authorized tests during the past year over ABC Television (both by land lines and satellite), WJLA-TV in Washington, DC, WCTO-FM in Smithtown, NY, and WGSM-AM in Huntington, NY. According to Audicom, the stations found that their audiences were entirely unaware of the signals.

Wold Wins Court Battle

Robert Wold Communications has won a court case that sought to deprive it of its main satellite uplink for metropolitan New York. In September the town of Little Falls, NJ, took Wold and the State of New Jersey to court in an attempt to force the removal of Wold satellite antennas located on the campus of Upper Montclair State College.

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The complaint filed by the township charged not only that the three antennas, a large 10-meter and two six-meter dishes, were unsightly and caused interference problems for local residents because of their size and power, but also that the town had not been consulted before the dishes were put in place. The suit attempted to have the site cleared of all the antennas, virtually eliminating Wold's New York area satellite uplinking center.

Wold and the state countered that the antennas were located on state property (land owned and operated by the state college) and that neither Wold nor the state was obligated to consult with the town officials about operation of broadcast equipment that had been cleared by the FCC for operation.

Wold Communications and the state had agreed that Wold would pay a rental fee for the space taken up by the antennas and would also train interns from the college's communications program. This arrangement was in effect through the summer of 1983 until the suit was filed. This fall, the presiding judge ruled in favor of Wold and Montclair State College.

Source Update

Please make the following additions and corrections in your copy of The Source, *BM/E*'s August 1983 buyer's guide.

Instant Source Locator:
Add Wilkinson Electronics under RF, Transmitting/Receiving Equipment, transmitters (1) AM and (2) FM; and RF power equipment (1) RF amps, (5) FM exciters, (14) stereo generators, and (15) modulators. Under satellite earth stations in the same major category, Antenna Technology Corp. should be listed for (2) receive only. Also, R•Scan should be added under weather radar systems.

Alphabetical Listing of Manufacturers:

ANTENNA TECHNOLOGY CORP.
8711 E. Pinnacle Peak Rd., Scottsdale, AZ 85255
602 264-7275
Full-arc multiple beam 3,5 & 7 meter TVRO earth stations for cable, TV broadcast, SMATV & radio.

FUJI PHOTO FILM USA, INC. (MAGNETIC PRODUCTS DIV.)
350 Fifth Ave., New York, NY 10118
212 736-3335
Audio cassettes; two-inch, one-inch, ¾-inch U-Matic & half-inch VHS/Beta videocassettes; video head cleaners.

R•SCAN CORP.
Business and Technology Center, 511 Eleventh Ave. S., Minneapolis, MN 55415
612 333-1424
Real-time lightning strike data service.

TELEVISION TECHNOLOGY CORP.
5970 W. 60 Ave., Arvada, CO 80003
303 423-1652
UHF, VHF & LPTV transmitters & translators; RF amps, FM exciters, power dividers, modulators.

WILKINSON ELECTRONICS—A TTC CO.
5970 W. 60 Ave., Arvada, CO 80003
303 423-1652
AM & FM transmitters; RF amps, FM exciters, stereo generators, modulators.

Also, the Manufacturers' listing for Center Video Center should be verified and the company added to the list of representatives and distributors.

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United Media incorporates every capability into the Commander II for sophisticated video editing, along with quality construction and built-in reliabilty while providing personalized customer support.

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Some people will tell you that a quality editor is not possible at our low price tag. Wrong. And here's why.

United Media's designers, engineers and technicians always go to extremes. They settle for nothing less than impeccable design, the finest components and precise assembly techniques. Because their uncompromising attitude results in high efficiency, United Media is able to be profitable while selling its editors at a price lower than its competitors. At any price you can't find a more versatile, more capable video editor than the Commander II.

Take the Editor Challenge.

We challenge you to compare United Media with any competitor by giving the Commander II a rigorous test. Only then will you learn what our customers have known all along. That in an editor-to-editor showdown measuring performance, construction, reliability, customer support and price, United Media is the forerunner.

Give us, or your local dealer a call and we'll bring the Commander II to your facility so you can put it through the toughest editing tasks. You be the judge.

United Media

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Funds have been approved for an FCC advisory committee on **technical standards for DBS systems** . . . . Group W has reported discussions of its **Satellite News Channel with Baton Broadcasting of Canada.** Simultaneously Baton has filed application with the Canadian Radio and Television Commission to provide such a service on cable . . . . ABC announced renewed support for closed captioned television along with a **10 percent increase in funds for captioning.** ABC's share in the service has gone from 20 to 50 percent in the past three years . . . . **World Communications and Metrosports** formed a joint venture to set up nationwide, satellite-based radio networks for broadcasting college sports. The nets will be ad-hoc, allowing stations anywhere to join via satellite . . . . The Mutual Broadcast System has begun work on **five permanent online satellite uplinks.** These will augment its existing uplink in Virginia.

The NAB filed comments supporting the FCC's proposal in June to repeal **personal attack and political editorial rules.** The association also said it supports the FCC's decision not to apply the Fairness Doctrine, reasonable access and equal time provisions to broadcast teletext . . . . On the other hand, Daniel L. Ritchie, chairman and CEO of Group W, **came out in favor of the Fairness Doctrine** as well as affirmative action, citing penalties to responsible broadcasters if those policies are changed . . . . At the same time, Dean Mell, president of the RTNDA, issued a statement opposing the Fairness Doctrine and the personal attack rule. **Joining the RTNDA** in its position on personal attack and political editorial rules were The Evening News Association, Gannett, Gaylord Broadcasting, and Lee Enterprises.

The NAB won Justice Department approval to publish commercial television station **revenue and expense data by market,** a program similar to one the FCC dropped last year. Assured of the Antitrust Division's sanction, the NAB can safely gather and distribute market data on the preceding year's total time sales, revenues, expenses, income and barter transaction figures for television stations aggregated on a market-by-market basis . . . . **WWSW Radio, Inc.,** a subsidiary of The Toledo Blade Co., will purchase **WDRB-TV,** Louisville from Cowles Media . . . . Group W will sell **WPNT,** Pittsburgh to Saul Frischling of H-R/Stone, Inc.

Kenneth B. Swartz of **KRON-TV,** San Francisco won the National Press Photographer Association's Ernie Crisp Photographer of the Year Award . . . . The 1984 **Test & Measurement World Expo** will run on April 3-5 in San Francisco.

Detroit recently got its first **Spanish-language television** with the inauguration of LPTV outlet K66BV, carrying SIN programming . . . . The Norfolk-Virginia Beach-Portsmouth market has merged with the Newport News-Hampton market to become the **thirty-fourth largest market** in the U.S. . . . . The NAACP has given its first annual Interpretive Reporting Award to Boston CBS affiliate **WNEV-TV** . . . . **KUTV,** Salt Lake City, has received an award for media excellence from the Big Brothers/Big Sisters Association of America for its weekly news segment, **Wednesday's Child** . . . . Jack Brickhouse, sports journalist at **WGN,** Chicago, has received the 1983 Ford C. Frick Award for excellence in broadcasting.

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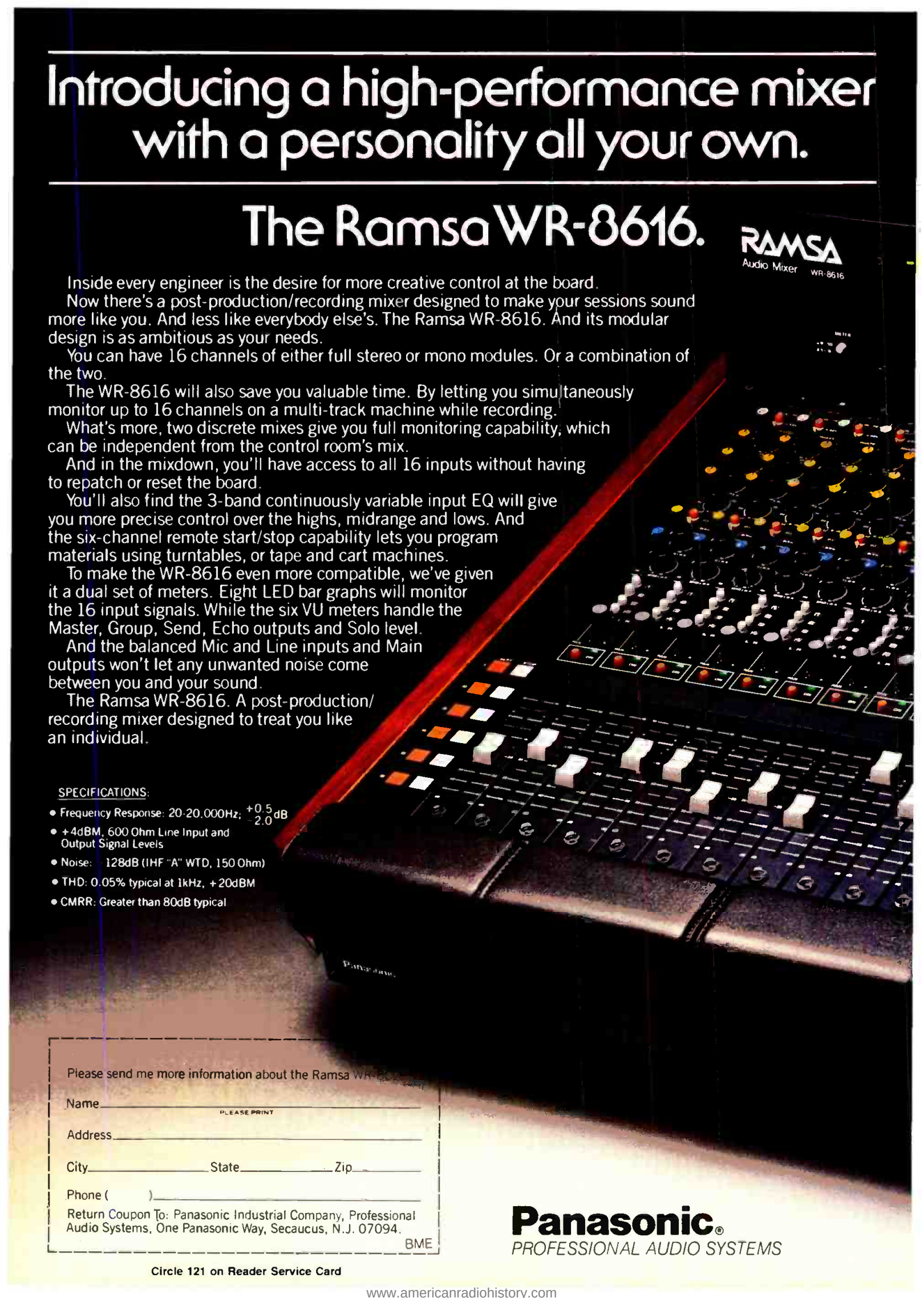

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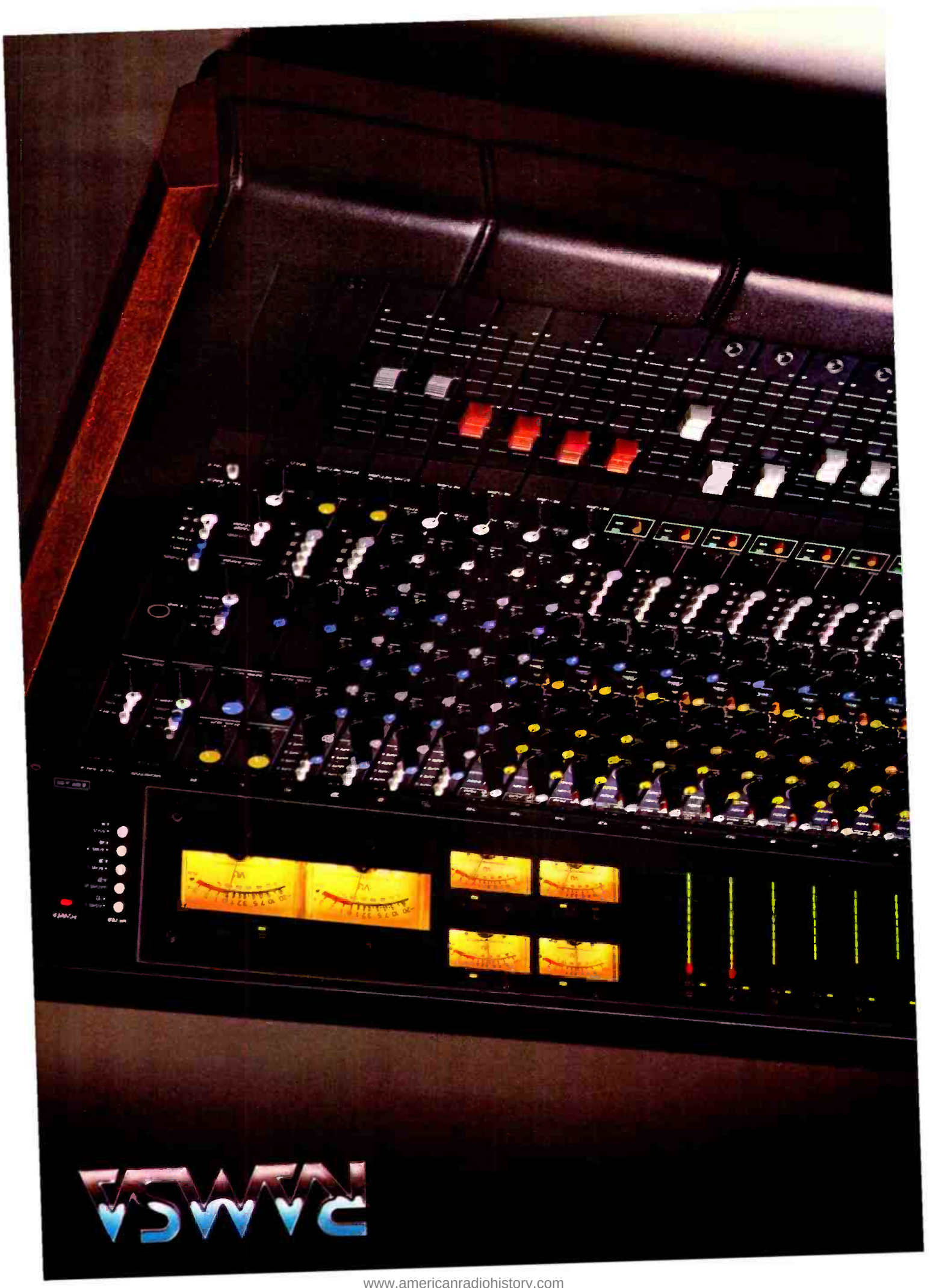

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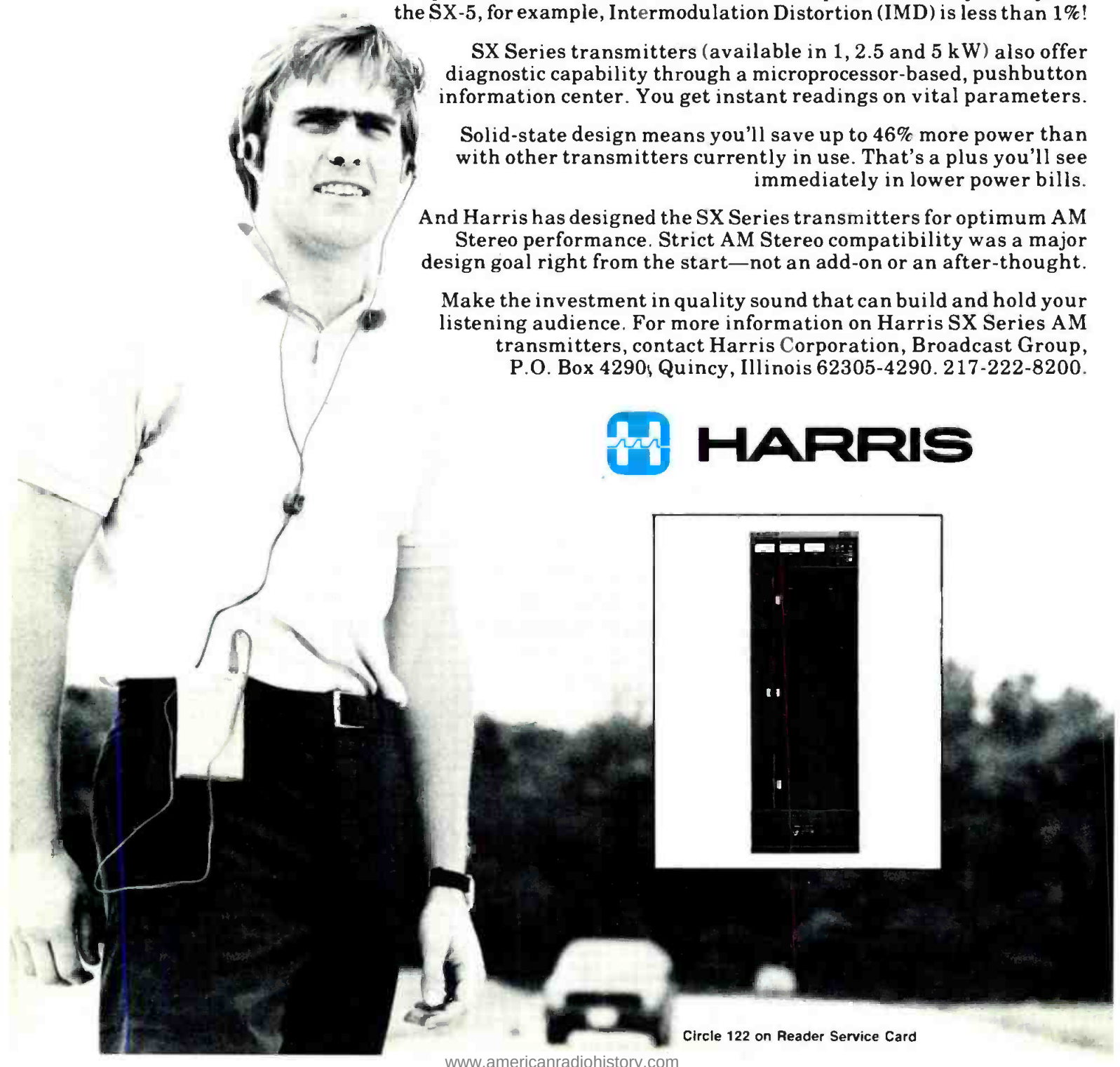

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HARRIS

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WELI Computerizes to Speed Storm Information

By Tim Wetmore
Associate Editor

The philosophy currently being espoused in the radio business is that AM radio needs to have programs of local interest if it is going to survive and prosper. At WELI, a Broad Street Communications AM outlet in New Haven, CT, this comes as no surprise. Community services such as local event scheduling, current business news and community weather reports have long been a part of WELI's MOR program content. And towns throughout the northeast depend upon weather information provided by "Storm Center" heavily in the winter. Ever responsive to its listeners' needs, the station has taken this time-honored part of its on-air schedule and given it a new, computerized twist.

Though the use of the computer in weather prediction is nothing particularly new, the way in which it is being applied to enhance the station's service to the community is of note. In the past, all of the information processing for the Storm Center was done laboriously by hand. It is now done by Broad Street's IBM 34 business computer. The computer serves as the payroll, accounting, and financial reporting tool for the three AM and two FM Broad street outlets. Even with that load, the computer was not operating near its 64 Mbytes memory capacity, that permits 96,000 characters of program storage and is expandable to 256 Mbytes if necessary.

Being aware of this and wanting to take at least a small step towards modernizing the way local news was handled, news director Bill White wanted to implement some changes. The best place to begin, he decided, was with the information processing for the Storm Center, since it was one of the most important community services, required repetitive entries and printouts, and was suffering in accuracy due to the old method of getting the information on the air. White believes the change will result in "time-saving accuracy, consistency, and organized on-air formatting of vital information for the community regarding school closings and delays, business shutdowns, and local recreational cancellations due to inclement weather."

WELI news director Bill White reads from the Storm Center computer printout.

Jack Sellati, director of information systems, reviews Storm Center software.

White realized something had to be done to improve the station's reporting of the effect of winter storms on the local population, and what better time than summer to start planning for the difficulties of winter? To do this, a review of the past system was in order.

Formerly, the different types of schools and businesses were listed alphabetically on sheets of paper that were color-coded according to the type of school or business (e.g., public schools on blue paper, private on green, businesses on red and so on). When someone called in to cancel school for that day, the person taking the call would have to look through the stacks of white, green, red and blue paper. In the blue pile would be all the public schools. After locating the particular school's file, it was marked according to its weather status. The name of the school and corresponding information were transferred by hand to a master sheet. A copy of this sheet was made and sent into the studio to be read on the air. The original master sheet was kept for a running tab of the status of each school and business throughout the morning.

Of course, by the second hour of this process the person on the air had a seemingly endless pile of paper with updates, changes and additions. Often, conflicting information about schools and local events was broadcast, since the latest changes were lost in the maze of paper and the announcer had to simply go with his best guess. As a result, the community's interests were not well served and the staff seemed to have perpetual headaches.

Out of this predicament grew the idea of using the computer the station already owned. White sent a memo to

Jack Sellati, director of information systems for Broad Street, asking if there was a way to put the information in the computer and subsequently have it print out the information for on-air use. At the time, the IBM 34 was being used only for traffic, billing, and accounting with the help of Columbine software. After several meetings and careful planning, it was decided that, with the existing hardware, the new Storm Center system could be achieved. Sellati wrote the necessary program using IBM utilities.

The Computerizing process

The hardware to be used consists of one remote terminal, communicating with the mainframe, located in the newsroom for entering any incoming calls up to about 9:00 a.m. The terminal will be attended by one of the news staff. All of the early calls will go into the portion of the program called the "Regular Storm Center" in which all schools, organization, and businesses will have code numbers. Any call coming in after nine without a code number will be entered on the Exception Storm Center list by the person operating the phone lines.

It was determined that if a mailing was sent out notifying those concerned about the program and giving them a code number, they would be likely to call with the information before nine, when most schools and businesses have made their decisions about closings and delays. Thus, those who call after nine without a code will be less likely to have the broad influence of the normal schools and companies.

The system requires the list of schools to be entered, giving each a code number corresponding to the type of school. For example, if St. Mary's School calls in to cancel classes for the day, they will state their code number, S 30, and the comment, "classes closed today." The code number will be entered, St. Mary's will come up on the screen, and the appropriate comment will be entered in that record, which will be organized alphabetically, by number, and by type of school. The code number also corresponds to the name of someone from the school who is responsible for decisions or closings and delays, preventing any pranks by school children trying to call in and cancel a day of school.

Lynette DeLuca handles the late entries that do not have code assignments on IBM computer.

The S in this system stands for regular school, and the 30 is its placement on the alphabetical list of regular schools. When the list is printed out, the S indicates the regular schools, next to which will be listed the names of all those types of schools and the comments stating what each school's policy is for that particular storm day. In the same way, a listing could read N 33, and the computer would file the record for the nursery school which corre-

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sponds to that number in the alphabetical listing. When the time comes, the complete list of records, which have been activated by storm warning entries, can be printed.

Those records kept in the Exception Storm Center, without number codes, are listed according to the surrounding geographical area and given city codes. For example, if someone calls in with a cancellation of an afternoon bridge club event scheduled to take place at the club's New Haven meeting place, the club name would be accompanied by NH for its city code. Outlying schools and businesses also have city codes corresponding to the names of the communities in which they are located.

Concise presentation

Such filing of records helps the announcer to keep the information organized easily by subject and by area making for a concise, accurate on-air presentation. Previously, different types of schools or businesses might have been mixed together in the announcements, because this type of organization was impossible without the computer. The new system also improves in the speed category, because the staff can wait until the last minute before printing out the latest list, which it does four times per hour up until nine o'clock. After nine the reports are reduced to twice per hour.

Improvements in accuracy and timeliness are clearly advantages of the new computerized storm center. The new operation, however, is not an end in itself but another step toward serving the station's growing constituency. Both White and Sellati see the use of the computer as a necessary trial period before going into a fully computerized newsroom.

This does not mean the station is reluctant to make advances. Recently, WELI went on the air with what it calls RadioVision News Service. It is a once-per-hour, two-minute local newscast aired to the 46,500 subscribers of the local Storer-owned cable television system and takes the place of the hourly local avail which CNN released to Storer, who turned it over to WELI.

Bill White in on-air studio. Sony VCR to the right is used for WELI RadioVision seen on CNN local news.

With this radio innovation offering a new opportunity for the station's news image, management is looking to better things in the future. The Storm Center data base is the next step toward that future which appears to offer WELI a better opportunity to serve the local community, improve its own news operation, and stay on what WELI already knows: community service is the first element for AM success. **BM/E**

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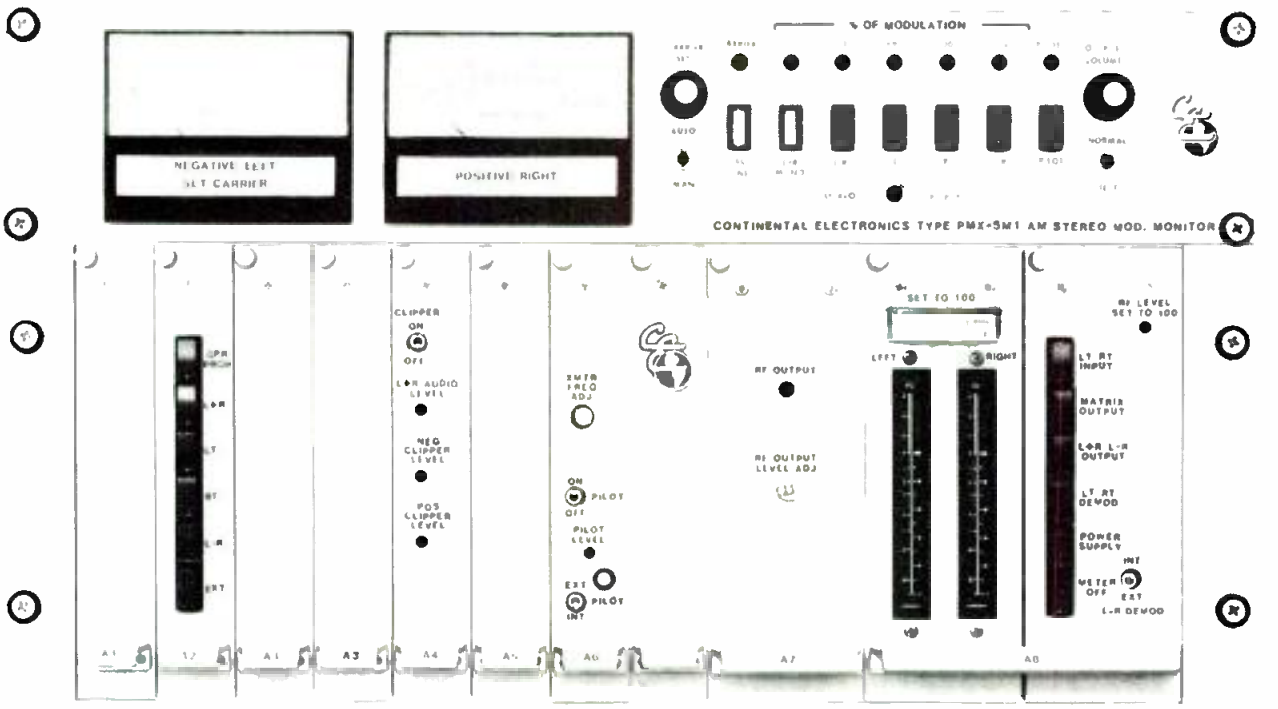

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Circle 128 on Reader Service Card

KDKA Celebrates Its History on Newsman's Anniversary

By Eva J. Blinder
Senior Associate Editor

KDKA-TV noon news anchor Bill Burns is almost as much a Pittsburgh tradition as the station itself—perhaps even more so, since Burns has been with the station since before KDKA was KDKA. When Burns first went on-air in 1953, the station was known as WDTV; the calls were changed after its purchase in 1955 by Westinghouse. Burns has anchored the noon news ever since then, for a time with his daughter Patti as coanchor; he's also anchored KDKA's 11:00 p.m. newscast.

Burns's thirtieth anniversary this summer prompted the station to produce a one-hour look at his long career, "Bill Burns' Pittsburgh: 30 Years." The show aired July 18, 1983, 30 years to the day after Burns first met Pittsburgh viewers.

Initially, however, Burns was not entirely friendly to the idea of a special program focusing on him. Noting Burns's "rather unusual combination of ability and modesty," Arthur Greenwald, who wrote and produced the show, recalls, "He said flatly he wouldn't show up for any tribute show." Burns agreed to cooperate, however, if the show instead highlighted the major news stories of his three decades with KDKA.

The first step, according to Greenwald, was identifying those stories. At this stage, the greatest asset was what Greenwald calls Burns's "truly remarkable memory." A brainstorming session generated several hundred possible events, which Greenwald then wove into a script in roughly chronological order.

To make each decade stand out, Greenwald and Burns decided to revisit three newsmakers who had participated in major Pittsburgh-related stories. Representing the 1950s was Dr. Jonas Salk, who developed the first practical polio vaccine at the University of Pittsburgh early in the decade. Attorney Byrd Brown was interviewed on the racial unrest of the 1960s, when he served as director of the Pittsburgh NAACP. The big story of the '70s was the coming of age of the Pittsburgh Steelers football team, which won four Super Bowl titles that decade, so team owner Art Rooney, Sr., was the logical choice.

A young Bill Burns back in 1953 smiles for the camera on the set of KDKA forerunner WDTV's 11:00 p.m. newscast, which he anchored in addition to the noon news.

Satellite hookup

Most complex from a technical point of view was the Salk interview. Salk had long since left Pittsburgh for sunny San Diego. Sending Burns to California for the interview was rejected as too expensive; besides, Greenwald felt it more appropriate for Burns to be working out of Pittsburgh. The obvious solution was a satellite hookup.

"We first explored doing the whole conversation at Salk's office in La Jolla," says Greenwald. "But we decided that would be an extravagance. To rent telco lines from La Jolla to San Diego would have cost five to six times the cost of the uplink." Therefore, Greenwald arranged for Salk to visit the studios of KPBS, the public TV station in San Diego. Producer Donn Johnson of KPBS acted as producer and director of the single-camera shoot, which went off without a hitch, according to Greenwald.

The uplink and production facilities were arranged through Bonneville Sat-

ellite by Heidi Lenz. The one-way uplink, via Westar 4, allowed Salk to hear but not see Burns. For extra safety, KDKA had the interview taped in San Diego as well as on its own Ampex VPR-2Bs.

The interviews with Brown and Rooney were handled in a more conventional manner, with KDKA field crews going to the newsmakers' offices. Field production is a specialty at KDKA, according to Greenwald, who notes that the station was in the original *Evening Magazine* lineup. The field interviews were shot on the station's Ikegami HL-79DAL and Sony BVP-330A cameras and taped on Sony BVU-110 ¾-inch recorders. (Greenwald notes that KDKA is just starting to shift to one-inch for field work and has recently purchased a Sony BVH-500A field recorder.)

Finding footage

The bulk of the special, however, consisted of archival material from various sources. The station's own archive, including newsfilm from 1970 through 1978 and videotape thereafter, was not extensive enough to answer the producers' needs. Help was on the way, however.

"We were very fortunate to work with a man who's been a shooter and editor for over 30 years, Fred DiFiore," says Greenwald. DiFiore, who works full-time at another Pittsburgh station, WTAE-TV, spent his spare time helping the folks at KDKA identify footage of old events from his own library, which he had purchased from an estate. KDKA paid him for his services and is considering buying the library.

In addition to DiFiore's material, Greenwald adds, "literally dozens of people around the station came up with one clip." The staff-contributed memories included a kinescope of Burns interviewing former Senator Taft of Ohio. Digging up the material "was a labor of love," Greenwald says.

Editing all the old and new ingredients together to make an integrated show took a large dose of sensitivity, according to Greenwald. "We had an odd mixture of happy and sad occasions," he recalls. "It made the writing harder, and we had to plan for it in editing." The juxtaposition of upbeat and somber events meant Greenwald had to work closely with the editor to avoid the possibility of offending the audience. "It's the judgment and taste of the editor that makes the difference, especially with emotional material," Greenwald points out. "We place a lot of emphasis on the intelligence and skill of the editor."

Fortunately, the editor was Lloyd Zimmer, with KDKA for over 20 years, who "knows all the little tricks," says Greenwald. (Zimmer himself appeared in the special in some old footage.) Editing took place in one of the station's three Datatron ¾-inch edit suites, which have audio mix capability. Each room has three Sony BVU-800s on-line, one record and two playback.

Zimmer created an opening montage for the special by A/B rolling on the ¾-inch recorders, then dissolving through the switcher during the final studio mix on one-inch. Greenwald notes that the station is considering acquiring a small switcher for the editing room to allow dissolves to be performed in the editing process. The station already owns a large Grass Valley Group switcher and a Vital SqueeZoom with one mix/effects bank, but Greenwald avoided SqueeZoom effects in the special.

A matter of taste

"I think it's inappropriate to take footage that had nothing but hard cuts available to it and squeeze it and flip it," he explains. "It's not what that footage looked like when it originally aired."

For the show's title and bumpers, KDKA artist Gary Sassaman created a video portrait of Burns with the city behind him on the station's new Colorgraphics weather computer. He also used the animation package on KDKA's Telemation graphics system, displaying Burns's signature and typing in "Pittsburgh" and Burns's trademark sign-off, "Good night, good luck, and good news tomorrow."

Greenwald notes that the station has a tradition of creative technical people; back in Burns's early days, he notes, the camera operators would create split screens by masking half the lens with cardboard. The creativity continues, as evidenced by camera operator Dave Forstate's handling of a troublesome story. Greenwald's script recalled the mysterious disappearance of a B-25 bomber that went down in the Monongahela River in 1957, but he could find

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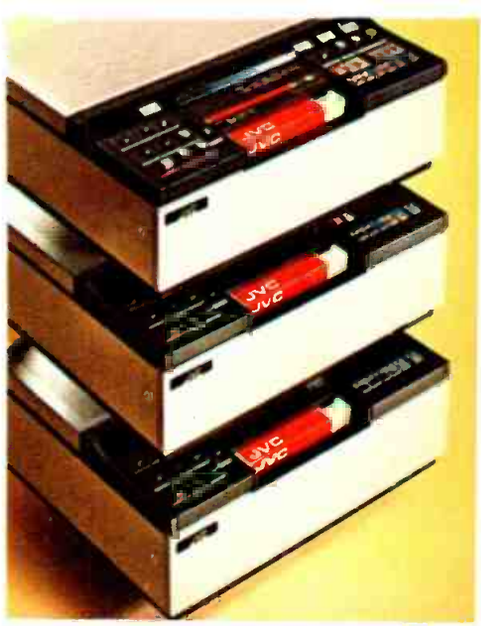

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Gathered around the Datatron editor used to produce Bill Burns' Pittsburgh *are (from left) producer Arthur Greenwald, associate producer Victoria Regan, and editor Lloyd Zimmer.*

no footage at all of the crash and very little of the unsuccessful salvage attempts. Forstate solved the problem by aiming the Ikegami HL-79 at a contemporary headline about the tragedy, then moving a piece of glass away from the surface of the paper to create an eerie, "underwater" image. Other camera operators for the special were Phil Chalmers and David Braman.

The benefits of the show for KDKA have extended far beyond the "excellent audience response" it received, according to Greenwald. "It has increased the station's appreciation for its own history and the history of the region," Greenwald states. "I know there's more interest in historical specials." Additional material from the three newsmaker interviews will be worked into news features; in fact, a half-hour special made from the Rooney interview was scheduled to air in September.

For Greenwald, there was another benefit, less tangible perhaps, but just as rewarding—the opportunity to work so closely with Burns. "Burns hasn't been doing a lot of street work lately, but he's not exactly rusty," Greenwald notes. "He's very thorough and professional. I'd like to do it again." After all, such experience and talent are no ordinary qualities. Says Greenwald, "Not too many anchorpeople are celebrating their thirtieth anniversary anywhere for anything." **BM/E**

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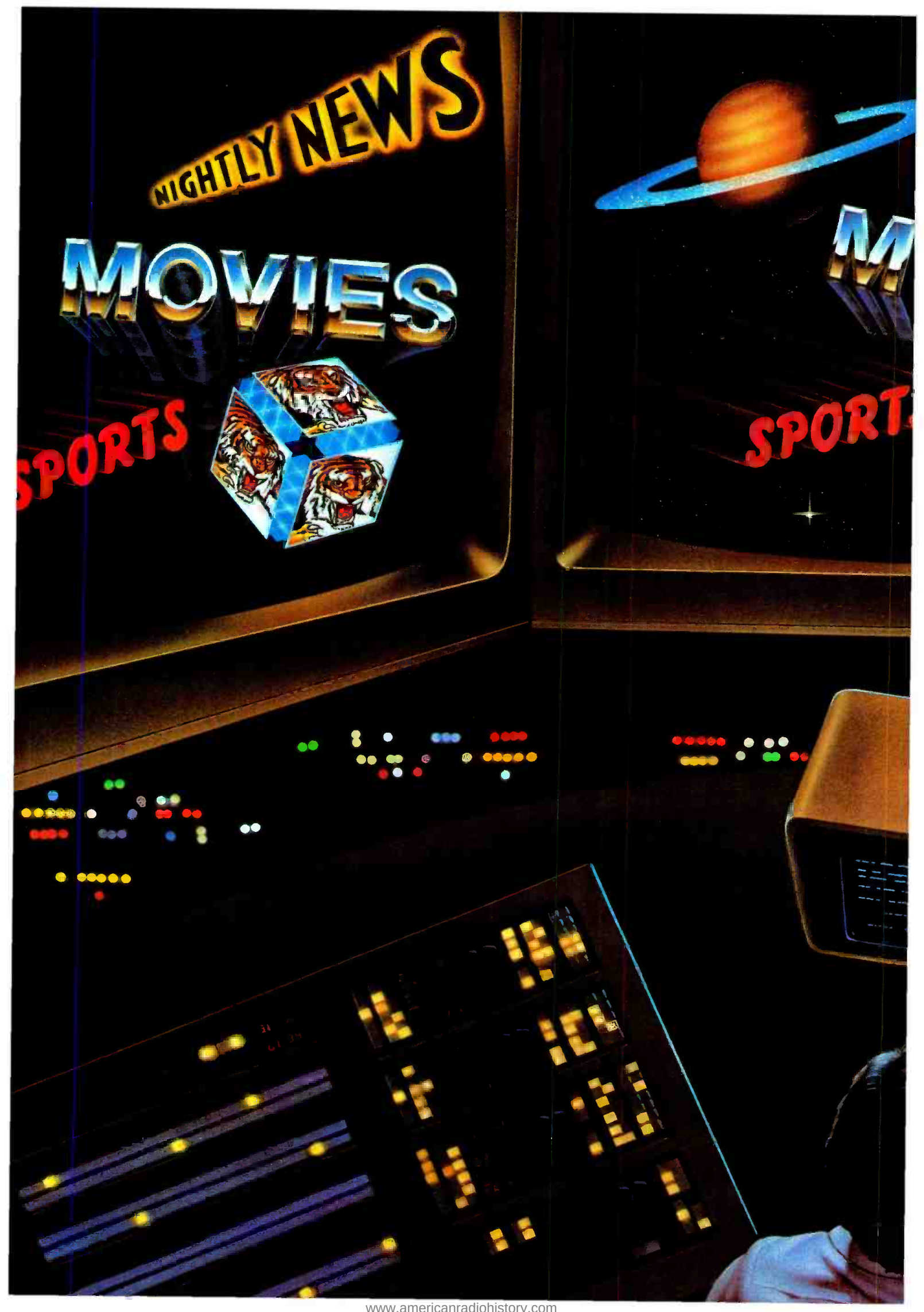

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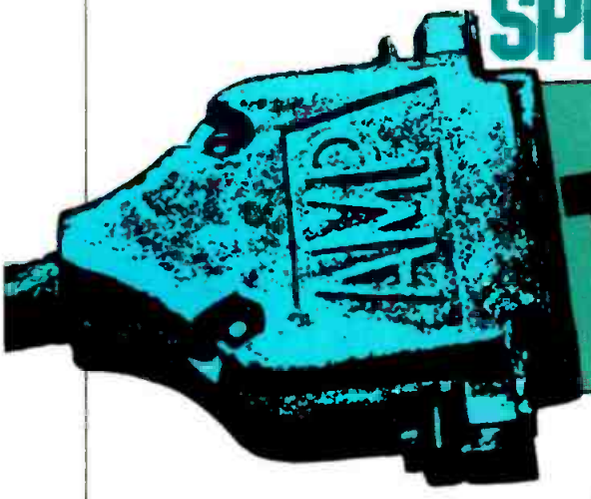


SPECIAL REPORT: TROUBLE AT THE

Engineers at stations and facilities dream of being able to interface any and all pieces of computer-controlled equipment from a single, central point. Some have gone beyond dreaming, working out their own software interfaces. For many, though, the dream can be a nightmare.

By Eva J. Blinder
Senior Associate Editor

As television equipment becomes increasingly computerized, the capabilities of editors, switchers, and effects devices are increasing dramatically. Engineers wishing to tie those devices together to form the most powerful system possible are frustrated, however, by their inability to obtain the maximum degree of communication. One limiting factor is the interface itself: the hardware that physically connects two devices and the software that defines the commands that can pass between them. A second problem is the edit decision list, which presently limits the amount of control an editing system can have over peripherals such as switchers. Third, and especially serious, is the (understandable) protectiveness of manufacturers of digital equipment, who anxiously guard their proprietary software against any encroachment by their competitors.

The very computer technology that makes individual devices so powerful, however, may hold the solution to the impasse. Two separate SMPTE groups are hard at work on defining standards for the digital control of television equipment and for expanded edit decision lists that many in the industry feel can alleviate at least some of the interconnection and communications problems that plague television facilities today. But even an agreed-upon standard will take time to implement, and engineers are getting restless.

The tight rein manufacturers maintain over their software chafes engineers such as Tom Dunn, vice president of engineering at Unitel Video in New York City. Some of the software is "more than proprietary," Dunn complains: "Companies make a lot of different products and they're reluctant to give out any information to their competitors. It's sort of unethical—it means that we buy systems that don't talk to each other." Dunn relies heavily on the CMX general-purpose interface for interconnection purposes, but the GPI has its limits. "It's easier to use it to trigger an effect on our Grass Valley switcher than to go through the dialog to have the editor perform the effect directly," he says. "Instead of updating some equipment for serial interfaces, we've made hardware interfaces with the GPI, especially with the switcher's E-MEM."

Even with manufacturer-supplied interfaces, things can go wrong. Everything worked fine with the interface between Unitel's GVG 300 switcher and CMX editing system until about a year ago, when they simply stopped talking. "There was no way to determine where the fault lay," Dunn relates. "Neither manufacturer could tell me how to fix it." In desperation, he finally powered down the system and brought it back up—and the interface came back "sort of like magic."

At another New York facility, Broadway Video, director of engineering Marty Zofson voices similar concerns. "There's not much of a way around it," Zofson says of the interconnection problem. "Some of the smaller manufacturers like Datatron have tried to figure out the communications protocols for other machines, but Sony and Ampex don't seem to want to go out of their way." The result, in Zofson's case, is a studio with a Sony editor that won't talk to Ampex VTRs. He notes that some switchers, including those manufactured by CDL and Grass Valley's 1600 and 300 series, will talk to Sony editors, but says that editor control is limited. "What we need is a communications protocol for *all* equipment," Zofson insists.

SMPTE's work on such a protocol could make a big difference, Dunn and Zofson agree, but they take a cautious outlook. While Dunn concedes that a standard serial interface "would help tremendously," he suggests, "the problem is getting everyone to adhere to it." He points out that SMPTE has no enforcement powers and says that even the well-accepted Type C format contains some ambiguities. "The SMPTE standard will help," he continues, "but it takes so long to be formalized. I understand their problems, but it

DIGITAL INTERFACE

doesn't help the end user." Zofson suggests past difficulties may have slowed SMPTE's work. "SMPTE has had problems in the past trying to get standards adopted," he says, "so they're a little bit hesitant."

Investigating interfaces

Manufacturers' very participation and cooperation in the SMPTE work heartens Pat Howley of Teletronics. "Some are already building equipment with a close version of the protocol," he points out. "It's a tremendous victory." Teletronics is one of a number of teleproduction facilities that has not waited for the completion of SMPTE's work to investigate an improved interface. Dean Winkler, Teletronics' design engineer, described an advanced studio integration system in a paper, "Videotape Editing Suite Design," delivered at SMPTE's 124th conference in November 1982. (The entire paper was published in the SMPTE *Journal* of March 1983.) According to Howley, the VI² (for "Very Intelligent Interface," a tribute to CMX/Orrox's Intelligent Interface, or I²) now in service at Teletronics, has not reached the state of development described by Winkler, but does ease the interface problem. The VI² performs a glitch-free preview edit of a desired event, and controls feedback LEDs to indicate when the edit takes place. It allows control of any mix-effects deck on Teletronics' GVG 300 switcher and will talk to any switcher crosspoint, according to Howley. Essentially, Howley says, "we have a replacement for the CMX switcher I²." Four of the devices are installed at Teletronics.

The next stage of development calls for a much higher degree of control. "Phase two is to serially communicate via RS-422 using an eight-output serial board," Howley explains. "Right now we're only using one output for the switcher." As described in Winkler's presentation to the SMPTE conference, the fully developed VI² will be capable of much more complex commands to peripheral devices and will allow the editing computer to command virtually any front-panel control on a peripheral. Meanwhile, Howley says, "We're waiting for the [SMPTE] protocol and getting by with the GPI."

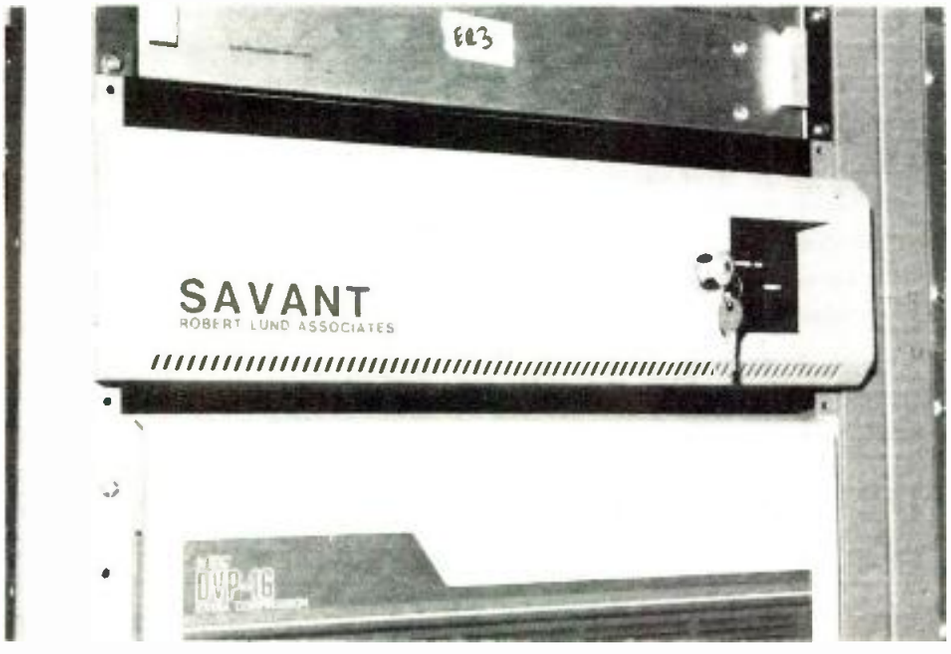
Perhaps the most comprehensive serial interconnection system available at this time is the Savant intelligent control system, developed by Robert Lund Associates in New York. According to RLA's June Guterman, the basic Savant is a software-based switcher interface that directly replaces the CMX switcher interface with no software modifications. So far, it is available for Grass Valley 1600 and 300 switchers, and RLA is working on communications with Ampex and CDL switch and Mach One and Sony editing systems.

Additional software modules and hardware updates can be added to give control of digital effects devices with serial communications ports. For example, the user can request access to discrete switcher pushbutton functions; digital video effects devices (including Grass Valley DVE, Quantel DPE-5000+, and Ampex ADO); and Chyron, Dubner, and Quantel Paint Box graphics systems. Access includes edit list storage and auto-recall. Savant will also control automated audio consoles, relay closure outputs if needed, and "learn mode" programming of multiple devices.

The most advanced version is the MultiMaster Savant, which coordinates remote operation of peripheral devices shared by more than one editing system. RLA states that this system will provide a software interface between any editing system and any device and will control ancillary delegation equipment, such as video and control signal routers. Interconnection of devices is entirely by software, with no patching necessary.

Exactly which machines Savant will control has been limited somewhat due to lack of source code. More than one manufacturer has balked at letting RLA have the source code it needs to complete the interface, according to Guterman. While she is frustrated at the lack of cooperation, Guterman also understands why some companies are reluc-

Robert Lund Associates' Savant interface installed at Matrix Video.

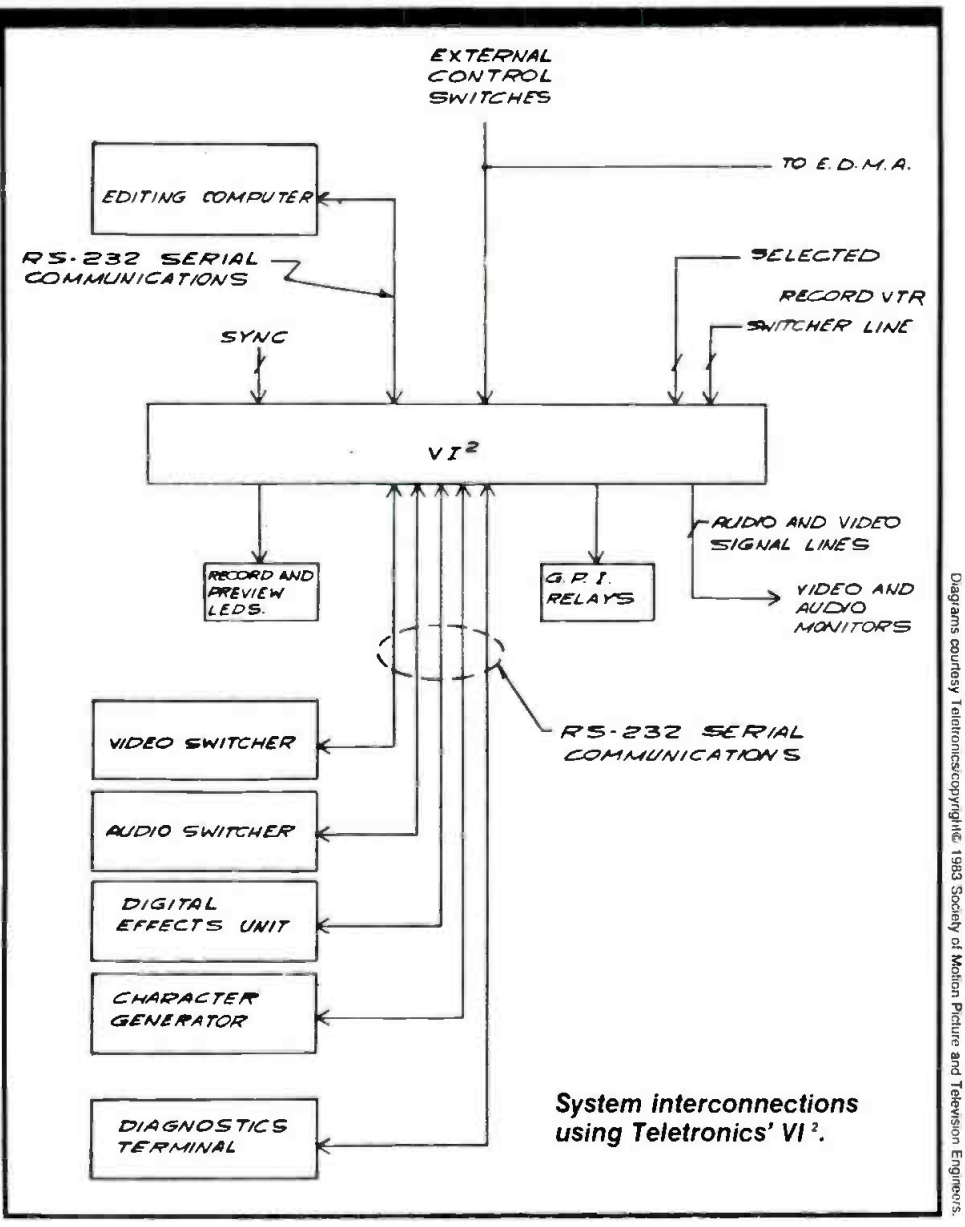


tant to reveal too much. "Because of the legal problems software has," she comments, "there's no way for manufacturers to insure their competitors won't gain access if they give out the protocols." Some companies, including Grass Valley and CDL, have been "enormously" cooperative, she says. Quantel has also allowed access to some functions of its 5000 effects system. "It's possible to find out how to control devices with serial communications without the protocols," Guterman says, "but it's much easier if they give them to you."

Waiting for SMPTE

According to Bob McAll of Digital Video Systems in Toronto, who chairs the SMPTE Working Group for standardization of digital control of television equipment, that standard has in fact traveled pretty far along the road to approval. The proposed electrical and mechanical characteristics of the interface (ANSI/SMPTE Standard 207M) were published in the September 1982 issue of the SMPTE *Journal*, along with Recommended Practice 113, which defines the first couple of layers of software protocols. McAll says that the remainder of the protocols will be approved shortly. Draft 9 of the control message architecture for the software interface has gone out for balloting, and Draft 8 of the tributary interconnection is "virtually 100 percent" settled; McAll expects it to be completed at this month's SMPTE conference in Los Angeles and to be out for balloting before the end of the year. Those four documents comprise the basic standard.

From McAll's description, then, the standard is very close. But is it? The working group has been hammering out its proposals for over four years, although McAll says four years is not especially long for such a job. "You have to swing a whole industry that's currently using the technology you're trying to standardize," he explains. "If you're working with products and services not yet here it takes less time, but it doesn't necessarily mean you get something that's good. If the technology already exists before standardization work begins, there's lots of inertia." McAll insists, however, that the industry's patience has paid off. He points out that the agreed-upon parts of the standard have been accepted not only here, but also by all the member countries of the European Broadcasting Union, which has been doing similar work (under the chairmanship of Michael Stickler) and coordinating all its efforts with SMPTE.



System interconnections using Teletronics' VI².

"We spent the first 18 months talking about what needed to be standardized," McAll relates. "The standard is here at exactly the right time: manufacturers perceive it as a need and users want it."

With agreement so close on the standards and recommended practices that make up the digital interface, what is the outlook for implementation? In McAll's view, the outlook is excellent. He notes that a number of manufacturers are already bringing their new equipment into compliance with as much of the standard as has been published, citing the Ampex VPR-3, Grass Valley production switchers, and Dynair routing switchers as examples.

What of some companies' fears for their proprietary software? "The internal software never comes to the surface" with the interface standard, McAll says. "The only things that come to the surface are those the manufacturer chooses to make accessible. We've built technologies to accommodate nonstandard performance. But if manufacturers choose not to release their control software, they run the risk of someone using similar codes that could interfere with the performance of the equipment. If they choose to participate, they'll be protected. If not, their systems will run, but there's the possibility of interference."

Edit list problems

As mentioned earlier, the software interface is only one area of concern for broadcast engineers. Another serious problem, especially for post-production, is the edit decision list (EDL) itself. List incompatibility among different edit systems can complicate the post-production job, as Joe Opeka, vice president of engineering for Positive Video in Orinda, CA, describes it. Opeka complains that an edit decision list created on one system often won't run when taken to another house with

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different equipment. He also worries about limitations of some current decision list formats. "The CMX decision list doesn't store the contents of switcher registers; it just pushes a button to start the effect," Opeka explains. "If I go to another facility, I have to set up the effect again."

One project at Positive Video involved 2700 identical edits, each requiring 23 keystrokes. Positive's CMX 340X system would not allow programming a series of edits into a single key so each edit required 23 separate functions. (The new CMX 3400+ corrects this deficiency, but when *BM/E* spoke to Opeka late in September, Positive was still waiting for the 3400+ it had hoped to get in June.)

Opeka's plan for getting around the problem was to program the soft keys on an Ampex editor for the 23-stroke sequence and make as many off-line as possible—then try to run the decision list on the CMX. Will it work? "I have doubts," says Opeka. The incompatibility of edit decision lists is "a frustrating thing," he says.

For the past five years, improving the edit decision list has been the province of the working group on editing procedures of SMPTE's Video Recording and Reproduction Technology Committee (VRRT). The subgroup is chaired by Robert Lund, who says that in this area, too, agreement is near. The format for the basic edit list data has been submitted to the VRRT several times already, and Lund expects his group to put final touches on it this month in Los Angeles and then give it back to VRRT in December; next step will be a recommended practice.

As with the digital control standard, the edit list standard is in four parts—in this case, two proposed SMPTE recommended practices and two proposed ANSI standards. The ANSI standards specify the edit list formats for eight-inch floppy disks and 5¼-inch diskettes, respectively, while the recommended practices specify formats for the basic EDL data and for special data. "A recommended practice is not as tied down as an ANSI standard," Lund says, explaining the different presentation of the proposals. The group chose ANSI standards for the disk formats because these are expected to remain unchanged.

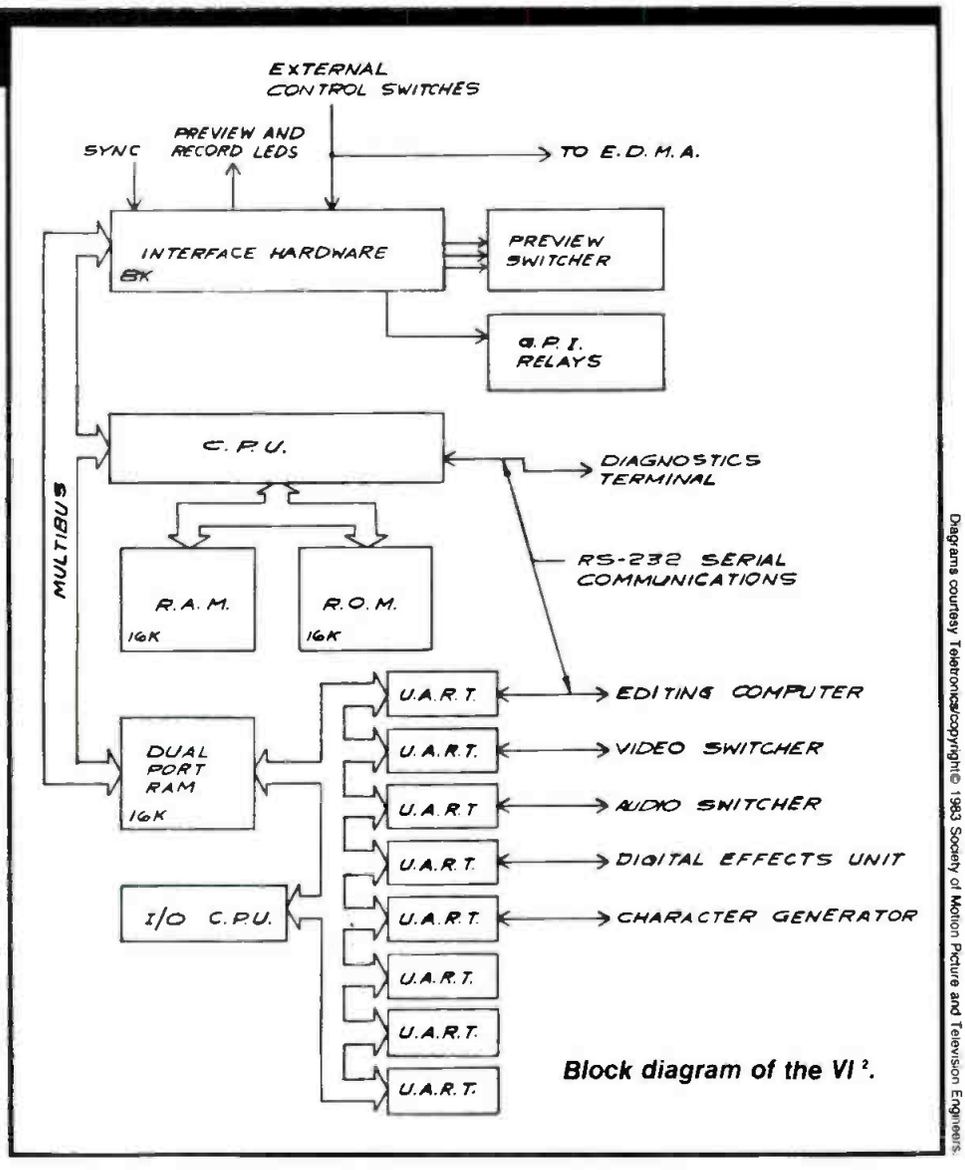
The actual edit list SMPTE has developed so far is similar in most respects to the current industry standard—CMX—but goes beyond it in some respects. For example, the CMX list allows events to be named by numbers 1-99; the SMPTE list adds six-letter names. But it is the second recommended practice—for special data—that shows the most difference. This standard would expand the edit list to include control over a much wider variety of equipment functions for such gear as switchers, digital special effects, and audio consoles.

Both of the recommended practices have waited for adoption of control language by McAll's working group. "It seems to make sense for us to wait for those codes," Lund explains. "Then we can package them into the list and it should work in any studio."

Despite turnover problems, Lund feels that the group's work will be effective. He notes that several manufacturers have been very involved with the group, and that some have already applied the recommended parameters. Convergence, for example, has defined its disk drive according to the recommended practice. CMX also has been consistently represented on the group, but seems to be interested in "more of an observing role," according to Lund. "I don't think they're letting it affect what they're doing in their edit systems," he says. He doesn't feel that the possible incompatibilities between the CMX and SMPTE EDLs are very serious, however. "There's some more information in ours, but the basic form is the same," he explains. "Probably you'll be able to select between the CMX and SMPTE formats on the same system, and some systems may be able to read both."

Where do manufacturers stand on the interface and edit list issues? The companies *BM/E* contacted all agreed on the need for increased standardization, although some saw limitations to the degree of standardization possible. All say they plan to conform to the proposed SMPTE standards once issued.

Charles P. Clarke, manufacturing manager of the production systems division of the Grass Valley Group, sees many of the limitations on switcher interfacing stemming from the edit decision list. "From the switcher end, any amount of control is possible,"



Block diagram of the VI ².

This is Larry Boden

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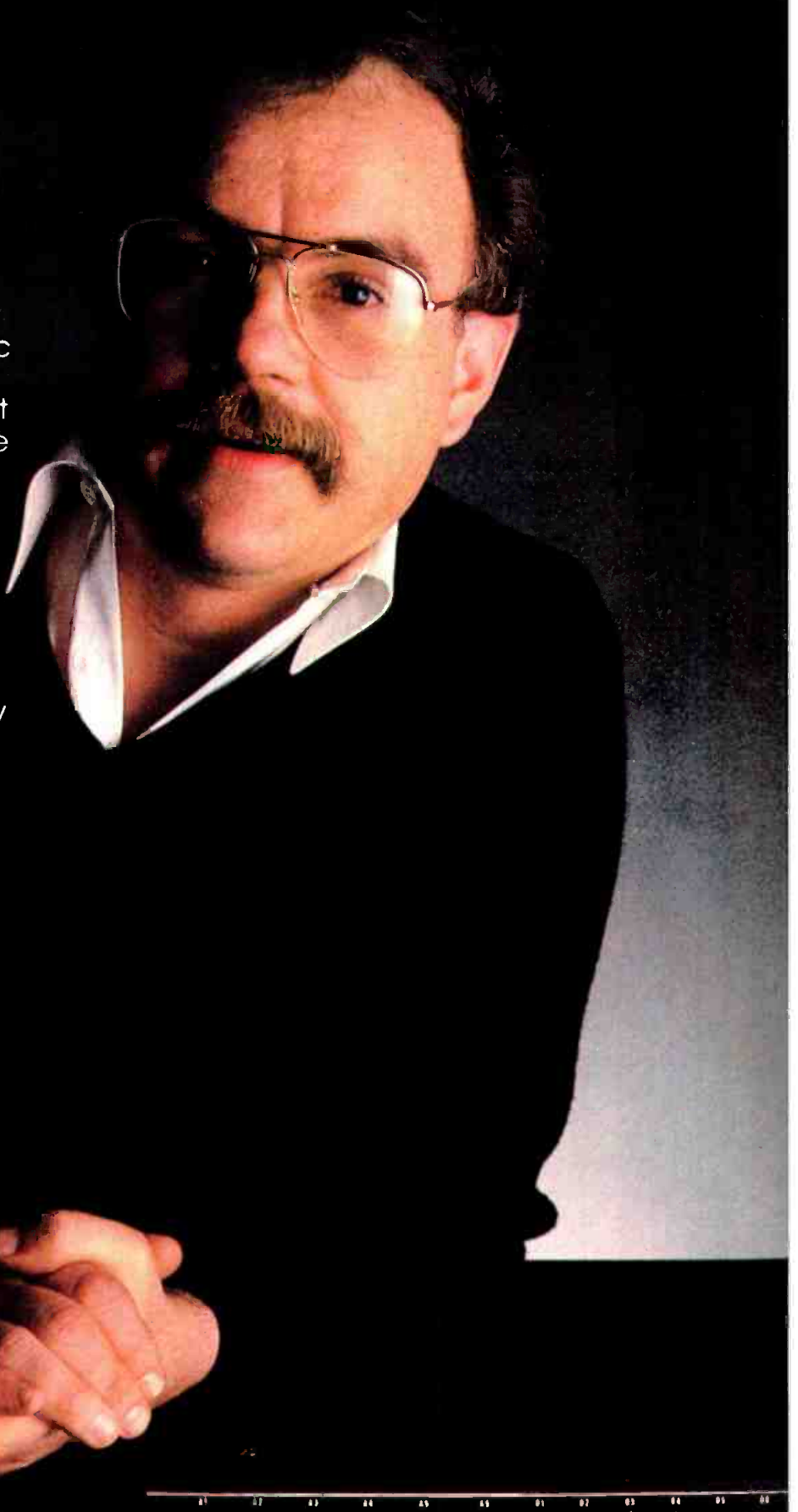

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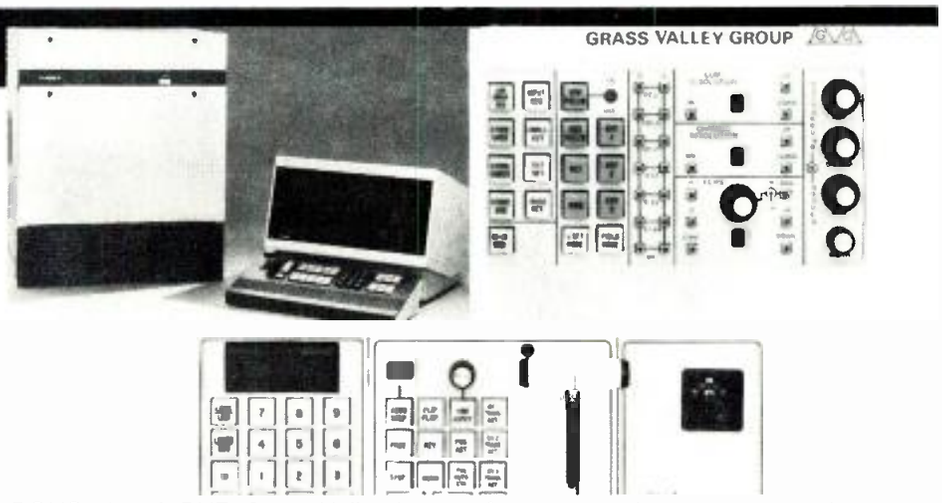

DGVG Mark II DVE. Grass Valley is one of many manufacturers closely following the evolving SMPTE standards. Ampex allows its ACE editor to have a high degree of control over its ADO graphics system, shown here.

Clarke states. "Going to a serial interface concept allows control by an external computer. Also, pre-created effects can be accessed through a serial port and the data transferred into a computer editing system for storage. The limits of the edit decision list have held this back." He noted that Grass Valley began using a serial interface in 1970 for its 1600 switchers, and says that GVG has been involved in the digital control working group "since day one." The company's 300 switchers and Mark II DVE use an interface patterned on SMPTE's work so far, and Clarke says the company will work with the standard when it's completed. "Our approach is that we'll bring control of our switcher and DVE to a serial port, and publish a protocol that we'll give to our customers, the edit system manufacturers, and the SMPTE committee, explaining how to control it. We also offer engineering assistance that allows our systems to be interfaced."

Clarke is most optimistic for the lower levels of standardization, such as the cable and connector work already completed by the working group, and the addressing protocol. "The next step after that, in a practical sense, is to establish an edit decision list everyone can design their equipment to. Going farther, we start getting into problems. All VTRs will fast forward, fast rewind, record, play, and so forth, but many also have slow motion and other special features. There's still dispute over how those functions will be controlled."

But one serious problem does lie in the switchers themselves, according to Clarke. "To totally interface switchers, you have to define the architecture for common control. And I don't think we'll get agreement on that. You don't want to straitjacket manufacturers of effects to do things all one way. The main objective is to define an expanded edit decision list that includes multiple mix/effects banks, expanded audio commands, and basic digital effects commands."

He notes that a "status reporting" feature in GVG switchers reports manual moves on the switcher at the serial interface. "If an edit system can accept this input and store it with time code, you can play back the switcher functions," Clarke says. "It's almost an automatic edit decision list buildup from manual movements on the switcher."

Editing manufacturers currently taking advantage of this feature include CMX and Sony. According to Clarke, the DVE can also be totally controlled through the serial port, but no editor manufacturers have done this yet.

"The main advantage of a standard," Clarke suggests, "is to simplify interfacing for manufacturers. With a standard, we could make one interface for our production switchers that would be compatible with all controllers."

Upgrade outlook

Chuck Wacker, vice president of engineering for CDL, sees plenty of cooperation in the standards-setting effort by manufacturers. He warns, however, that even with a completed interface standard, current users may not be able to upgrade their equipment. "All current CDL hardware is compatible with the standard," Wacker states. "We may come out with a 'black box' for our 480 switchers, but probably not for all our old lines." Upgrading computer-based switchers is much easier than for the older, noncomputerized models. All the new models, of course, are computer-based, and Wacker predicts, "Within the next three to four years, the switcher interface problem will be virtually nonexistent . . . . It's all acheivable and it will be reached someday."

Another manufacturer strongly committed to working with SMPTE is Ampex. Bill Justus, senior product manager of Ampex's Video Systems Division, says that the ACE editor fully complies with the hardware portions of the digital interface group's work. "The software protocol hasn't been agreed to yet, but we're operating in compliance with the most recent discussions," he adds. Since the software is in random access memory, Ampex will be able to update all its customers to the final agreement.

As far as switcher control is concerned, Justus comments, "What we control is more a function of the switcher than of the editor. If the commands are not brought out on the remote plug, we can't control them, but we can control anything we can get our hands on." Ultimately Ampex hopes to control "everything on the switcher," according to Justus, and software is being written to control more than one mix/effects bank. At this point, the ACE system "eavesdrops" as the operator sets up to switcher and stores the moves for later recall; duration of the sequence can be changed during recall.

The ACE editor has a special relationship with Ampex's ADO digital effects system, which has a "SMPTE-like" port to talk to ACE, according to ADO product manager Ron Marconi. Again, when the SMPTE issues final standards, ADO will be upgraded to meet them.

Until then, ACE has a much greater potential for control over ADO than other editing systems, according to Marconi. Ampex is presently at the first step of a three-stage process that will gradually increase ACE's power over ADO. At this time, once a user has created an effect on ADO off-line, he can call it up off the disk and enter it into the ACE decision list. The editor can then run the effect, modify its duration, and rehearse the effect in part or in whole. The second phase, which will go into effect when SMPTE protocols are issued, will involve use of a true SMPTE port and will allow minor effects-modifications—perhaps repositioning—to take place from the editor. The third phase, according to Marconi, is to build whole effects from ACE.

"We would love to interface with everything on ACE," Marconi adds,

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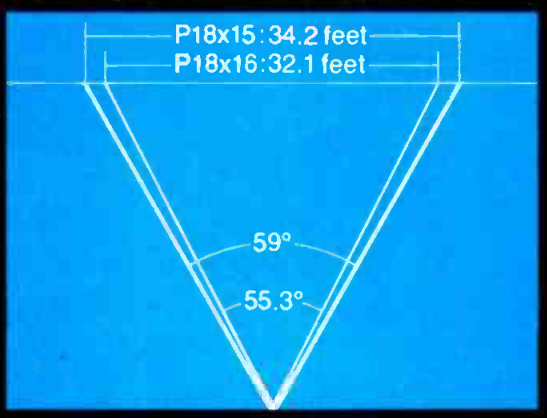

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"but it takes time and research." Even with a standard interface protocol, editor manufacturers would still have to compensate for the varying ballistics of tape machines. But with standardization, the work of interfacing "would be half done," Marconi admits.

Facing the limits

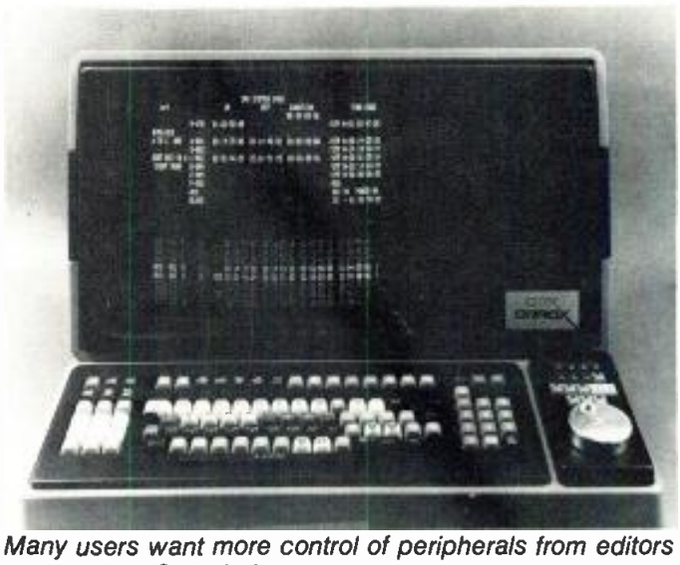
Convergence Corp. is also working closely with SMPTE, and has representatives on both the digital control and edit list working groups. Doug Tao, manager of product development, says that Convergence is integrating the SMPTE standards, as they develop, into its products. He warns, though, that there are limits to standardization. "The long-term goal of machine manufacturers," he states, "is to minimize the impact of having to change machines in the field . . . . There's going to be minimal functionality that can be standardized."

Marketing manager Debra Harter adds, "On our own switchers, we can control up to 32 wipe patterns, soft or hard, normal or reverse, for one mix/effects bank. But people use two- and three-M/E switchers." The number of commands needed to control multiple M/Es, plus E-MEM or similar systems, easily "gets out of control." Even with the edit list, Tao points out, "You can't get a standard that applies to everybody."

"We'd all like to see some standardization, for example, of wipe patterns," continues Mark Riley, project engineer at Convergence. "The SMPTE committee on edit list interchange has published a request for comment describing a certain set of effects. But some companies may have different sets of effects. We all have to give and take." Tao says the SMPTE's serial protocols are "not going to be the thing that will end all the problems of interfacing . . . But it will make it easier for all manufacturers to talk to one another." He and Harter agree that cooperation among manufacturers has greatly increased in the past few years.

Sony's position on interfacing its BVE-5000 editing system with equipment from other manufacturers is slightly different from many other companies. Michael Greene, Sony Broadcast product manager for video recording products, says that when the SMPTE standard is completed, Sony will comply with the protocol and will interface with any VTR that follows the standard. Until then, however, Sony editors will talk only to Sony VTRs.

"In order to avoid system communication problems, we elected to market one-inch recorders and editors that would have no communications problems," Greene explains. "With the RS-422 movement, the communication problem should become a situation that can be resolved. Until this time, it's been necessary to use an I^2 to do personality-molding between editors and VTRs. We elected not to pursue that, but to insure compatibility between Sony products." Greene admits that customers have asked for interface to other machines, but he asserts, "No intelligent interface is perfect . . . . We couldn't guarantee 100 percent repeatability." As far as switchers are concerned, Greene says Sony has been working with manufacturers to develop intelligent interfaces that provide varying degrees of switcher control.



Many users want more control of peripherals from editors such as this CMX 340X.

Ed Bolger, product manager for CMX's large editing systems, says, "If there was some standardization, we'd be very relieved—we could just make one interface for everyone." The company's attitude toward the SMPTE work, however, seems to be more along the "wait and see" line. "We're watching SMPTE," Bolger says. "It takes a while to come into agreement and implement a standard."

Even with a standard, interpretations may differ slightly. "We continue to try to make things as simple and as common as possible," Bolger adds. Asked about customer-built "black boxes," Bolger noted that CMX currently offers over 100 interfaces for VTRs, ATRs, and switchers. "To insure that we have a good solid interface, we have to obtain the machine from the original manufacturer, take it in and learn its personality, then tailor-make the interface, do the documentation, and market it. It's a constant task to get our hands on each machine in a timely manner and then get the interface out to the public. The machines we perceive will be most popular receive our immediate attention. A lot of the frustration comes from the people with the less popular units."

As for controlling digital special effects devices, Bolger feels that the best bet at this time is the CMX GPI. "As equipment gets more and more sophisticated, having one device control and communicate with all those pieces of equipment gets very difficult." CMX does offer E-MEM control in the EDL, a feature that records manual switcher settings as well as the ability to specify many standard wipe and key patterns with transition rate.

As the whole industry works its way toward the digital interface, perceptions differ on how close or how far that interface is from realization. Engineers at post-production houses, anxious to interface as many machines as possible for the most powerful systems, are impatient with the time-consuming process of reconciling the differing needs of various manufacturers. On the other hand, McAll and Lund, the SMPTE working group chairmen, see progress continuing as fast as can be expected given the complexities of the task. Both feel that their groups' efforts are close to fruition.

Any chance for resolution lies in the hands of the manufacturers, who are the only ones capable of bringing about industry-wide compliance with the hoped-for SMPTE standards. Among manufacturers, there is a general willingness to adopt the new SMPTE protocols. Users, too, can sway manufacturers toward compliance by insisting on equipment that meets the new standards. But, as with any technological change, those with systems already installed may be stuck with yesterday's newspaper—hardly yellowed, but carrying information that's a little bit old. **BM/E**

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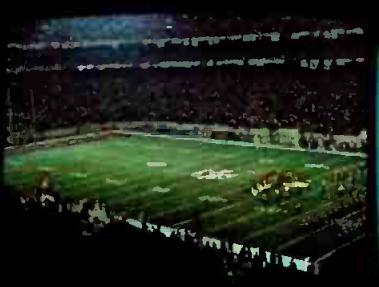

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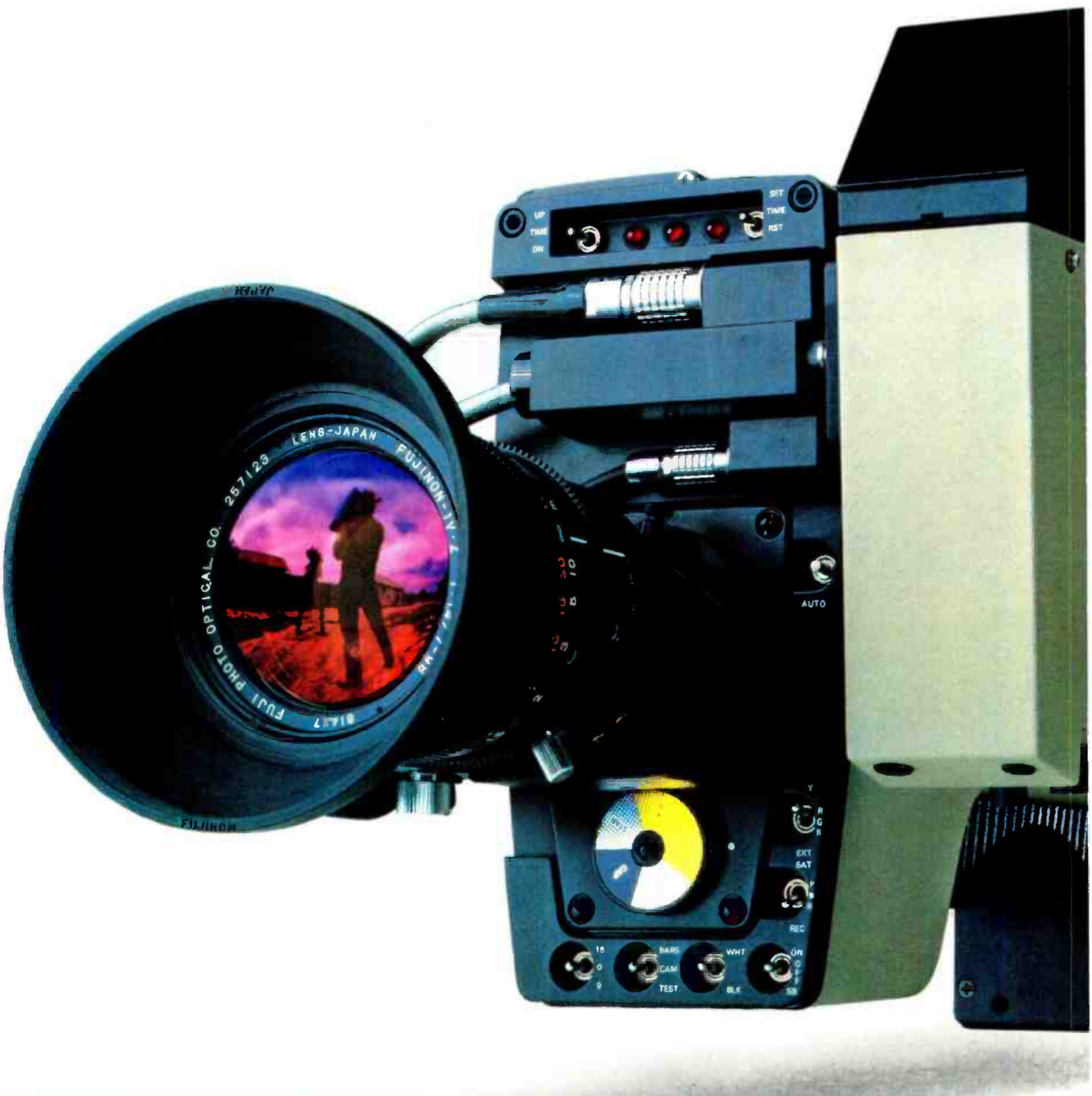

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ENGINEERING THE RADIO REMOTE

A detailed guide to remote pickup systems – transmitters, antennas, repeaters, and so forth – and how they are used.

By Jerry Whitaker

How to get there from here is the problem posed by remote broadcasts, and solved by the Remote Pickup Unit (RPU). The concept of a remote radio broadcast has not changed very much over the years, but the means to accomplish the task has seen quantum leaps in equipment performance and reliability. As with most technological advances, however, new problems have developed as well, not the least of which is RF congestion in large urban areas.

Starting with a review of the basic regulations governing radio remotes, Part 74 spells out the FCC rules for operation of a remote pickup unit station. A variety of frequencies are allocated in both the 150 MHz and 450 MHz bands. Assignments are also made on lower frequencies in the 25 MHz region. Virtually all activity is centered, however, in the 150 MHz and 450 MHz bands, and so this article will focus on those two groups.

License classifications include Automatic Relay Station, Base Station and Remote Pickup Mobile Station. Automatic Relay Stations (ARS) are restricted to operation in a particular group of 450 MHz frequencies and a licensee cannot operate more than two such stations on different frequencies in the same geographical area. Base stations are, as the name implies, fixed-position installations used for one-way or two-way communication on either of two frequency groups. These systems may, in the event of an emergency, be used to provide program circuits for relay of Emergency Broadcast System information. Remote pickup mobile stations are generally licensed as a system in conjunction with the principal base station or stations. RPU mobile licenses specify a minimum and maximum number of mobile transmitters allowed in the system, such as no less than one and no more than five mobile units. Other standard divisions include from four to 12 stations, from 10 to 20 stations, and from 20 to 50 stations.

Special provisions are placed on automatic relay stations, designed to prevent disruption of normal communication on the RPU frequencies due to two or more repeaters being keyed at the same time. Each ARS must include a monitor receiver tuned to the transmit frequency which will inhibit the repeater operation if a transmission is already

Jerry Whitaker *is chief engineer of KRED-AM/KPDJ-FM, Eureka, CA.*

in progress on that channel. The relay station control circuits must also lock out operation of the transmitter portion of the system unless a predetermined coded signal is received or a continuous subaudible tone is superimposed on the traffic to be repeated.

The FCC's Part 74 rules require that the transmitter power for an RPU station be limited to that necessary for satisfactory service, and in any event, not more than 100 W. RPU equipment operating on board an aircraft will normally be limited to a maximum power of 15 W. A mobile station consisting of a hand-carried or pack-carried transmitter is limited to a power output of 2.5 W.

All transmitting equipment must be type-accepted by the FCC and checked each year (for units with more than 3 W power output) for frequency accuracy, deviation, and power. RPU transmitters greater than 3 W power output are also required to be equipped with a means to automatically prevent modulation in excess of the authorized limits.

There are virtually no operator requirements for use of an RPU unit. Any person designated by and under the control of the station licensee may operate the system. An operator's license (as outlined in Part 13 of the FCC rules) is not required.

Frequency coordination

The RPU channels are used on a shared basis, and so receipt of a license is no guarantee of unlimited interference-free operation. In fact, in most metropolitan areas, an unused channel is the exception, not the rule. For this reason, the Society of Broadcast and Communications Engineers (SBCE) has established a National Frequency Committee with coordinators in 64 SBCE local chapter areas. The SBCE program assists broadcasters and other users of RPU channels in setting up local or regional committees to coordinate frequencies and take whatever special measures may be necessary to insure reliable, interference-free operation.

Limiting RPU transmitter power output to only that needed for reliable coverage and high-quality performance is an important tool in frequency coordination. If a signal-to-noise ratio of 5 dB can be obtained from the RPU system with 5 W, there is little justification for driving 15 W into the antenna, espe-

Equipment Roundup

Broadcast RPU equipment is manufactured by a number of companies. Here's a sampling of what is available:

Marti Electronics makes RPU gear for the 150 MHz and 450 MHz bands in power output levels of 2.5, 15, 25 and 40 watts. A special feature is the "S" band, which provides a frequency response of 50 Hz to 15 kHz with distortion of one percent and signal-to-noise ratio of 58 dB. Unfortunately, there are only two frequencies available in this band. Other Part 74 groups with respectable specifications (50 Hz to 10.5 kHz) include N1 and R (both 450 MHz). Good-quality voice-grade groups (50 Hz to 7.5 kHz) include N2, K and L (450 MHz and 160 MHz bands).

The Marti RPT-2 hand-carried transmitter is a popular unit that is representative of the company's RPU product line. It can be ordered for use on either the 150 MHz or 450 MHz bands. The unit is rated for 2.5 W of continuous power output and provides dual-frequency operation with an optional second crystal. A subaudible tone generator is included to make the system compatible with automatic relay station installations, or user-supplied special functions. A built-in meter reads power supply status, RF power output, or audio limiter operation. The RPT-2 includes an internal nicad battery and charger. The unit will accommodate a microphone input and an unbalanced line level input, with front panel gain controls for each. The Marti Series RR is the companion receiver.

A pair of Series RR receivers and one of Marti's 15 or 25 W transmitters may be configured to provide an automatic relay station. In this application, one of the receivers is used as the relay unit that picks up and demodulates the signal to be repeated and the subaudible tone necessary to unlock the automatic relay station logic. The second receiver performs the monitor function, which prevents retransmission of a signal if the transmit frequency is already in use.

The Moseley Associates RPL series of transmitters and receivers provide broadcast quality communications on any of the 150 MHz or 450 MHz RPU bands. The transmitter provides a nominal 10 W output power into 50 ohms. Protection circuitry in the transmitter allows the unit to withstand infinite VSWR at all phase angles. Front panel metering includes peak audio, forward RF power, reflected RF power, power supply voltages and three stages of RF drive. The transmitter also contains a three-channel audio mixer and an audio peak limiter with a range of better than 25 dB.

The Moseley Associates 10 W RPL transmitter.

The RPL transmitter operates from either 120 V or 12 V. Dual frequency operation (within 1 MHz spacing) is provided as an option, with separate oscillators for each channel. The transmitter employs direct FM voltage-controlled oscillators to generate the carrier signal. The system is constructed of five basic modules: the audio processor, VCXO, multiplier/driver, RF power amplifier, and power supply.

The RPL Series receiver is a superheterodyne design using double conversion with IF frequencies of 30 MHz and 10.7 MHz. As with the transmitter, the receiver may be operated on dual frequencies.

For situations that demand more RF power output than the RPL transmitter can provide (10 W, typically), an externally mounted RF power amplifier is available that gives 5 to 6 dB gain, depending on the operating frequency. With the 10 W drive of the RPL transmitter, a power output level of 32 to 40 W can be achieved.

For AM stations wishing to use their tower as a support structure for one or more RPU antennas, an isocoupler is available from Moseley that couples that 150 MHz or 450 MHz signal to an RPU antenna mounted on an ungrounded AM tower. A further option is the Scala PD-1 power divider, which makes it possible to use a common antenna to feed two RPU receivers with a minimum of loss. Other PD series dividers give two-, three-, or four-way splits of equal or unequal ratios for driving antenna arrays of special design.

McMartin Industries has two basic remote pickup unit transmitter types, a high-power system and a low-power portable unit. The high-power models

McMartin's 50 W 150 MHz transmitter.

RPU-1150 (150 MHz band) and RPU-1430 (450 MHz band) provide 50 and 30 W RF power output, respectively. Power is through an ac supply or from an external source, such as an automobile accessory output. Two microphone inputs and one line level input are provided. A built-in compressor simplifies operation for the user and prevents overmodulation of the transmitted signal. A front panel multimeter reads modulation, forward and reflected power, voltage, and PA current. A convenient built-in VSWR bridge enables the user to check the antenna for an optimum match. Dual-frequency operation is possible with the proper optional crystal.

The McMartin high-power transmitter is available with an optional remote-control head if space limitations or transmission line loss dictate location of the unit in a separate area. The RF power amplifier module is capable of withstanding infinite VSWR conditions without damage, and the output stage is thermostatically protected against long-term mismatch or overload conditions. All interstage and output impedance matching is accomplished with broadband microstrip techniques.

The low-power McMartin transmitters provide a nominal 3 W power output. Dual-frequency operation with up to 1 MHz spacing for the 150 MHz unit and up to 2 MHz separation for the 450 MHz unit is accomplished with an optional second crystal. An internal compressor with a 25 dB range relieves the operator from gain-riding chores. The transmitter contains an internal rechargeable battery for portable operation. User controls include microphone and line level pots. Three LEDs indicate the status of the unit.

The McMartin companion receiver is available for use on either RPU band. Dual-frequency operation is possible with an optional second channel element. The receiver is a dual conversion design with IF frequencies of 10.7 MHz and 455 kHz followed by a new Precise Tracking Decoder (PTD) demodulator circuit. Better than 50 dB of AGC is provided by a diode-protected dual-gate MOS-FET RF amplifier.

A carrier-operated relay is standard for user-supplied external equipment. A front panel meter reads the relative RF level and modulation on either of the two receive frequencies.

Cetec Vega R-42 wireless mic receiver.

The Cetec Vega R-41 and R-42 receivers and their companion microphone transmitters are good examples of what is available in wireless microphone systems. Cetec's new T-81 hand-held transmitter uses a Shure SM58 dynamic element as the pickup device, the T-82 uses a Shure SM85 condenser element, and the T-83 includes the high-performance AKF-535 condenser element. All three models feature the Dynex II audio processor, which is designed to give lower noise, wider dynamic range, and flatter frequency response than previously possible. The units include soft gain compression circuitry for modulation limiting. A patented internal dipole antenna is used as the radiating element.

The companion receiver is the R-41 or R-42. The R-41 is a nondiversity receiver that is used where multipath phase cancellation is not a problem, such as in open areas or fixed position interviews. If the wireless microphone system is to be used in several places and the possibility of multipath cancellation could be problem due to nearby metallic objects, the R-42 receiver is recommended. The diversity uses two antennas, located in different areas of the event site. A minimum separation of 20 feet is usually recommended. The receiver automatically selects the stronger of the two signals for demodulation. This RF source switching occurs silently without any "squelch type" noise bursts.

The receiver includes a four-pole helical resonator preselector filter and overload resistant dual-gate MOS-FET RF amplifier and mixer stages. The local oscillator is crystal-controlled and a total of 16 poles of IF filtering provide sharp adjacent channel rejection. —J.W.

cially if another station is fighting the signal in an adjacent city. Unfortunately, transmitters with continuously variable power output are rather rare, and modification of existing equipment can be an expensive and time-consuming proposition. It will also invalidate the transmitter's type acceptance.

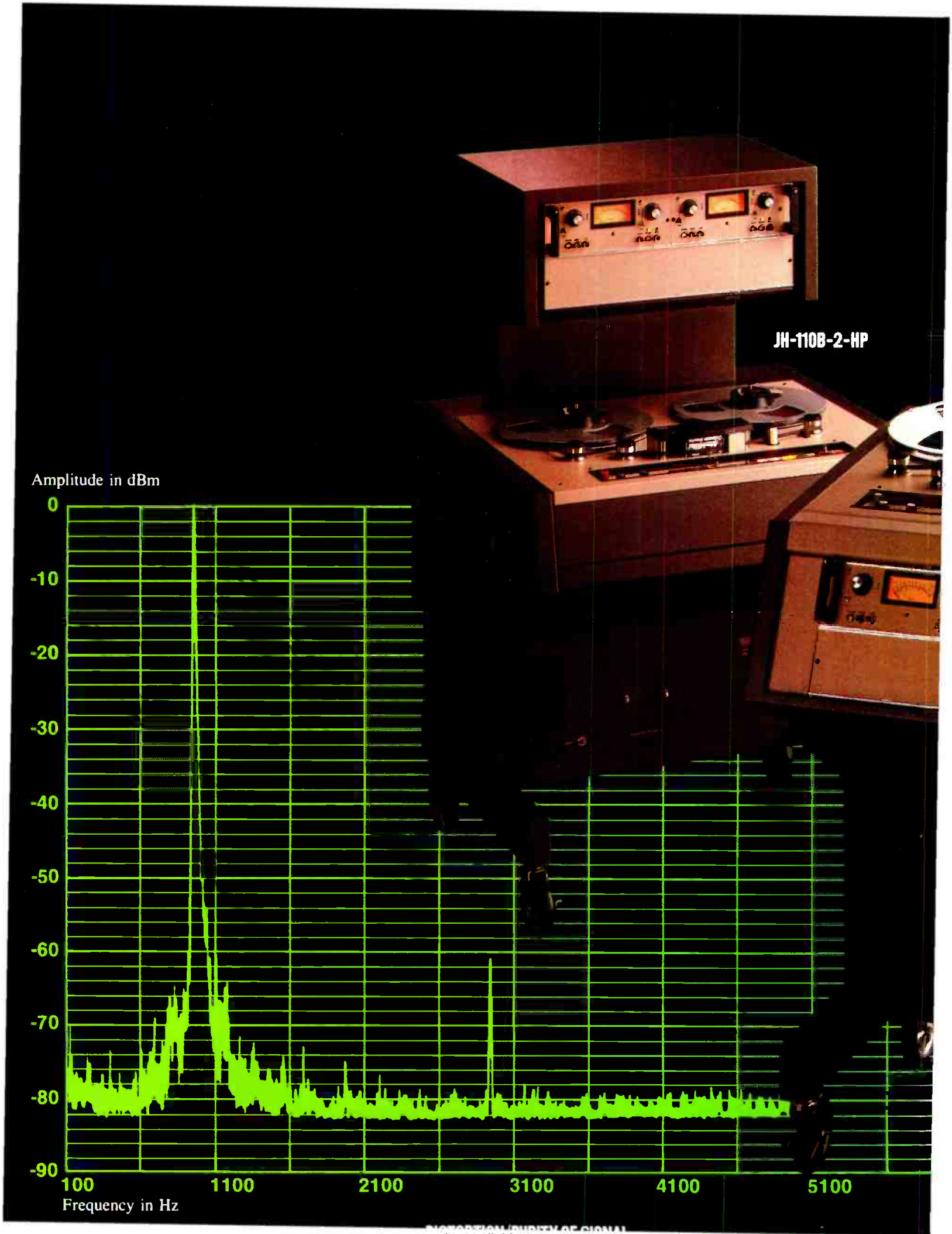
A simpler solution is to purchase transmitters operating on the same frequencies but with different power output levels. All popular broadcast RPU equipment manufacturers offer transmitters with a variety of power output specifications. In some cases, a single transmitter is used and an optional power amplifier module is added before the antenna to give the desired RF output. However, the power amp itself must also be type-accepted for use in the Part 74 frequencies.

RPU antennas

The classic RPU antenna has, until recently, been the omnidirectional vertical whip with (generally) a small amount of gain. Large numbers of stations are, however, now being forced by interference concerns and economics to use directional antennas with moderate to high gain. At the power levels and frequencies of the RPU channels, increased Effective Radiated Power (ERP) can be achieved economically (up to a point) through the use of high-gain transmit antennas. If the coverage area or logistics permit the use of a directional high-gain receive antenna, so much the better.

Antenna polarization is another frequency coordination tool that can improve the isolation between competing signals. Most directional moderate- or high-gain antennas can be mounted with either horizontal or vertical polarization, which must, of course, be matched at the receive end. In areas subject to multipath problems, such as metropolitan centers occupied by high-rise buildings, cross polarization for isolation may have little benefit, due to the fact that multiple reflections of various polarizations may be present.

Omnidirectional base station antennas for 150 MHz and 450 MHz are generally vertically polarized types with moderate, 4 to 6 dB gain being typical. With a maximum power input level of 100 to 250 W, these antennas are more than adequate for any broadcast RPU transmitter. Electrical beamtilt is sometimes available, depending on the



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The Scala CA5-150 yagi antenna used as part of KRED/KPDQ's three-hop RPU system.

manufacturer. Scala Electronics, for example, offers up to 20 degrees downtilt for its 150 MHz antenna and up to 11 degrees for its 450 MHz omnidirectional stick. Beamtilt is used when the antenna is located high above the surrounding terrain, thus improving the close-in coverage. The size of these types of antennas can become somewhat cumbersome, with the 150 MHz unit being about 12 feet long.

Probably the most popular directional RPU antenna is the medium-gain yagi. At 150 MHz, a five-element yagi antenna is fairly easy to handle and will provide a typical gain of 9 dB over a reference dipole. This type of unit will accept up to 250 W input power. It can be mounted for vertical or horizontal polarization.

The unit provides a front-to-back ratio of 14 dB. At 150 MHz this antenna measures $40 \times 40 \times 4$ inches and weighs eight pounds; it is small and light enough to be used on remote broadcasts.

The 450 MHz version of the five-element yagi from Scala Electronics is the CA5-450, which gives 10 dB of gain and a front-to-back ratio of 18 dB. This antenna may be mounted for horizontal or vertical polarization, and may be stacked in two- and four-bay arrays to provide additional gain and directivity. The maximum power input rating is 100 W. At 460 MHz it measures $27 \times 13 \times 5$ inches and weighs just 4 pounds.

All of the antennas discussed so far are made-to-order types that are cut to the particular operating frequency. Multiple-frequency operation can be accomplished with these units with a maximum VSWR of 1.5 to 1 as long as the operating frequency is not removed from the cut center frequency by more than one to two percent, depending on the antenna type. An exception is the CA7-460 broadband yagi that covers the entire 450 to 470 MHz RPU band with a maximum VSWR of 1.35 to 1, with a radiation pattern similar to the CA5-450 described above.

A recent addition to the RPU user's arsenal is the broadband log periodic antenna, such as the Scala CL-150 and CL-400. The CL-150 can be used on any frequency in the 147 MHz to 177 MHz band with a maximum VSWR of 1.5 to 1. The antenna gain is about 7.35 dB and the front-to-back ratio is 25 dB. The unit will accept 250 W input power and may be mounted for vertical or horizontal polarization. The frequency-independent log periodic design provides a smooth pattern with minimal sidelobes. This type of antenna is larger and heavier than the familiar yagi, with typical dimensions of $55 \times 6 \times 41$ inches. The unit weighs about 23 pounds.

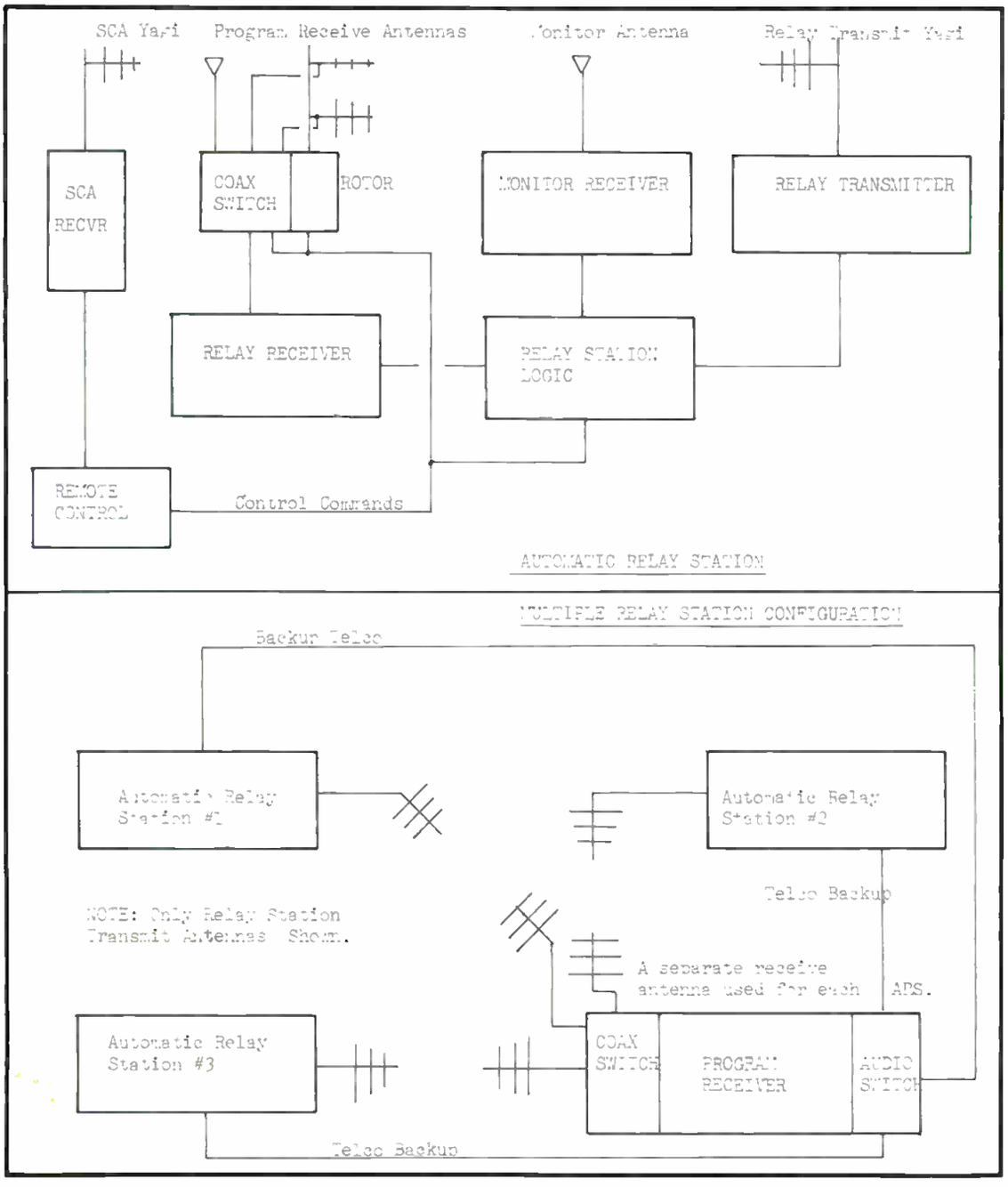
The CL-400 is designed for broadband use in the 400 to 512 MHz band with a maximum VSWR of 1.5 to 1. Tests by Scala show a *typical* VSWR of just 1.2 to 1 over this 112 MHz spread. The CL-400 comes equipped with a fiberglass radome to protect the antenna from damage or degradation in performance due to snow, ice, or salt spray. This antenna measures $14 \times 19 \times 29$ inches and weighs 22 pounds.

Preventing interference

By using directional antennas for transmit and receive functions, broadcasters can many times prevent interference from or to traffic on adjacent channels in a given geographical operating area, or communications on the same channel in a nearby community. One method to insure reliable operation is through the use of a directional transmit antenna and an array of receive antennas. When beginning the initial setup for a remote, the omnidirectional antenna is connected to the receiver at the studio through the coaxial switch. Once contact has been established with the remote crew using the omnidirectional stick, one of the yagi antennas, which are mounted on a common mast driven by an antenna rotor device, is switched (depending on the prearranged polarization that the remote crew will use) into the studio receiver. The antenna rotor is then adjusted to give the greatest signal strength. At this point the base station talks the remote crew into the best position for its directional antenna, which is then used for the broadcast.

The "omnidirectional" remote transmitter (a higher-power unit than the operating transmitter) is used for setup at the site and general-purpose communications not requiring a high S/N. By using a lower-power transmitter and directional receive and transmit antennas, a more secure and quiet channel is assured, without causing interference to other RPU licensees.

Other types of configurations can, of course, be devised. The ideal arrangement would be to have several of the base station receiving systems described above located in different areas of the city and linked to the studio through automatic relay stations. The receive antenna switching and positioning scheme is the same, except that it is done by remote-control from the studio through an SCA channel, separate dedicated remote-control radio link, dial-up telephone patch, or leased telco data or voice loop. A standard broadcast transmitter remote-control package is used to perform the positioning and switching needed to tune in a remote crew. Stations with multiple-



other signals from opening the transmitter section of the relay.

One of the problems inherent in the design of an ARS is the possibility of a desired signal unlocking the system and an undesired signal keeping it open. This situation could occur if a tone burst method is used to activate the ARS function, since the tone will key the repeater until a loss-of-carrier command turns it off. If no loss-of-carrier command is generated due to spurious signals being received by the relay receiver, the repeater will be "stuck open." In such a case, a remote means must be provided to override the system.

Remote operations

At the site of a remote broadcast there are several ways to put RF in the air. The most obvious is the method in which the only equipment at the event is the communications high-power transceiver and the program material low-power transmitter. Two other possibilities, which give the talent free movement around the area, are to use either a small hand-carried transmitter or a wireless microphone. The companion receiver is mounted in a van or car outside the event, and is fed into an ARS as described earlier. The talent receive antenna at the ARC may be either an omnidirectional or yagi type, depending on the mobility needed.

There is a limit, of course, to the number of times a signal can be repeated and still maintain a low S/N. Each hop will add noise, distortion, and loss of high-frequency response to one extent or another. Moreover, it will increase the chances of an interfering signal interrupting the remote feed. Each added hop also increases the system complexity and vulnerability to

site capability on their main transmitter remote-control systems can treat each RPU receiving and automatic relay station as another "transmitter site" and control it as such from the master unit.

The operation of the automatic relay station must conform with the Part 74 FCC rules outlined earlier. The ARS transmit antenna and the receive antenna at the studio are high-gain, directivity types that are fixed in position. If a system of two or more such remote-controlled automatic relay stations, all on the same transmit frequency, is used, the studio control unit determines which one is allowed to "repeat" the remote crew traffic. For multiple-site operation, the repeat receive antenna at the studio can be mounted on an antenna rotor to pick up the desired ARS, or separate fixed-position antennas can be installed at the studio and the proper one selected through the use of a coaxial switch.

As a measure of insurance, a station should have a backup telco equalized loop installed between each ARS and the studio. With this precaution, a failure in the relay equipment would not prevent the station from finishing a remote broadcast.

As mentioned earlier, if an ARS is used in a remote pickup unit, the FCC requires that a subaudible tone or identification tone burst be transmitted to unlock the repeater, thus preventing

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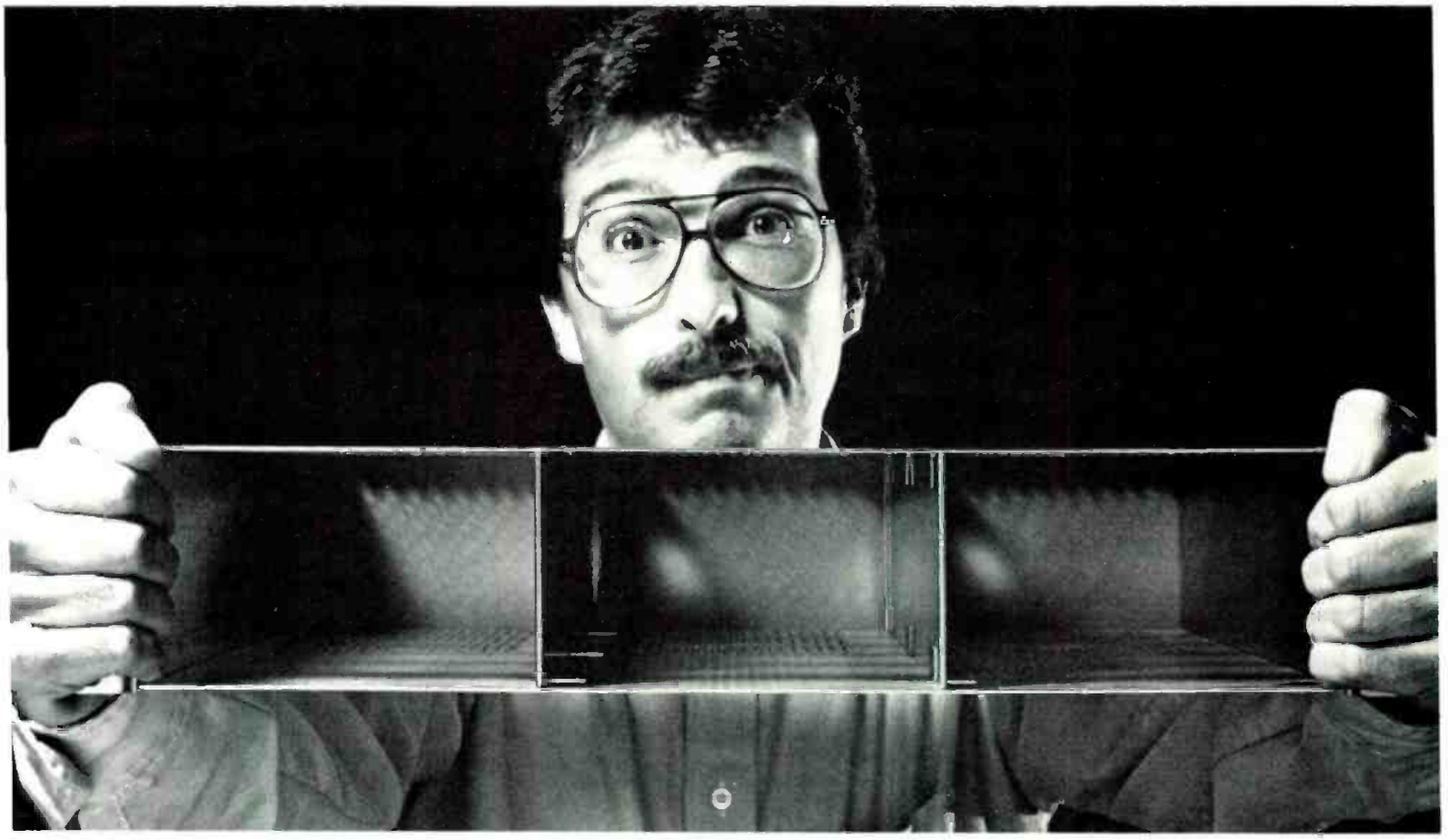

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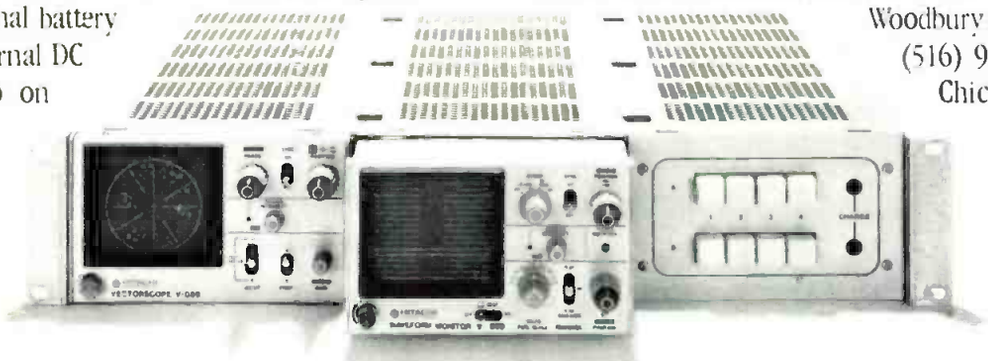

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equipment failure.

Broadcasters constructing an RPU system in a spectrum-congested area should consider building "satellite" receiving stations located at more quiet RF points, such as atop large hotels or motels. Generally, most broadcasters and governmental radio users in a particular area will cluster on one of several buildings, making clean reception more difficult. A better arrangement would be to isolate the station's RPU receivers on a building that has no colocated transmitters, then to relay the signals from the 'satellite' receiver back to the studio via a separate radio relay link.

The best receiving location for an RPU system is not always the highest building in town. Placing receive antennas at a high elevation in a metropolitan area can make it difficult to get a good signal out of the downtown section because the gain of most antennas decreases as the elevation of the antenna is raised above the transmitting point (unless downtilt, in the case of an omnidirectional antenna, is used). Tall buildings are very good for point-to-point transmissions, but wide area coverage around a downtown section can leave much to be desired when these locations are used.

Cueing of the remote crew from the studio can be accomplished in one of several ways. The simplest of all is an over-the-air cue in which the talent simply monitors the air signal and then goes from there. Alternate methods include use of an SCA signal for cueing instructions or a separate, dedicated radio link to the talent from either the remote truck or the main studio.

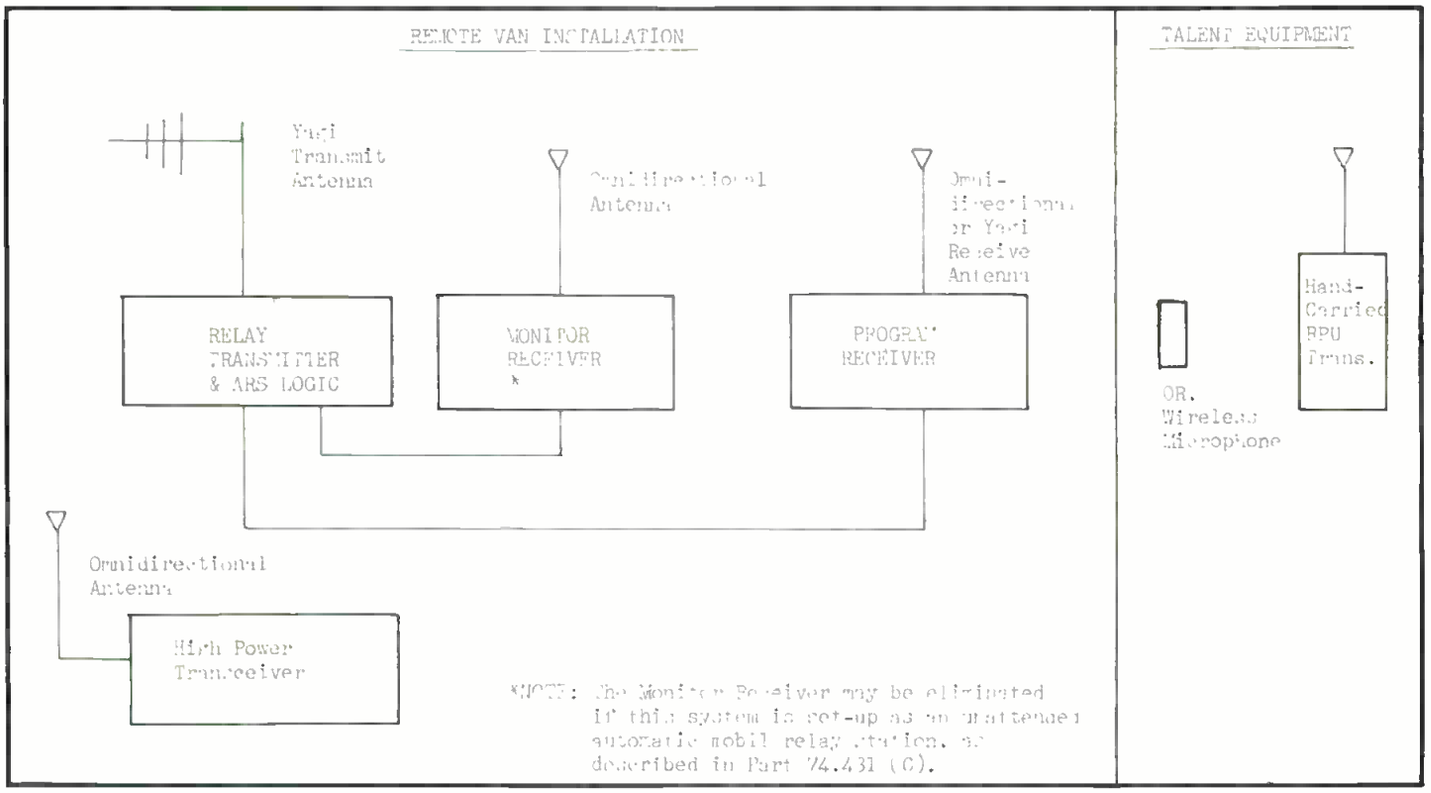
One of the problems encountered when doing remotes on an automated station is the need to have an operator stand by during the broadcast to advance the automation system to the next event when the talent gives the proper cue. It is a simple matter to program the "remote start" times into an automation system, and the talent can then take his or her cue over the air from a prepared introduction cart. For maximum flexibility at both the remote site and the main studio, however, a station can add a simple touch-tone generator unit to the talent's transmitter and a decoder to the RPU receiver at the studio. A particular command from the talent is then used to advance the automation system to the next event. Other command tones can be used for various functions, such as making the remote the "next event," or alerting the operator on duty to contact the remote crew.

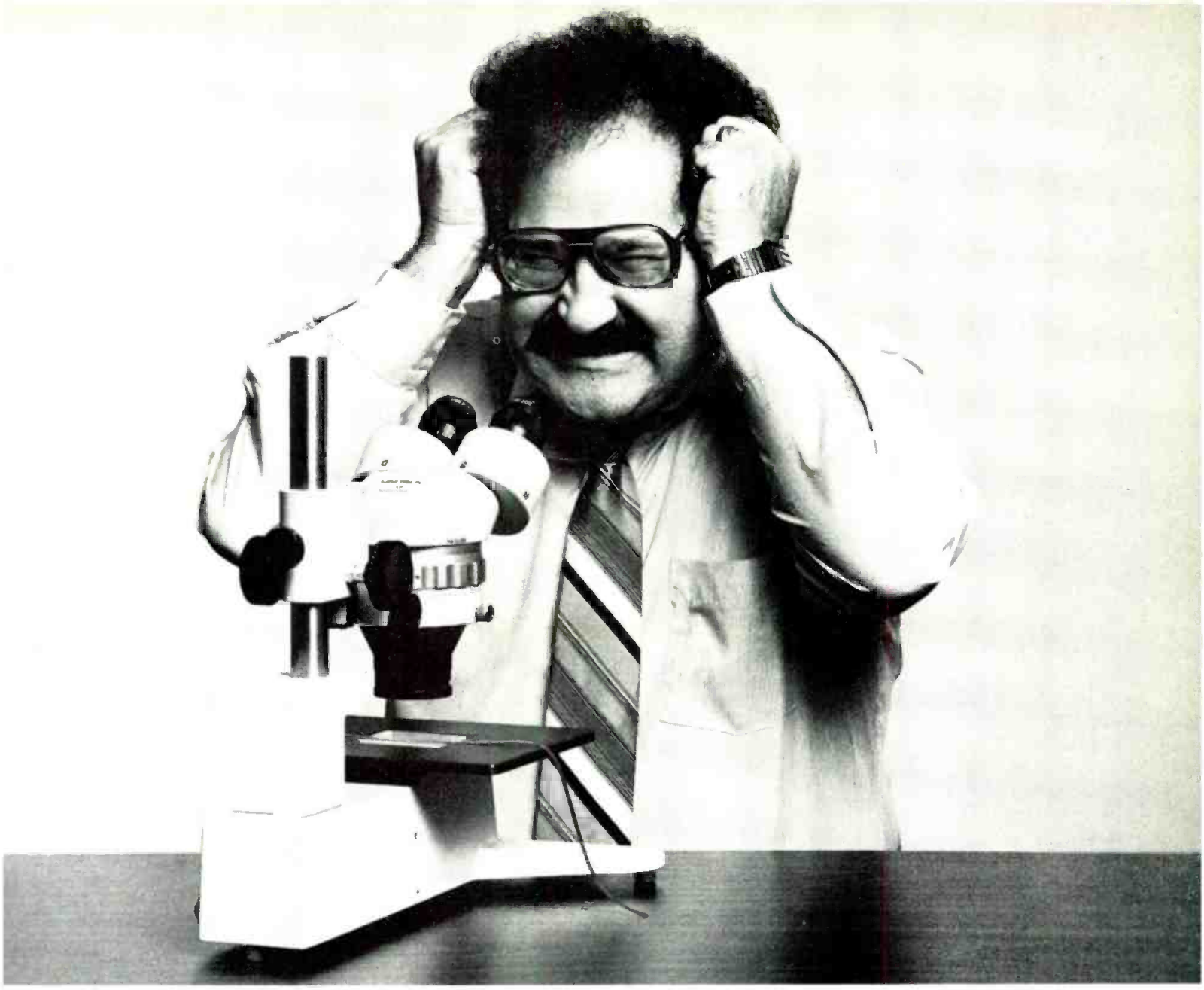
Although the "advance system" touch tone command is audible in the air signal, it generally takes the tone sensor less than half a second to decode the transmission and instruct the automation system to dump the RPU audio and move to the next event. This being the case, the tone would be unnoticed by most listeners. Using the loss-of-carrier squelch contacts on an RPU receiver to advance the automation system is a poor way of performing this function, since an objectionable noise burst will be heard before the audio is switched off by the controller.

Audio processing in RPU

Until recently, many RPU systems were constructed of "communications-grade" gear that worked fine for voice but terribly for anything else. The frequency response of a typical system would be (±3 dB) 300 Hz to 3 kHz, with a distortion figure of two percent or more. This is bad enough; but if a relay system consisting of two or more such units was needed for wide area coverage, the audio quality would go downhill rapidly. Often, communications gear will be on the low end of the frequency response window at the high limit, that is, down 3 dB at 3 kHz. If this signal is to be repeated two or three times, frequency response is then down 6 to 9 dB, and distortion becomes noticeable.

Some engineers have tried modifying the deemphasis stage of communications-grade receivers in order to





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Marti receivers for 450 MHz (top) and 160 MHz (bottom) in use at KRED/KPDQ.

flatten out the response. Older units that use a simple RC deemphasis circuit are easy to change and, so long as the noise figure does not get out of hand, performance can be improved substantially. Newer units, however, sometimes build the deemphasis circuit into the negative feedback loop of an audio amplifier stage, making modification of the rolloff curve a difficult proposition. In such a situation, increased high-frequency response can generally be achieved only at the expense of increased distortion and noise. This being the case, an external equalizer is the best solution to the problem. Equalization can, of course, only be used to the point at which the resultant noise becomes more objectionable than the poor high-frequency response. Do not expect frequency response beyond 5 kHz and perform the modifications to the receiver only. Moreover, boosting the high-frequency level into the transmitter will most likely invalidate the equipment's type acceptance and cause out-of-band emissions.

If a station has a two or more hop system using communications gear, equalize each step individually. Do not try to use just one equalizer at the end of the relay to correct for several bandwidth-limited stages. The demand will be too great on the equalizer and the resultant noise will be substantial. Depending on the design of the communications gear, it may not be possible to extend the frequency response much beyond 3 kHz because of IF filtering in the receiver. If this is the case, only a redesign of the system will give the desired result.

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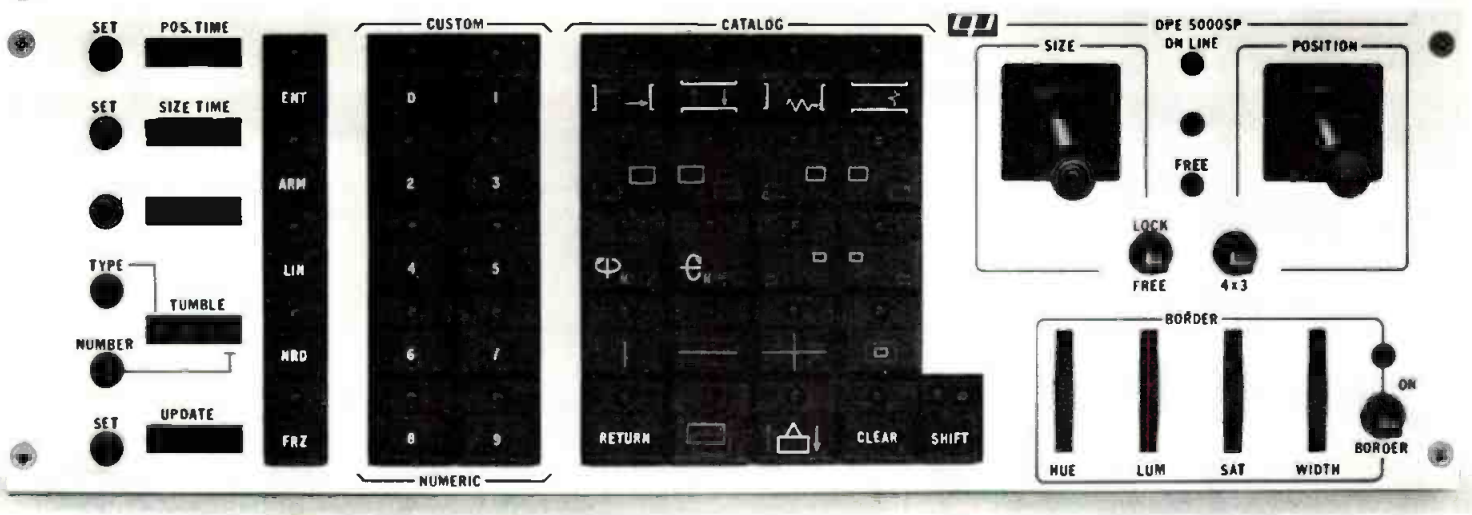

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Motorola Electronics line of two-way radio gear. While these units are ruggedly built and perform very well for point-to-point voice transmissions, their use in broadcasting has been difficult, until recently. Now, however. j-ngineering has come up with a conversion procedure that widens the audio frequency bandwidth of the various Motorola product lines (see *BM/E*, March 1982, p. 23). With the proper modifications, frequency response can be extended to 7.5 kHz or greater and still not exceed the 25 kHz bandwidth limit of an N-2 channel. The sensitivity figure of 0.85 μv is about half of the unmodified equipment sensitivity (0.5 μv or less). This decrease in quieting is due to the increased bandwidth required in the IF stages of the receiver in order to pass the higher audio frequencies. This drawback can be eliminated through the use of a galium arsinide FET preamplifier stage ahead of the receiver.

The conversion process is a complicated one that involves modification of both the transmitter and receiver. A shelved preemphasis circuit is used on the audio input to the transmitter, along with an 8 kHz low-pass filter to remove higher-frequency energy that could increase the transmitted bandwidth beyond the N-2 limits. A new IF section is installed in the receiver and crystal filters are changed to provide wider bandwidth and steeper slopes. Other modifications include a new deemphasis and audio preamplifier circuit card. The audio squelch and "private line" decoding circuits are also changed to accommodate the wider audio bandwidth.

Modificaton of transmitting equipment will, under FCC rules, invalidate the transmitter's type acceptance. The conversion process described here is acceptable to the Commission and is licensed by it following modification and completion of performance testing. Engineers should be cautioned, however, against making any modifications to transmitting gear on their own without careful study of the applicable FCC rules.

Generally, installation of an RPU system should be done with care. It makes little sense to purchase a new high-performance receiver-transmitter system and medium-gain yagi antennas for each end and then connect everything together with long runs of RG-58/U. Interconnection should be done with RG-8/U or half-inch foam transmission line of the shortest possible length. Half-inch foam line is generally not practical for use in anything other than a permanent installation, due to its size and rigidity. Use of a low-loss cable will insure that the entire system is operating at its maximum capacity.

In addition, consider mounting the transmitter and/or receiver at a base installation in a remote location if it will save a long cable run. To do so would, of course, require a system that can be remote-controlled. Until a few years ago, the usual method of doing a remote was to use a telco loop driven by a remote mixer board. These techniques are now disappearing fast as new technologies make possible coverage of events with a flexibility never before realized. **BM/E**

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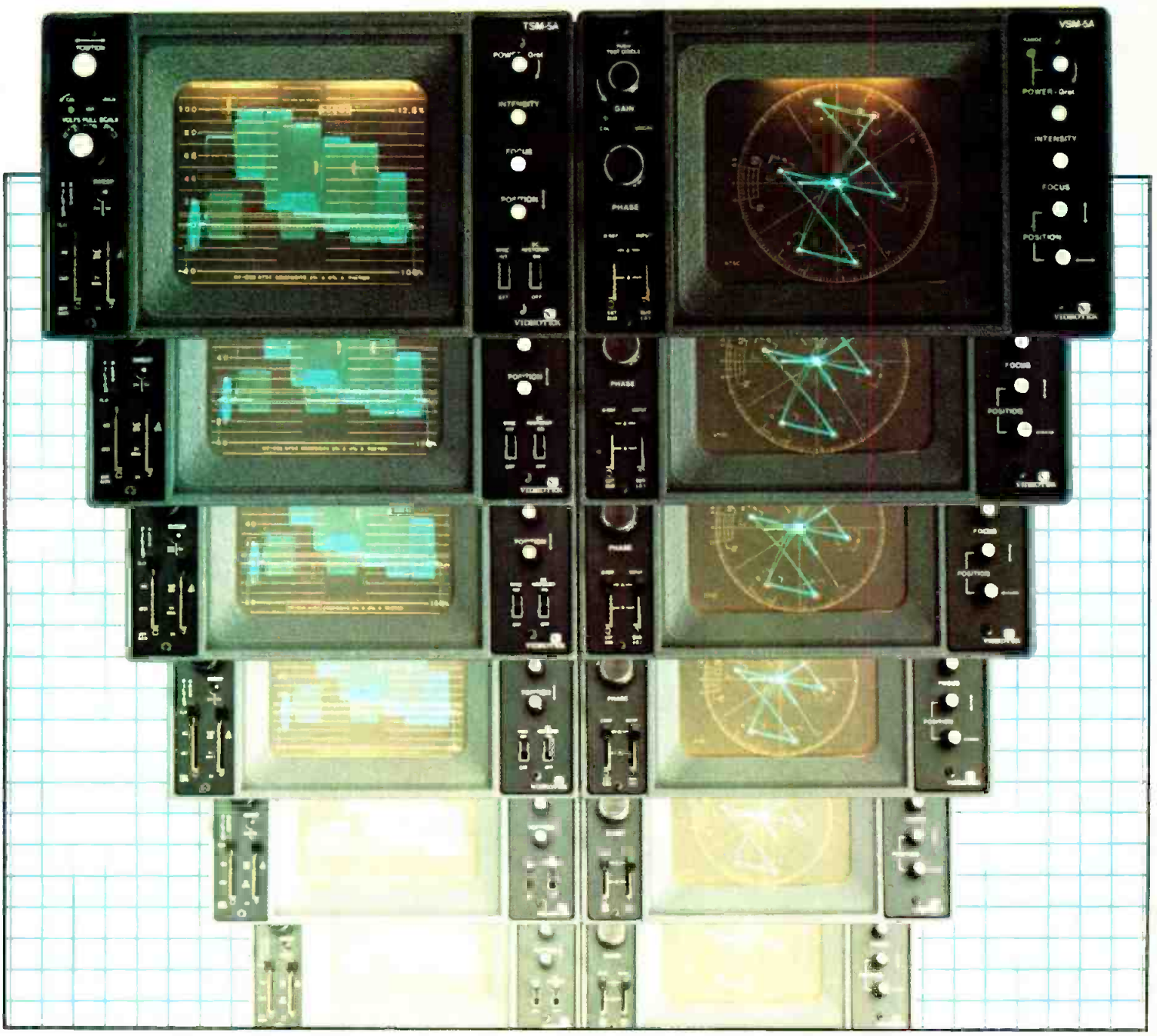

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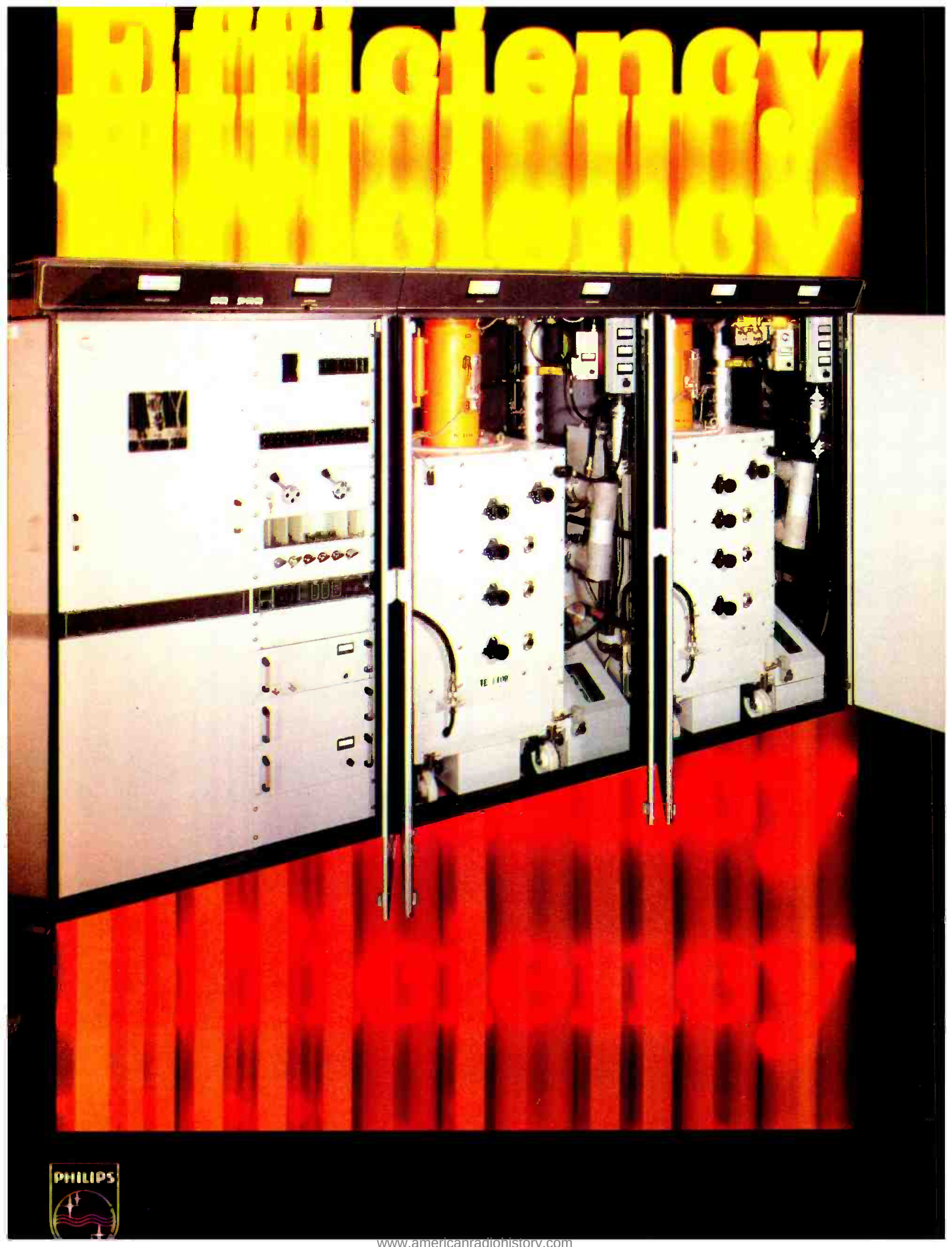

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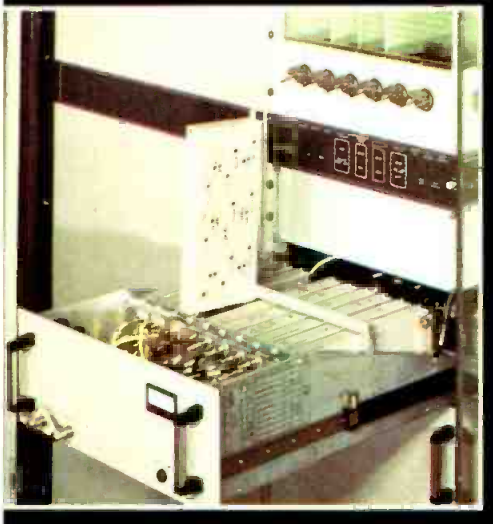

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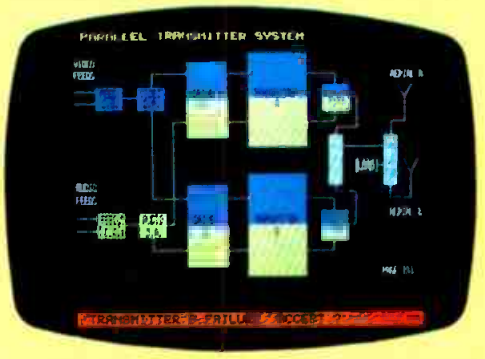

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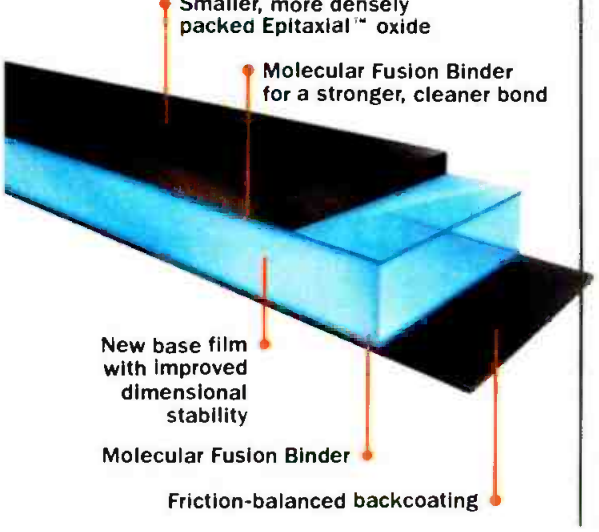

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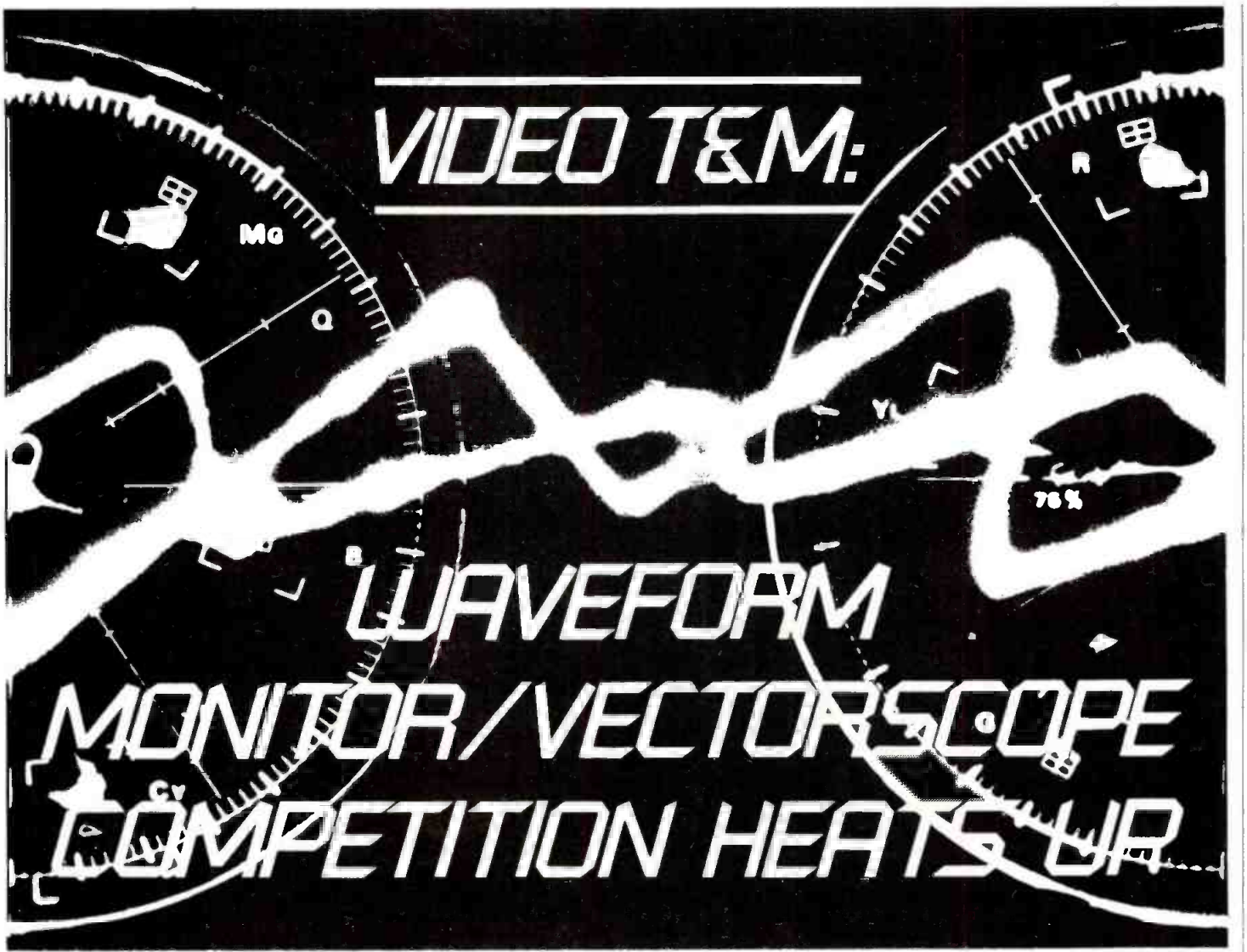


By Tim Wetmore
Associate Editor

As the television industry increases its use of complex equipment in the production chain, waveform monitors and vectorscopes with increased capabilities are required. The equation is simple: quality video production equals quality testing.

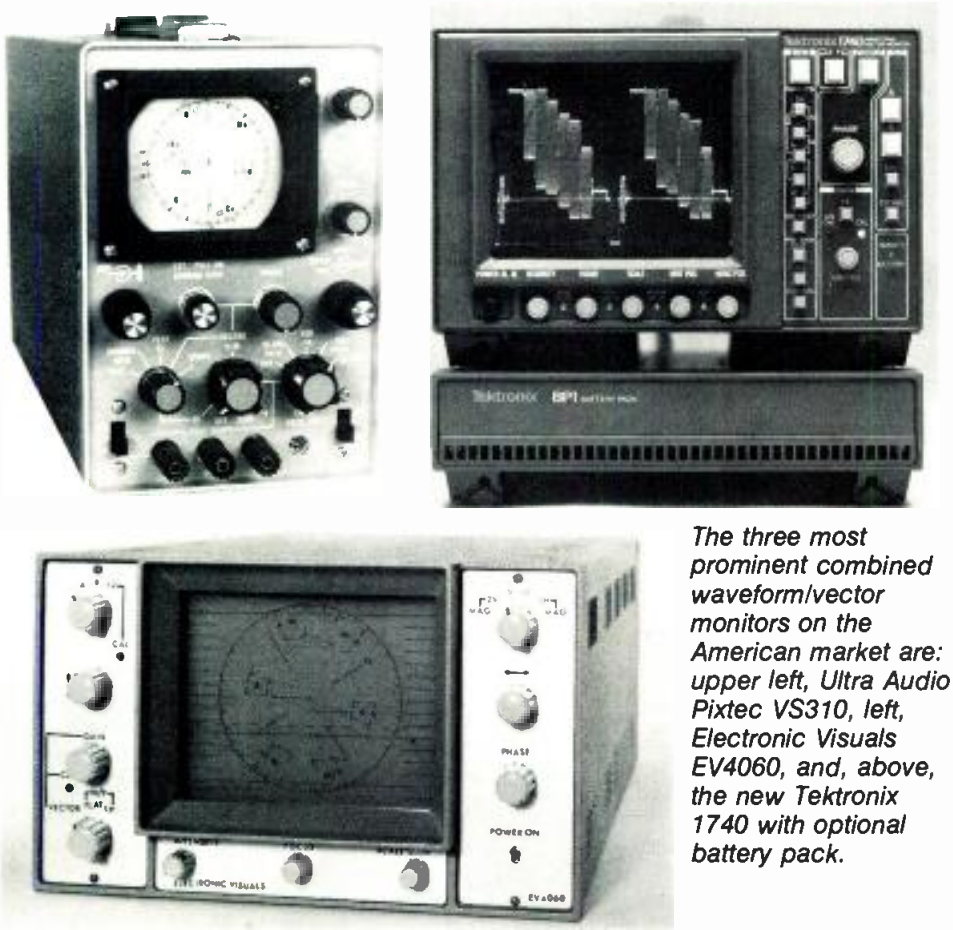
Over the last few years, as the demands by users have increased and the stakes in the game have climbed, competition in the once-dormant test and measurement department of waveform monitors/vectorscopes has heated up. Five years ago, if a station was looking to install these necessary devices in its VTR bridges, the shopping list of major manufacturers was a short one: Tektronix. Today, there are several major companies offering a wide range of vector and waveform monitoring; among them are Leader, Videotek, Philips, Hitachi, Lectrotech, and Ultra Audio.

It stands to reason that, as these companies compete for market share by lowering prices, increasing quality, and adding useful features to their instruments, the broadcaster will come out ahead as a result. But the question remains: Did the market open up because the television production departments were expanding their horizons and demanded better instrumentation, or was greater ambition in the production studio made possible by the availability of improved monitoring instruments?

It's the familiar chicken-or-the-egg question. The fact remains that, only within the last few years, more companies have introduced more quality models of waveform monitors and vectorscopes incorporating more numerous and applicable features. Since the test and measurement pie began to expand, manufacturers have been scrambling to get a bigger piece of the action. This has resulted in new product introductions and modifications several times per year. Nor are the innovations simply cosmetic makeovers. Typically, changes in waveform and vector monitoring have meant smaller size, greater accuracy, and more durability. While bringing the broadcaster a wider variety of features, these are instruments that are generally easier to operate as well as being more accurate.

The T&M marketplace forms

Presently, the large quantities of available models, offering equally



The three most prominent combined waveform/vector monitors on the American market are: upper left, Ultra Audio Pixtec VS310, left, Electronic Visuals EV4060, and, above, the new Tektronix 1740 with optional battery pack.

large numbers of features, are to be found in the midst of a broadcast industry that is expanding the quality of its dedicated equipment racks in the studio as well as improving the way in which it monitors its professional field production. As a result, the manufacturers are listening to the demands of the broadcaster and designing equipment that will meet almost any conceivable video production need.

Out of this atmosphere has come the introduction of several new models designed to meet special needs. One of the latest models introduced to fill a gap for the video engineer is the new 1740 combined waveform monitor/vectorscope, recently unveiled by Tektronix. Announced in September, the device not only combines the functions of the monitoring pair but also offers increased capability in the form of remote-control functions and dc power. Options are always a big part of any Tektronix offering, and the 1740 is no different. Dc capability is one option. A second option combines the dc power converter with a portable case and the BP1 battery pack as the power source. Also new with the 1740 is the ability to monitor a single line vertical interval signal.

Electronic Visuals has introduced a switchable waveform monitor/vectorscope combination unit, distributed in the U.S. by Broadcast Video Systems, which it hopes will attract those interested in trying to save money by not buying two separate instruments, as well as those who have limited rack space. This most obviously applies to small field crews and mobile production vans. Many of the other companies have considered the switchable instrument combining the vector and waveform monitor in one unit, but decided against it, the reason being that they felt most video engineers required the simultaneous viewing of both monitors.

Clearly, Tektronix thought differently. John Horn, product marketing manager at Tektronix, relates, "We perceived an increased awareness by broadcasters that monitoring was important for quality production and we observed a need for small but versatile measuring instruments to conform to the style of modern production techniques. Tektronix then designed the unit to allow more efficient use of rack space. In addition, the use of this type of quality signal monitoring has increased in even the most severe field conditions, right down to two-man production teams using a roll-around equipment cart. Yet the unit still retains the quality of more expensive separate monitors."

Typically, the 1740 will find applications in camera control units, VTR bridges, production switcher consoles, and any mobile production unit. The combination monitor is well-suited for on-location use, with the provision that there is no need for simultaneous viewing of vectors and waveforms.

The combining of the waveform and vector measuring functions into one device is unusual, but there is precedent for it. In fact, though it doesn't compete directly with Tektronix, Ultra Audio introduced its VS310, a three-in-one unit, three years ago. The unit is at the other end of the buying spectrum from Tek's 1740 and combines waveform, vector, and 4 MHz service oscilloscope functions into one box. It is a portable, rack-mountable, 11-pound unit, but offers no dc powering capability.

More companies enter market

Three years ago both Videotek and Hitachi revealed their vector and waveform products. Two years ago, at approximately the same time, both Leader Instruments and Philips Test & Measuring entered the arena. All of these companies introduced products at prices that were less than Tektronix's existing units in order to gain market share.

After coming on the scene two years ago with its LBO Series of waveform monitors and LVS Series of Vectorscopes, Leader has continued to cater to user demands and has added a number of innovations to its production instrumentation.

The standard model of its top waveform monitor is the LBO-5860A, a half-rack unit with line selection for VITS and VIRS observation. The standard unit can select lines 14 through 21 on field one or two. A recent incarnation of the device is the LBO-5860L, which can select lines seven though 21. This innovation was achieved because of feedback from the company's video customers, especially cable and satellite operators and manufacturers. An added benefit of the monitor is that, when a line is selected, one BNC cable connection will blank the vectorscope so that it will automatically display only the selected line.

Leader's lastest vectorscope is the LVS-5850B, which replaces the A version. The new unit combines a standard

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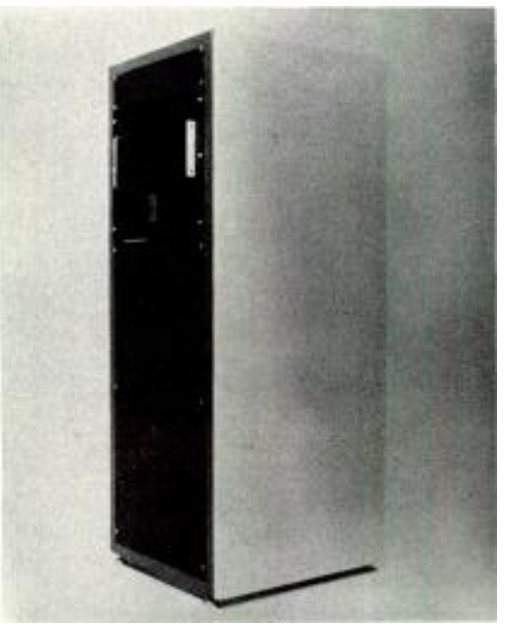

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internally etched graticule with electronically generated targets. John White, product marketing manager for Leader, feels such a feature has many advantages. "Vector readings are easier with the illuminated targets, even at a distance of 10 feet. The accuracy of a vectorscope depends on the proper alignment of the center dot, and the electronically generated targets move with the center dot, eliminating misalignment." Leader has also designed the pair to integrate easily with its LCG-400 NTSC pattern generator for checking many video signal parameters, including frequency response.

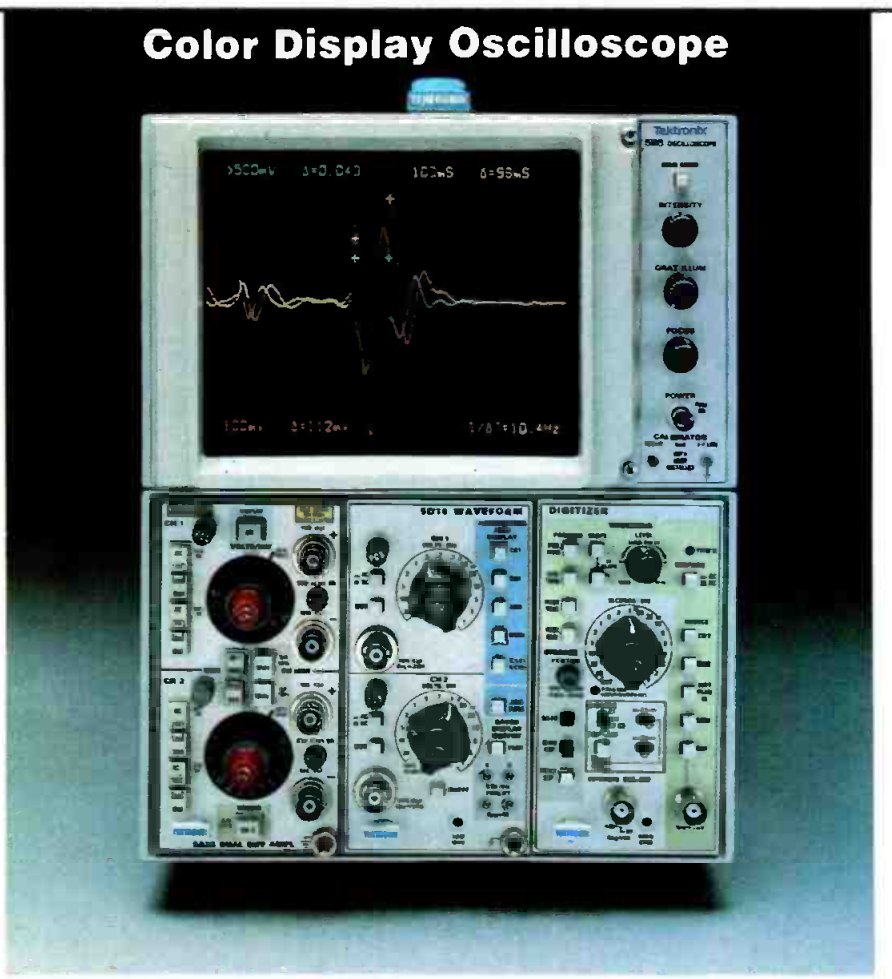
Also having designed its measuring instruments to integrate well with other available equipment, Videotek has not stood still since its entry into the market three years ago. When Videotek introduced its line of waveform monitors and vectorscopes, its intention was to introduce to the broadcast industry a quality product that was less expensive than existing units, while remaining at the high end of the performance scale. Videotek's development in instrumentation culminated this year in the debut of the VSM-5A vectorscope and the TSM-5A waveform monitor. The new vectorscope replaces the VSM-5 and has added several new features. An internal graticule CRT provides parallax-free observation and measurement of color vector displays, and the unit now comes with a removable nonglare contrast filter.

The VSM-5A takes up only 5.25 inches of vertical rack space and a half-rack space in width, allowing easy mounting of its companion unit, the TSM-5A waveform monitor. The TSM-5A is also a replacement model for its preceding unit and offers the advantage of the internal graticule CRT.

An additional feature of the TSM-5A is selectable A/B looping video inputs and a separate switched video output which may be connected to a vectorscope or picture monitor. A 1 V internal calibration signal may be switched on to verify vertical sensitivity calibration. In addition, a filter response switch allows selection of flat, IRE, chroma, or differential gain positions, with other front panel controls furnished for dc restoration and sync selection.

Videotek introduced this year an industry first: a dc-powered digital waveform monitor, the Delphi I. It was designed as a compact unit for measurement of sync and burst amplitude, peak luminance, setup level, and

Color Display Oscilloscope



One of the crucial elements required to ensure accuracy is an oscilloscope's readability. That is, how quickly and efficiently the information on the screen can be perceived by the user. In an attempt to solve this problem, Tektronix has introduced a high-reslution display it calls liquid crystal color shutter technology (LCCS). The technology is now available in the 5116 color display oscilloscope which, when hooked to the 5D10 waveform digitizer, becomes a color digital storage scope.

Because of user requirements, smaller size in instrumentation has been the trend in recent years. Due to this need for small, high-resolution displays, the application of color to oscilloscopes was impractical. Small, high-resolution displays are generally unavailable in shadow mask or penetration tube color technologies, except at prohibitive costs. Tektronix feels that by using the LCCS CRT system to create the color—blue-green (cyan), orange, and neutral (off-white)—the resolution remains equal to the system's CRT digitizer.

"In fact, because of the way the color shutter works, its resolution is limited only by CRT spot size," says John McCormick, color shutter engineering manager. With the use of only one electron gun, there is an inherent high-quality convergence, as well as good contrast in high ambient light, and ruggedness because neither complex shadow mask nor fragile high-voltage electron guns are used.

The color traces are obviously helpful in separating on-screen information and for emphasizing important data, enhancing pattern recognition, and in organization of information on the CRT. In past attempts at facilitating the scope-user interface, many techniques were tried, including highlighting, cursors, and alphanumeric readouts. The use of color is a logical progression in this trend toward on-screen data differentiation. In the 5116, channel one data is blue-green and channel two data is orange. Alphanumeric readouts are color-coded by channel, while X-Y and time measurements appear in neutral.

The colors representing signal information were chosen for ease of operator use. The particular colors in use on the 5116 were selected because they are spectrally separated enough to be distinguishable, yet close enough to minimize the eye's need to refocus. The display's black background provides maximum visual contrast.

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VITS. Measurements are selected by front panel pushbutton and are read on an LCD display calibrated in IRE units with a standard one-volt input signal. The unit is powered by two 9 V rechargeable nicad batteries that come mounted inside the unit. The batteries provide about five hours' continuous use before recharging is required and the unit can be ac-powered via the 9 V charger.

Different marketing for sales

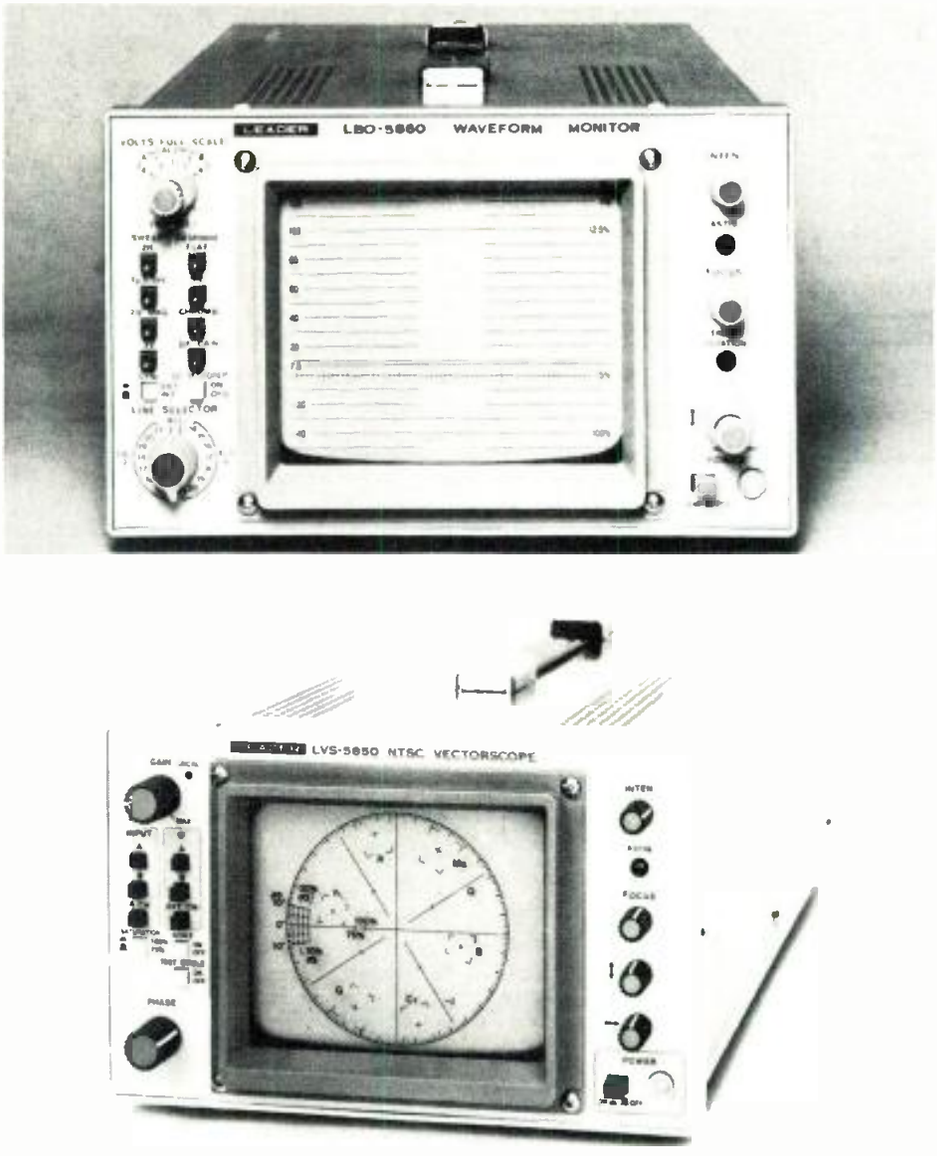
Both Videotek and Leader offer a catalog of specialized test instruments with waveform monitors and vectorscopes making up an important part of that inventory. Videotek specializes in a few instruments, while Leader, through its parent Japanese company, inundates the broadcaster with over 100 pieces of test and measurement equipment.

Hitachi, on the other hand, offers the waveform/vector test pair out of its broadcast and professional divisions, while selling its oscilloscopes separately in the test & measurement division. This marketing approach leads to the realization that the company intends to offer its waveform monitors and vectorscopes as part of an overall video package; it offers the monitors, in fact, as adjuncts to its cameras and VTRs. The Hitachi instruments are indeed sold separately from each other and outside of the VTR bridge, though they are also offered in the package deal, and can be purchased through the broadcast division.

The latest vectorscope from Hitachi is the V089, which can be purchased with or without a battery pack. The V089 and its match, the V099 waveform monitor, are the only units of broadcast quality which fit three across a rack. Internal or external sync and autofocus are standard features, as is the ability for simultaneous reading of the displayed wave on the monitor.

The unit that accompanies the V089 is the V099 waveform monitor, an IRE unit graticule device with dc restorer. The V099 has autofocus and internal/external sync and a built-in 1 V calibration signal. A gain increase of more than five times is possible with this unit, which, because of its size and dc power capability, is particularly suited for remote field productions.

Hitachi found its niche by designing very compact units offered along with its other video equipment, trying for the advantage in cramped space conditions. This is particularly applicable in small mobile vans or when more instruments must be fitted into a studio rack.



Leader's test & measurement pair, the LBO-5860 and LVS-5850, both offer illuminated graticule.

Tektronix, of course, has been very solid with broadcasters both in the studio and in the field. For applications where the 1740 is not suitable, with production requirements demanding readings of both units simultaneously, Tektronix offers an array of waveform/vectorscopes. For the instrument pair that demonstrates highest performance, the company offers the 1480R vectorscope and 520A waveform monitor to top the list. Spreading its offerings throughout the marketplace spectrum, Tektronix offers a more economical half-rack pair, the 528A waveform monitor and 1420 vectorscope.

Concentrating more on the studio and in other segments of the electronic industry, Philips Test & Measuring Instruments manufactures for the professional broadcaster two models for video signal monitoring: the PM 5565 waveform monitor and the PM 5567 vectorscope. Features that Philips developed in its instruments to capture a certain sector of the marketplace are numerous. For the waveform monitor, developments include illuminated graticules for ease of reading mesurements in variable ambient light environments, efficient filters that allow for the display of the luminance (without chroma), the chrominance signal alone, and chroma amplified for difference gain measurements. Clamping makes available two dc-restoration time constants, one permitting superimposed hum to be fully displayed, the other suppressing it heavily. The PM 5565 also offers a parade display with an internal staircase generator, also permitting the use of an external staircase signal for display of RGB signals sequentially as an aid in camera and telecine setup.

Features incorporated into the PM 5567 vectorscope include the availability of two video inputs, both with two

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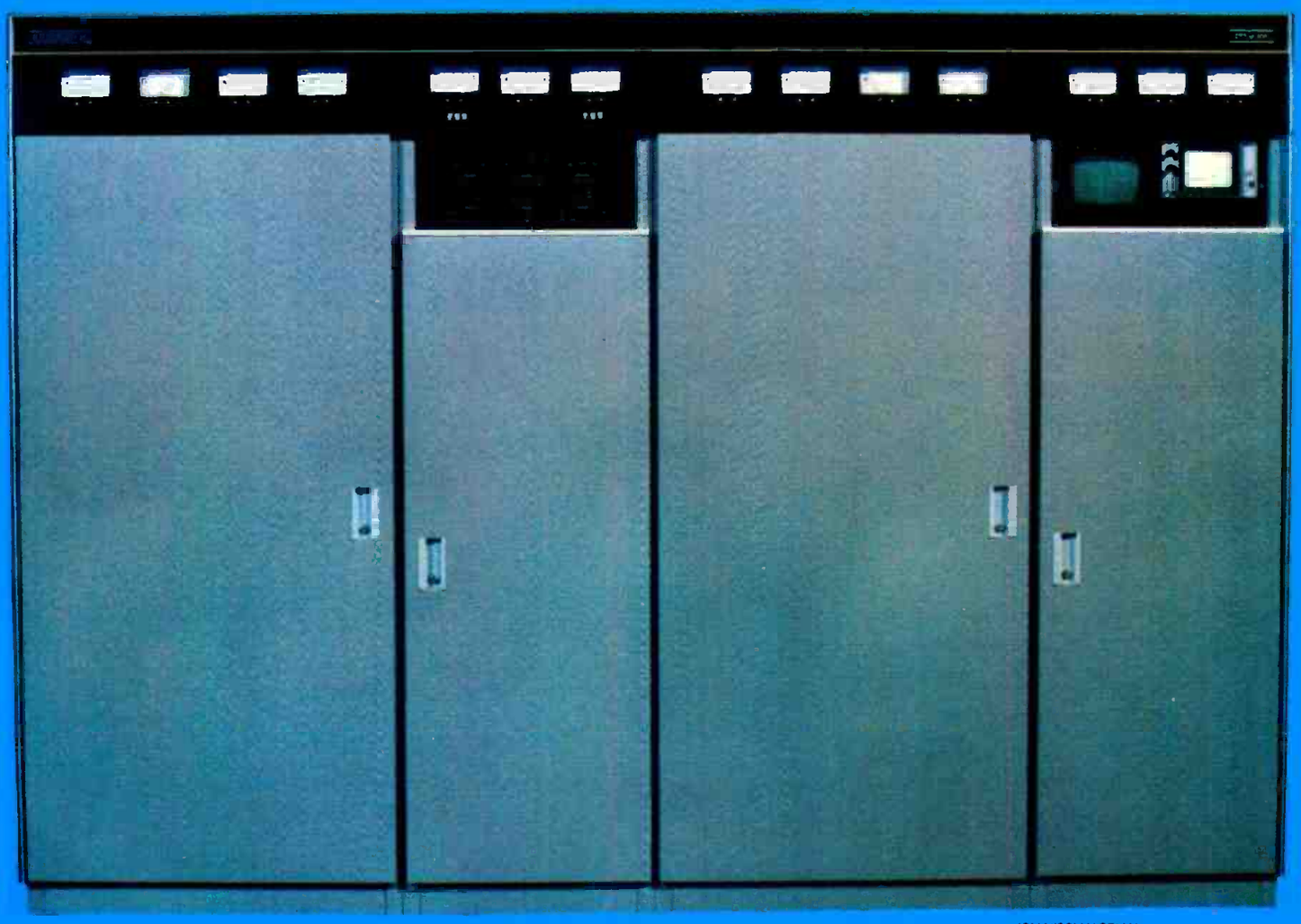

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Videotek has complemented its waveform monitor/vectorscope pair with a depowered digital waveform monitor, the Delphi I (left). At right is the side-by-side PM 5567 vectorscope and PM 5565 waveform monitor from Philips T&M.

calibrated sensitivities plus a knob for variable sensitivity. All video inputs are of the high-impedance, looped-through type. Like most paired units, the Philips instruments will synchronize on mixed sync and color subcarrier, but will also lock to the black burst or any other composite signal. Phase control allows for continuous and infinite phase shift for accurate adjustment. Both instruments consume only 15 W each without graticule illumination, 25 W with illumination.

Such features are used mainly as a trump card. If any manufacturer can offer equal quality and at the same price as a competitor, while including more features that have a valid application for the engineer, then it has an advantage. So each equipment company strives to find its place in the sun, and as this occurs the competition begins to get hot. Does the manufacturer make higher-quality devices and charge more, thus setting himself apart? Should he make a quality instrument, but charge a little less, carving out a sector of the market in that way? Is it better to provide the user with more and more features, distinguishing himself as the one who provides those items that make one's work easier while still upholding broadcast standards?

The questions go on, and the answers concerning waveform monitors and vectorscopes can be found with each new product announcement. One thing is sure: as the struggle for market share continues, the quality will continue to spiral, the prices will continue to plummet, and broadcasters can stand back and enjoy the heat in the kitchen. **BM/E**

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ABC "OLYMPICS WINTER GAMES

A former New York City warehouse was the unlikely setting for trial runs of the various audio, video, and transmission systems that ABC will use in Sarajevo, Yugoslavia, this winter to provide 65 hours of Winter Olympic Games coverage for the U.S. audience. "Olympics Village," as it is dubbed by ABC, is an exact model of the equipment setup planned for the Sarajevo broadcast center. The entire facility was fully checked out in New York, disassembled wire by wire, then shipped overseas for reassembly in Yugoslavia.

Tests were completed by late August, and the equipment, including one of ABC's huge tape/camera truck combinations, was on its way by the end of September. The full setup in Yugoslavia will take less than a month. Yugoslavia TV, through Radio-Televizija Sarajevo, will also televise the event.

As reported in *BM/E* in April, ABC plans major innovations in Olympics coverage next year, both for the Summer and the Winter Games. An area of special interest will be on-air graphics. For the Winter Games, ABC will use five Dubner CBG-2s, two Chyron IVs, a four-channel Ampex ADO with channel combiner, an MCI/Quantel Paint Box with animation program, a Quantel Mirage 3D graphics system, and extensive still storage capability, probably including a new Abekas VSP still store.

Extensive work has already been done by ABC's Olympics Graphics Unit under the direction of Roger Goodman, on animation sequences to be used during the coverage, particularly those designed to run on the Dubners, which have also been programmed to create some 3D effects. A series of "technical animation" sequences will show, for example, a cutaway view of a downhill ski slope, then spin around to show an overhead.

PHOTO COURTESY OF ABC

Full-scale "war games" setup for Broadcast Center in Sarajevo. ABC set up shop in a former New York City warehouse.

Many of these technical programs have been designed to interface directly with an H-P computer hooked to the official electronic scoreboards, giving the Dubner an Atari-like computer graphics display working with official athletic data.

ABC BO&E president Julie Barnathan stands in front of main monitor bank. Producer Roone Arledge will sit to his right.

The graphics systems are interfaced with the main on-air operation through the PreSet (emergency backup) control room, where much of the videotaped Olympics material will be preassembled and switched, along with feeds from six mobile ENG units. The PreSet room, in turn, feeds the main air control room's 22-input switcher through three dedicated inputs.

Upper floors of the Sarajevo broadcast center are devoted to post-production. A total of 26 VTRs (primarily Ampex VPR-3s, six in PAL) will be used. There will be six three-machine video editing cubicles, each with a new ISC editing controller and a GVG 1600 IL switcher. Included in each suite is a new Graham-Patten audio switcher that takes its cues directly from the editing system to provide audio cuts and fades that automatically match the video transitions. Other audio capabilities at the center include two audio playback rooms.

Videotape in post-production will be the new Ampex 196 one-inch tape, Ampex being the official supplier of

VILLAGE" IN TRIAL RUN

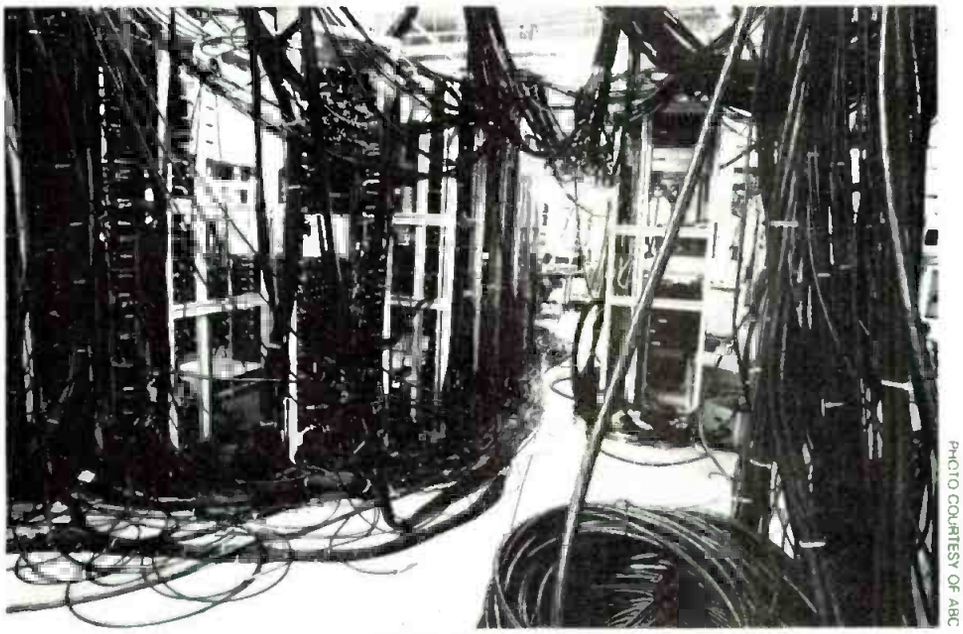

PHOTO COURTESY OF ABC

Some of the miles of pre-cut cable for Yugoslavia, Burbank, or final end-user destinations. Each cable is computer-coded for head and tail end

PHOTO COURTESY OF ABC

ISC editors and Ampex VPR-3s set up for "war games" trial run. Edit bays also contain Grass Valley switchers and Graham-Patten audio faders.

tape to the Olympics.

Master control will also contain an impressive array of equipment, including two routing switchers—a 100x100 system with video plus three levels of audio for NTSC, and a 50x50 system for PAL. Standards converters are being leased rather than bought.

One technique of particular significance in master control, and also throughout the entire operation, is the computerized identification of each and every cable. All wires were precut during the Olympic Village assembly, and each was identified as to its destination in Sarajevo. Los Angeles for the Summer Olympics, or the national political conventions to which ABC will travel after the Summer Games. The computer-created wiring plot also accounted for the final destination of the equipment in ABC facilities around the country. Both ends of the cable were identified with a computer-generated tag that instantly identifies both ends of the cable—in which area of the broadcast center it belongs and in which equipment rack.

Also of significance in the overall design of the operation is that equipment was purchased and configured for the final end users—ABC facilities which will eventually take delivery of the equipment after the 1984 Olympics and political conventions. Thus, the rather "fancy" consoles and desks of the main control room were designed and built at ABC, Burbank, where they will become part of the station's new broadcast center, serving both the Summer Olympics and everyday operations thereafter. And there are two different heights of equipment racks in the MC area—one destined eventually for studio operation in Burbank, the other for installation in one of ABC's mobile teleproduction units.

In the field, Yugoslavian TV (JRT) will be providing events coverage with 72 studio cameras and 20 hand-helds (70 percent of the cameras are fitted with Angenieux lenses) and 11 mobile units. ABC will supplement with 41 studio cameras and 22 hand-helds and nine mobile units (including one of its own tape/camera truck combos being shipped over from the U.S.).

These are being used to augment coverage of events being carried by JRT, to provide complete unilateral coverage of ice hockey and figure skating, and to give American viewers top-to-bottom coverage of skiing events, since JRT will only cover the bottom portion of the slopes. **BM/E**

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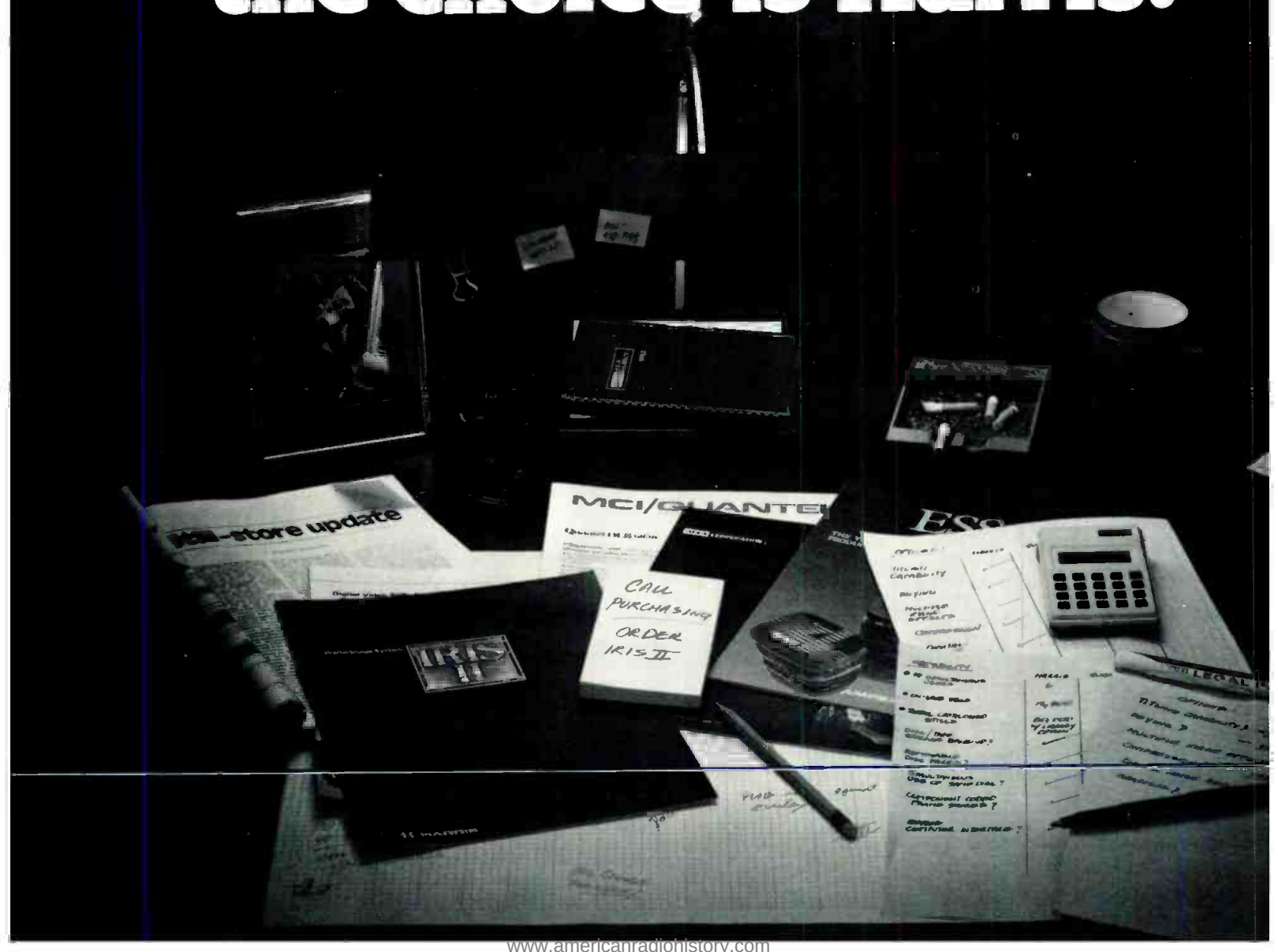

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production facility report PART 2

THE POST GROUP

By Robert Rivlin
Editor

It has been the best of times and the worst of times for the teleproduction facilities industry. The best, as witnessed by the proliferation of new facilities, because video post-production has been a major beneficiary of the increasing need for programming demanded by cable and other new media; even programming derived from already-produced material needs new post-production, titling, effects, and so forth. The boom has also come because more and more producers who were once post-producing film-originated material on film have now discovered that tape is both cost-effective and faster.

But it has also been the worst of times, as witnessed by the decreasing profit margin of many of the larger facilities companies. The failure of productions such as *CBS Cable* and much of *Cable Health Network*. Bad economic times which have meant the production of far fewer new TV commercials and long-running campaigns subsitituted in their place. And the trend for many of the larger network productions to be taken back and edited in-house. All have added their share of misery.

It takes a rare combination of raw talent, a little luck, and considerable sophistication to survive within this climate. But The Post Group in Los Angeles, considered one of the country's largest and most influential post-production facilities, has managed not only to stay alive but to grow. Later this year, in fact, construction will begin on a new wing for Post Group's existing two-story building, enabling the addition of two new editing bays, an audio sweetening area, and also a graphics room to house the brand-new Bosch FGS-4000 graphics system which is scheduled for delivery later this month—the very first installation.

The economics fueling this growth are quite simply the number of booking days which The Post Group manages to amass. The facility is booked for an average of 18 hours a day during weekdays and another 10 hours on weekends. Adding duplication time into the formal, daily booking comes closer to 20 hours. Some 85 percent of the facility's work is designed for broadcast in some form—TV commercials, network programming, and cable productions. The rest, of course, is for corporate and industrial clients, sales presentations, and so forth. Recent objects have incuded 130 half-hour syndicated programs for Johnny Carson Productions—*Carson's Comedy Classics;* "The 21st Anniversary Tonight Show Special" which aired in early October; Hillier Productions' *Epcot Magazine* for the Disney cable channel, and many others.

Leading-edge technology

"Our company philosophy has always been to stay on the leading edge of the technology," explains Fred Rheinstein, The Post Group president. This extends back to the very foundation of the company itself in 1975 when Rheinstein, who had been at NBC for 20 years primarily as a news producer/director/writer, found his production company (Lirol) faced with a massive tape editing job for a PBS series it was producing.

"A friendly salesman from CMX told us we could make a fortune by doing all our off-line editing at our own facility using the new CMX-50," Rheinstein recalls. "He also said that the 50 would require absolutely no technical support—that even non-technical people like us could run it. What's more, he virtually guaranteed us a six-month exclusive on the system

"We've always been on the leading edge of technology," says the president of Hollywood's The Post Group. "But it's more than just having the latest gimmicks."

The Post Group chief engineer Rich Thorne creates effect on Ampex ADO interfaced with CMX 340X editor and Grass Valley switcher.

in our area, based on the fact that CMX couldn't possibly build another machine in less time.

"We were wrong on several counts, not the least of which was that the salesman left CMX, took delivery of a CMX-50, and set up a competitive business to ours within four weks after we got our system. At that point, however, we were committed. We set ourselves up as Off-Line, Inc. in Burbank. And a short while later, as the business began to grow, we bought one of the very first CMX-340s to be built."

Another forward-looking step was Rheinstein's early realization that the industry was going to go one-inch. He bought four of the very first Sony BVH-1000s (still in the Omega format), and, while the CMX-50 was doing off-line editing on *Here's Hollywood*, Rheinstein and company would shoot during the day with the 1000s, then carry all 400 lbs. of them up a narrow flight of stairs back to the studio where they would edit with them at night. The decks are still working today, modified, of course, to the C format once it had been standarized. The acquisition of one-inch decks was a turning point for The Post Group. In 1979 it moved to its current 12,000 square foot building right below Sunset and Vine. And it has been growing ever since, with the new 2000 square foot addition containing two suites, a new machine control room, and a graphics area on the first floor, and an audio sweetening room on the second, to be completed by January or February.

"But being competitive in this business is not always just having the latest gimmick or system," cautions Rheinstein. "Over the years we've had many of the very latest editors in here—the Mach One; The ill-fated Datatron 2000 that was never built but was in here being demonstrated for several months; the BVE-5000. But we've settled down to CMX because it is a standard, and we've been keeping up with their newer

6139 SUPERB QUALITY

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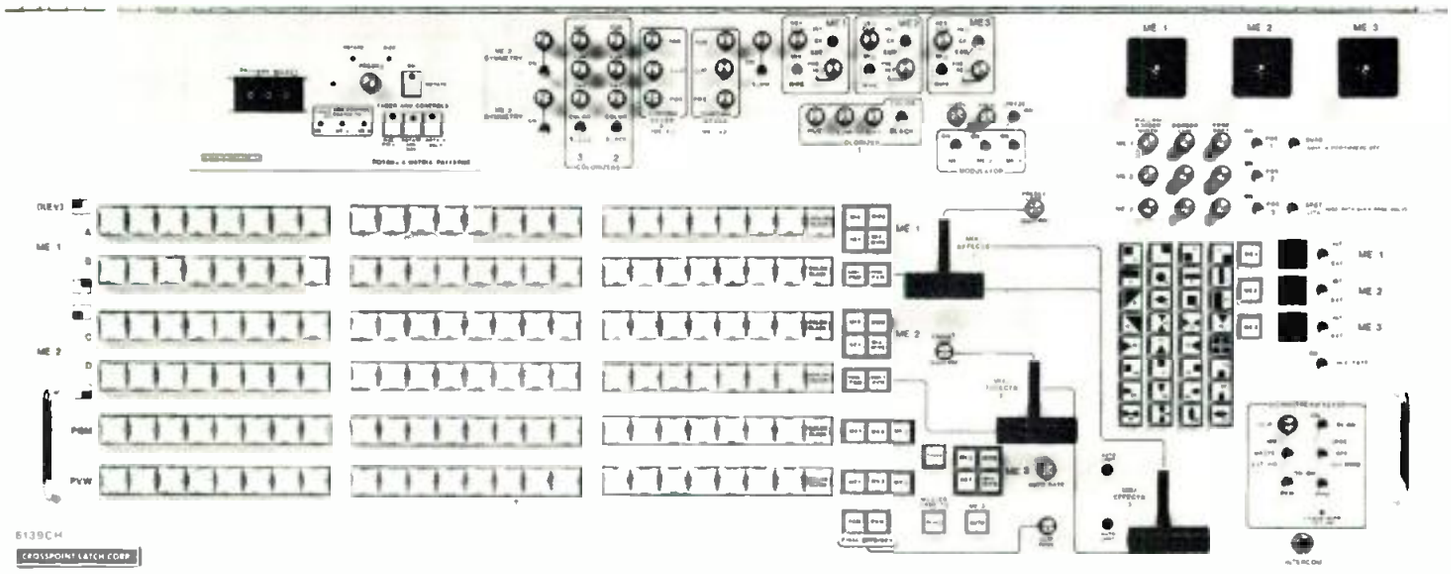

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POST PRODUCTION

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THE POST GROUP

programs. We have one of their new 3400s and we're going to the 3400+ as soon as it's out."

A prime reason for going the all-CMX route, according to Rheinstein, is that the facility is often rented out as a bare-bones package to a network which will then bring in its own editors and engineering staff. The CMX is familiar to almost everyone in the businss, so they can use the facility with no further training.

Practical considerations

"We've never bought anything just because it's new," claims Rheinstein. "But we are definitely on the cutting edge of technology." Nonetheless, there are practical considerations when choosing equipment, too. For example, when selecting an art/paint system, Rheinstein was visiting The Weather Center in Atlanta where he met an old friend who "smuggled" him into the back room. There, the artists who were working on both Aurora and Paint Box systems suggested that if it was speed and quick turnaround he was after, he should go with the Aurora whereas if he was after image quality he should select the MCI/Quantel system. He went with Aurora, realizing that at some point he might need to invest in the Paint Box as well.

A similar set of considerations led to the selection of the Bosch 3D graphics system. Although The Post Group has decided to go with this system first, "we are keeping watchful eye on how TAV [the Hollywood facility which has just taken delivery of the Mirage system] will do with it," notes Rheinstein. "We know there are things Mirage can do that won't be possible on the Bosch system, and we can see a strong need for both." The Post Group has scheduled its delivery of Mirage for next February. Also due for delivery soon is a Multimode Graphics Module (MGM) package from Chyron, which will allow for animation, and drawing tablet entry of graphics and logos.

These new pieces of equipment supplement an Aurora art/paint system which has been in place for almost a year now, innumerable Chyrons, a four-channel ADO, and several other pieces of state of the art graphics equipment.

Emphasis on graphics

Graphics at The Post Group is obviously a major concern, and falls within

the province of Linda Rheinstein who also heads her own company, Autographics, for many years one of the major innovators when it comes to use of the Chyrons for other than by-the-books lower third IDs. As director of special projects for the Post Group, she is responsible for such ongoing work as the effects for *Jennifer Slept Here*, a new series on NBC which began airing in October that is calling up the talents of the entire graphics repertory of the company.

"We married the Aurora and the ADO together for some of the effects," claims Rheinstein, "and the Chyron, ADO and Grass Valley 300 switcher for some others." Jennifer is a ghost, and Rheinstein and Rich Thorne, senior VP in charge of engineering, are adding ghostly effects including a cloud-like, nebulous image which was originally created on the Aurora, then fed to the Grass Valley switcher, ADO, and DVE to add perspective plus decay to give it a softer look. The 300 was used to collect all the perspective areas and make it one unit. These are "brand-new, never-before-seen video effects" claims Rheinstein, although they are as realistic and "non-glitzy" as possible.

"Most people use the ADO in its one-, two-, or three-channel version and the number of four-channel uses is pretty limited," observes Thorne, adding that Post Group will acquire an Ampex channel combiner as soon as it is available. The three-channel configuration is generally used to build either cubes or "different-shaped cubes." The ADOs, like other pieces of grahics equipment, can be patched into any of the editing bays. Prices, according to VP of Marketing Meryl Lippman, are $300/hour for each channel of ADO, added to the basic $410/hour for basic three-machine editing. (DVE and Quantel effects cost $200/hour, Chyron $100, and Aurora $300 including an artist.)

One highly innovative effect is the use of ADO to achieve curved effects with ADO. "It's very limited at this point," says Thorne. "And nothing like the Mirage. It only has five or six different ways it can curve." But one of its most effective uses is with the "traveling panels" effect in which one image slides behind or in front of another; with the new program, the panels can have curved edges and can move in curved patterns. "I don't think people will ever really get tired of this kind of effect," says Thorne, "because the ADO is really a very smooth, very versatile tool. So while people probably will tire of flying panels, we're not really into flying panels here. We put our emphasis on the creative, the different."

ADO system at The Post Group can be configured for single-channel or multiple-channel operation.

Rheinstein describes an innovative use of Aurora in the creation of effects for the game show *Press Your Luck*

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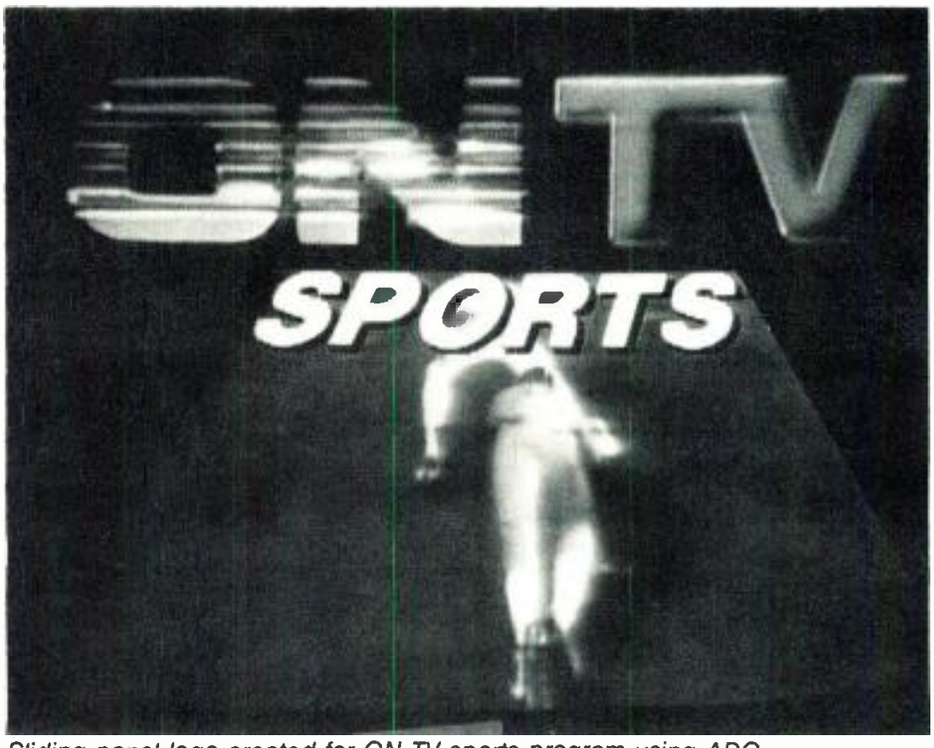
(CBS). Using the Aurora's looping animation program, a character ("Whamee") moves across the screen and adds new elements to the game—such as jumping on his pogo stick and sticking out his tongue. The same kind of effect was used on *The Half-hour Comedy Hour* this summer.

As mentioned, once construction on the new wing is completed, graphics will have its own area at the Post Group where the Aurora, Bosch, possibly the Mirage, the MGM Chyrons, and various other pieces of equipment will be tied together into the electronic graphics center of the future, then fed to an editing bay where the Grass Valley 300/DVE and ADO effects can be added in—a place where a producer can put together an entire graphics package for a show or a station ID or a special in one area. But even now, the graphics end of the business is somewhat separate, and a client is free to use the Aurora or ADOs without necessarily editing the tape at the Post Group.

"We employ 74 people—including 15 engineers, 13 staff editors, one-and-a-half Chyron operators, four people who are familiar with the Aurora, and 22 tape operators," says Fred Rheinstein. "And by some standards, that's a pretty large company. But our philosophy is that we want to operate like a small company, and set up separate units if we ever get so big we begin to lose touch with what's going on. This way everyone can be as creative as they want. And the client ends up with the most 'bang for the buck.'"



Sliding panel logo created for ON-TV sports program using ADO.

Facility setup

Thorne's basic design for the facility is a "wheel and spoke" affair in which the central part of the building acts as the central distribution point for all the shared pieces of equipment—the four ADOs, the MCI/Quantel DPEs, the Chyrons, the FGS and Mirage when they arrive, the ADDA, and so on. A key feature here is the 100x100 Utah Scientific routing switcher which has three levels of audio as well as video. Arriving shortly will be a new Grass Valley 16x32 routing switcher with video only, to be used just to distribute signals to the various pieces of graphics equipment. "We're trying to eliminate as much manual patching as possible," observes Thorne.

Also located in this centralized area are the various sync and distribution systems. Sync generators and sync distribution is carried out with Leitch equipment. Most of the DAs are Grass Valley products.

Leading away from the central area on both sides is the log machine room, with its complement of some 25 one-inch VTRs (mostly Sony models, but also with Ampex VPRs for clients such as ABC who want to be fully compatible with their internal operations, and a Bosch B format deck); 12 BVU-800 and 820 ¾-inch decks (mostly for ¾-to-one-inch editing, a technique which Post Group was one of the first to initiate when it designed its own editor interfaces instead of waiting for CMX); and even several RCA M-format decks for clients who want to go half-inch-to-one-inch. Several Bosch Lineplex decks have also been ordered.

Adjacent to the machine room are the various edit bays—five fully-equipped on-line suites with either Grass Valley 1600s or 1680s, or a GVG 300. Some are set up with three VTRs, some with four, although the CMXs can handle up to seven playback machines and one record. When extra playbacks are needed, operators turn to "spare" VTRs located throughout the machine room and the rest of the plant which can be quickly routed to any of the edit bays.

The film-to-tape operation is located in a separate area, using a Rank Cintel flying spot scanner telecine. A recent model, the Rank has the variable speed control introduced just last year, and Post Group also has a Lexicon digital audio compressor/expander to allow the soundtrack to keep pace with the image. Scene-by-scene color correction is offered through an RCA system. And, to make its services even more valuable, Post Group has an Ultimatte in the film-to-tape room.

Also of great importance to Post Group is its large production facility across the street, The Production Group, founded some 17 months ago. The Post Group itself owns the equipment at the two stages, one 2600 square feet, the other 600 square feet. Equipment includes seven RCA TK-45 cameras and two control rooms, one with a Vital VIX switcher, the other with a Central Dynamics CD-480-8. And the Post Group also provides engineering services, especially since the stages and control rooms are directly wired into The Post Group facilities through an underground trench which Thorne had one of the local cable companies put in. In this way, various pieces of equipment used frequently during production—such as digital effects, the ADDA, and so forth—can be patched through to the stages as easily as they are to edit bays. The same is true of VTRs.

Despite the shared resources, however, The Production Group runs as a

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totally separate company, according to Fred Rheinstein. "We will, of course, package production and post-production services together if the client wants," says Lippman. "But the idea is that if a client just wants to shoot on the stage, then edit elsewhere, that's fine. Although we're a full-service facility, we don't want people to feel intimidated."

The only weak spot in The Post Group operation at this point seems to be audio, and the facility offers only very limited sweetening and mixing capabilities through Quantum mixers located in the edit bays. All this is about to change, however, since the new building's second floor will house an extensive sound mixing facility. It isn't far enough along yet to be able to describe in detail, but Thorne's plans are for a large console, at least 32 x 32, multitrack ATRs which can be interfaced with the CMX, "and a truckload of audio processing gear."

Human considerations

Ultimately, of course, it is human considerations which make or break an operation like this. On the client side, Lippman stresses that the facility becomes involved in projects from the beginning. "We sit down with a client at the earliest possible moment," she observes, "and try to find the best way to go with the project. If they're going to use special effects in post-production, we like to have a look at the storyboards even before they begin shooting, and suggest ways that will make the post process go smoother. In some cases, we will even send our people on shoots to make sure it's being done right for post.

"We also like our clients and editors to get to know each other and the projects in advance, so before the editing actually gets underway, we'll arrange for the client and editor to sit down together and talk things over."

Even beyond this, however, there is a company-wide dedication to maximizing the creative potential of everyone involved. "One of the most important factors in The Post Group's growth," concludes Fred Rheinstein, "has been our policy of internal promotion. People start out here working in the vault, getting used to the discipline of handling tapes. We then let them work as assistant editors—in the dubbing operation and that sort of thing. We work them up to apprentice loaders and then video operators. This way they get their hands-on training with the equipment and begin to meet people. Then they can become junior editors and finally full-fledged editors." The whole development process can happen within two to three years. "In fact, our 'star editor' Steve Purcell started here as an errand boy. He's since won an Emmy.

"That's the kind of facility I've always wanted to run. I came out of a network where even moving a head was a very political manoeuver. I wanted to create an environment where good people could succeed without any politics, where there is only a single level of management and everyone is encouraged to put out their very best. We've only got one real rule: If you like the bureaucracy of a network and you start acting like a network bureaucrat, then perhaps you're better off working for a network than around here." **BM/E**

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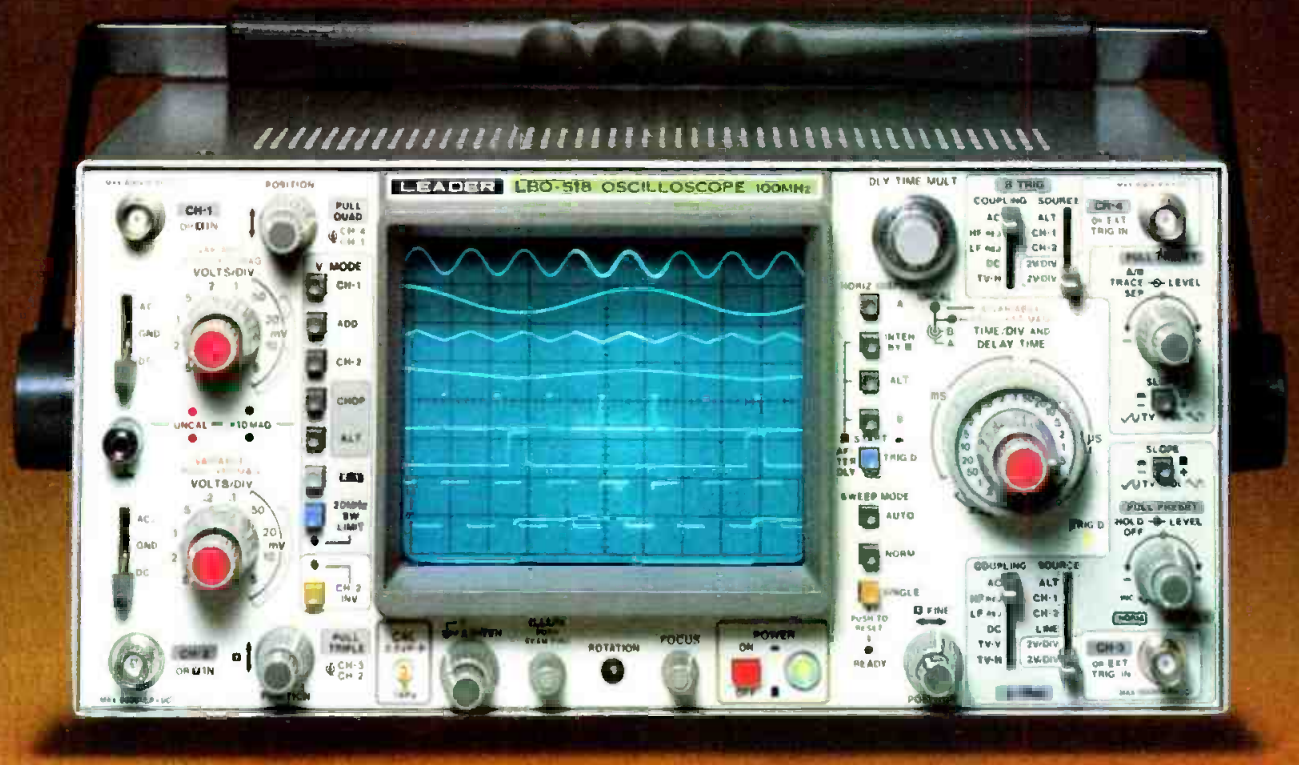

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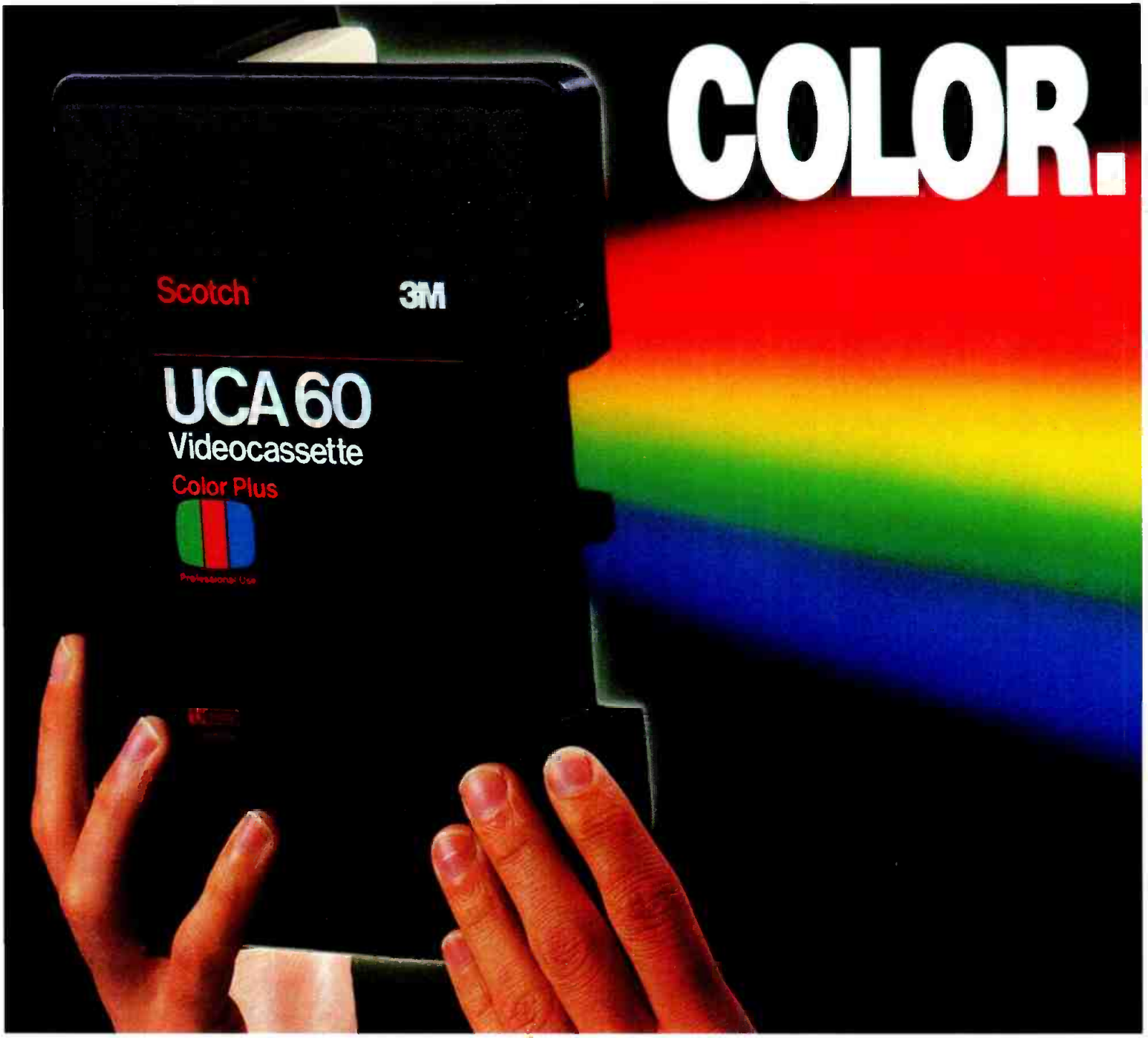

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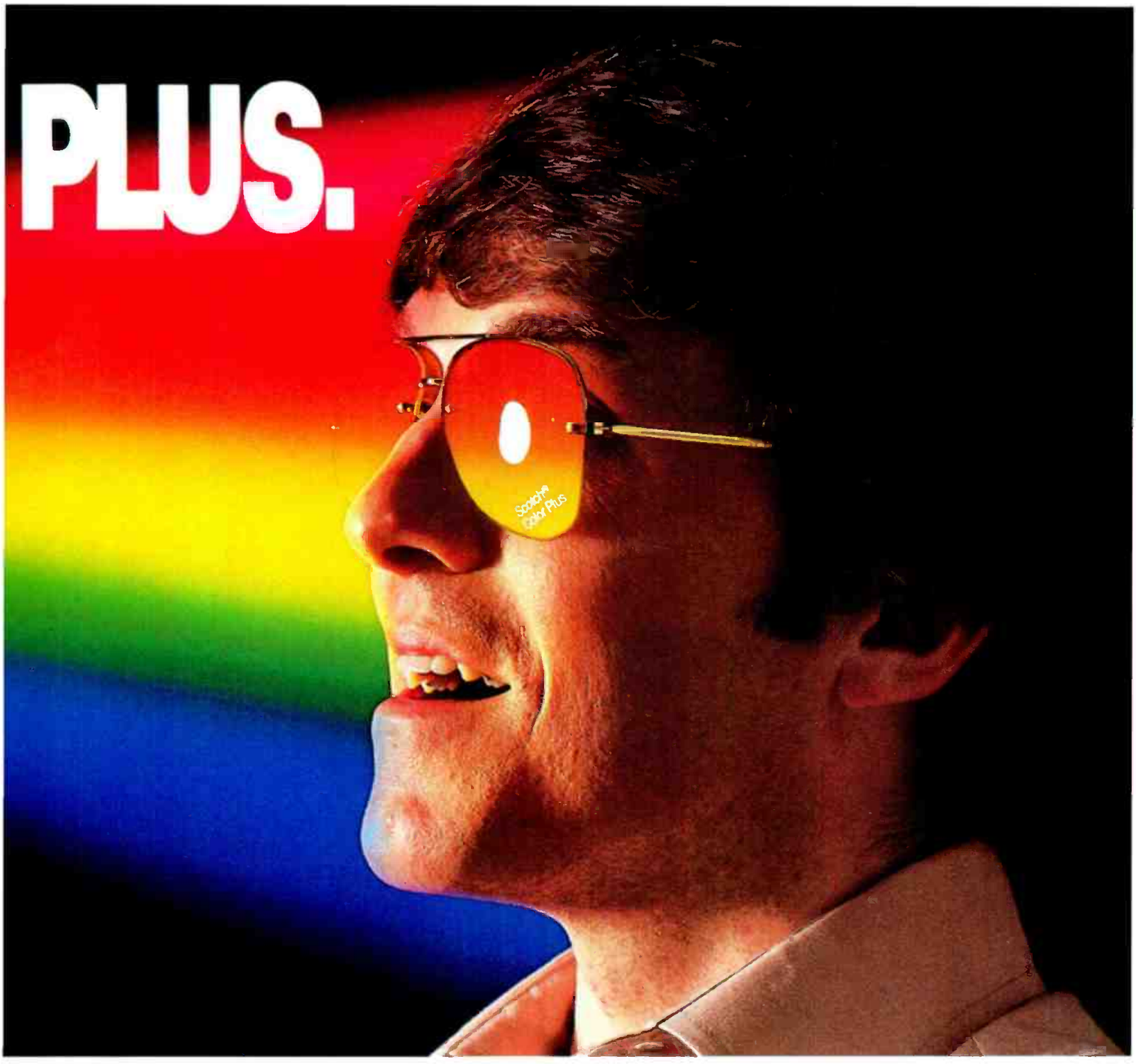

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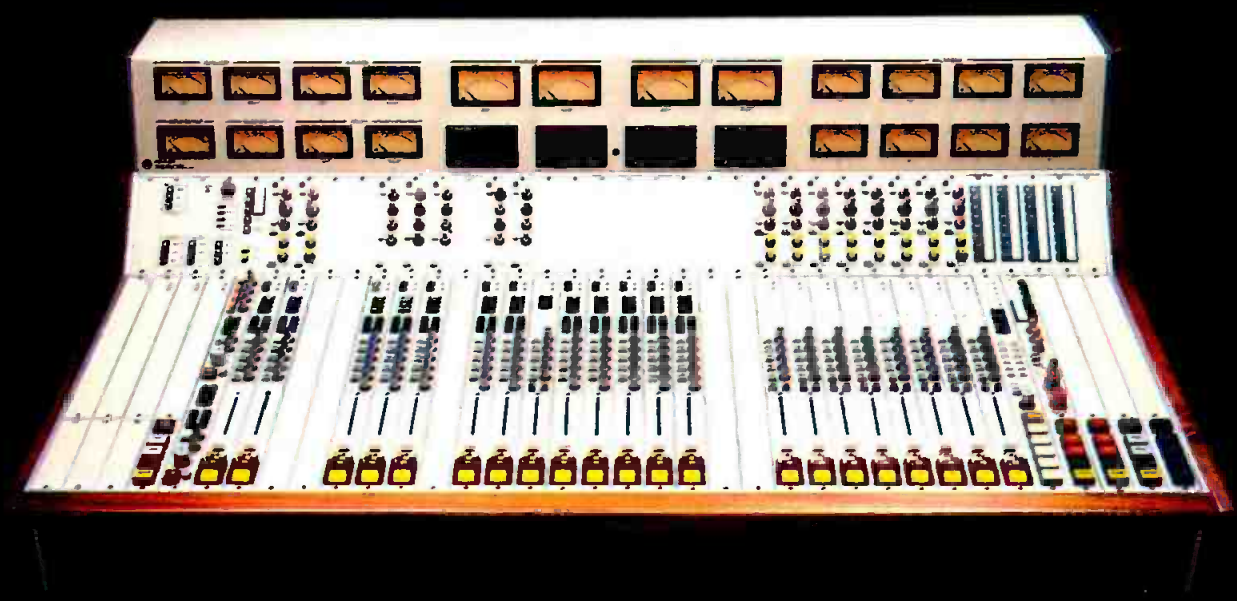

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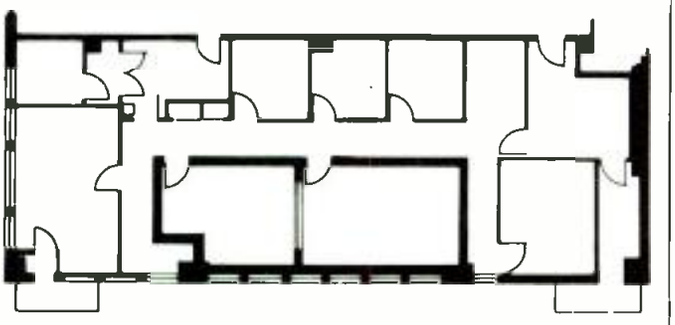

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BY MARK DURENBERGER

AUDIO PROCESSING IS ONE of the last frontiers in competitive broadcast engineering. We all know how it should be done, but we also recognize that, being highly subjective, processing is an art worthy of the most accomplished engineer. It's a challenge that requires the engineer to take an interest in how other people listen, and where.

The goal is to project the best sound possible on as many receivers as possible. And the station which does this best has a leg up on everyone else. So it's worth a review of the basic principles of audio processing for radio broadcast, for in so doing, we touch on how to listen, how others listen, why we process audio in the broadcast medium and, most importantly, how it's done with the least amount of side effects.

A LOOK AT YOUR PROCESSING

Broadcasters discovered long ago that the broadcast medium simply wasn't up to the dynamic range available on prerecorded material. It was true of AM 40 years ago; it's doubly true today, even on the best FM stations. You simply cannot operate with the 80 dB + dynamic range available from modern recordings because of inherent limitations in the broadcast media, including noise levels in the band, and especially the varying ambiance of diverse listening locations. So you have to make a compromise to squeeze the dynamic range. I'm sure some of us would like to own the ideal broadcast system and play the record to the listener just as it was recorded, without touching it. A fine-arts station I know previews its records on the audition console and attaches a label to the record dictating "fader setting" when played. This approach ignores the fact that it's impossible to preview a recording for uncontrolled FM transmission using the VU or PPMs. The result, on this particular station, is occasional overmodulation. That may be one extreme. The other is the "fader-less" console we see in some operations. All variations in levels in the program material are "handled by the processing."

Mark Durenberger is director of technical development for Hubbard Broadcasting.

Somewhere in between is the engineer who wants his station to sound exciting but not overly processed; loud but not squashed. This engineer knows that some compromise is needed. He may have discovered years ago that compression was absolutely necessary to create a predictable average level and in so doing he reduced the dynamics as perceived by the listener.

By and by someone found that the more compression employed, the louder the sound. Then someone found a way to distribute audio energy through parallel processors so that high-energy spectral concentrations didn't modulate the rest of the audio. And once again we found a way to abuse *this* approach, because we created artificially dense spectra, most obvious in the high-end density created by multiband systems. This is today's pragmatic and popular approach to station sound, spurred on by the folks who were successful AM operators, assuming they need to do the same thing to FM. It may explain the comments made nowadays about the station which chooses to remain "flat." Even the word is in disgrace; those stations are described as "dull" or "washed-out." What was once an extreme is now the norm.

Today it's hard to find a station processed for a flat frequency response and even harder to hear one which at least maintains the illusion of dynamic range.

SOUND EVALUATION

If you listen closely to competitive stations, you may find that if the audio isn't letter-perfect, at least the *illusion* of good audio is there. Because creating illusions with processing is the latest art, one which requires a great deal of finesse and attention to the ground rules, it is no longer fashionable to say "to heck with the manual, I know how to set it up." While you might have been the last word a few years ago, today a lot of people understand psychoacoustics. Programmers worth their salt follow the research which tells them what sort of station sound appeals to or turns off a certain demographic. And as target demos narrow, the psychoacoustics become more and more important. And as alternatives to your station become more plentiful, the task of projecting the proper im-

age becomes harder.

But before you can fine-tune that sound, you must be able to identify the target, know what receiver the typical listener uses and where he or she is usually listening. The more successful you are at doing this, the better will be your numbers. It's no longer enough to generate an exciting sound to attract the casual dial-spinner, because if by so doing you've created enough objectionable artifacts, that listener will move on. Look at your station's cume-to-quarter-hour-maintenance ratio to see if you have high tune-in but fast tune-out. It'll be a clue to how your station is *perceived*.

It's a sad commentary that the station trying for true high-fidelity today sounds "flat" compared to its competitive neighbors, but it is a fact of life that to make radio exciting to certain target audiences, an illusion of excitement must be created and maintained. Market research must go beyond what songs are most popular. You must know how and where your audience is listening before you can go after it. And once you've achieved that goal, learn how to define the sound to attract that target and how to relate it to what you're used to hearing.

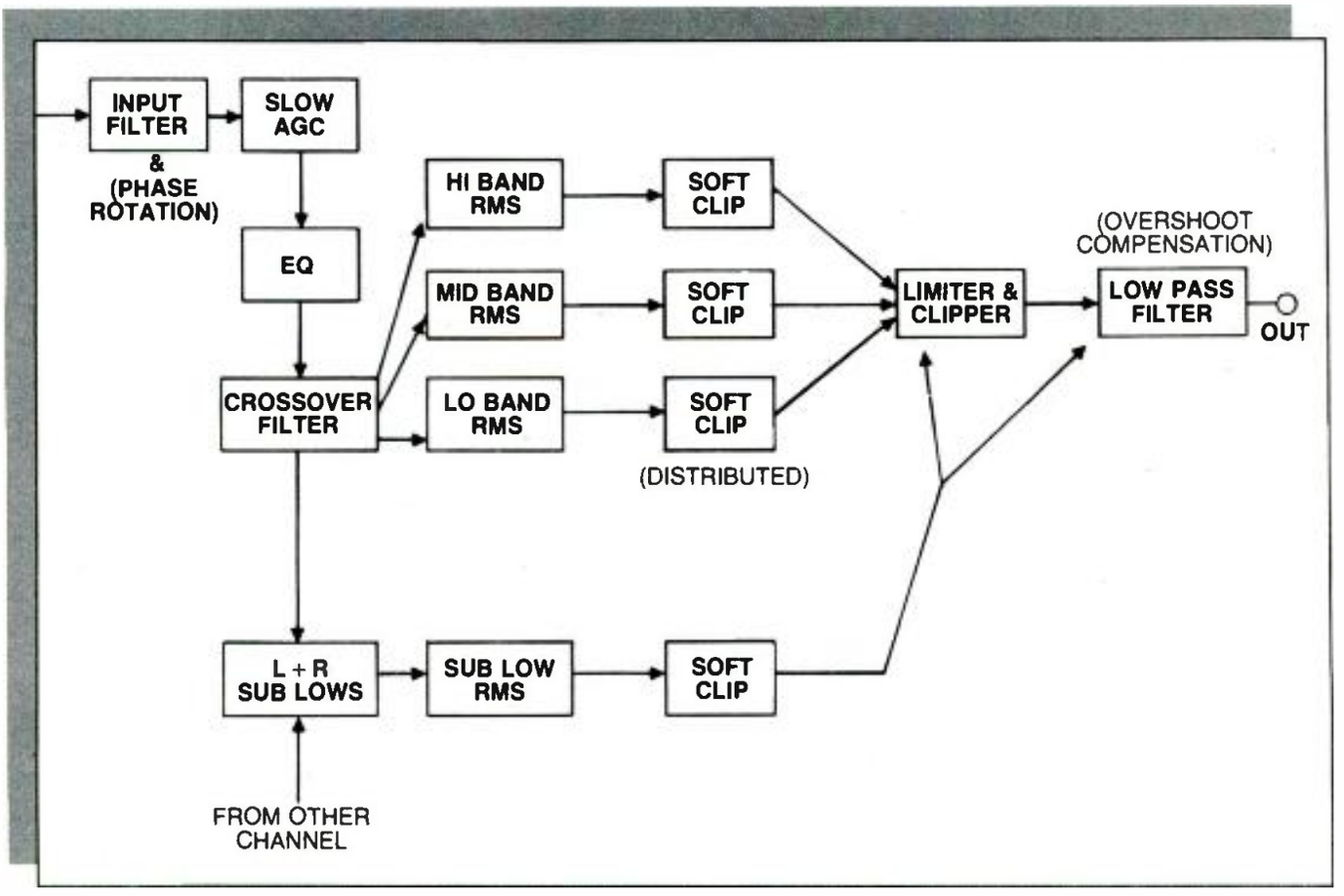
The most important first step you can take is to establish a reference listening environment that you can relate to your typical listener. Check any changes you might want to make as a result of the ideas below against your idea of what the listener will like best. This means knowing your audience; beyond that, it implies at least a cordial relationship between the program director and engineer. Without communications you'll get nowhere. Enough has been said about the importance of communications but it should be stressed that in the one area which most affects the product—the sound of the station—you invariably find two people who know how it should be adjusted: the CE and the PD. A lot of hard feelings are generated when the program director intrudes upon what was once regarded as hallowed ground: adjustment of the equipment. The sensible engineer knows he might learn something from a hip program director but he also knows when to draw the line; the good programmer learns to respect an engineer's wisdom if that engineer can display a knowledge of the complete broadcast system, from recording to listener, and can communicate effectively with his peers in the management of a radio station.

CREATION OF ILLUSIONS

With all of that as a sort of preamble, and assuming you know what your audience wants, how do you go about evaluating your present sound and adjusting your audio chain to create the sound you think you should have? Before we begin, some ground rules, a few of which will cause an argument:

- Remember that no matter how the audio might sound to a jock in his earphones, any change, even for the better, is likely to disturb him. Remember, that's his frame of reference, and be understanding if he complains about a change you make. One solution to this dilemma is to install some processing in the monitor chain. A compressor and equalizer in the headphone bus can make you a hero, because not only can the talent get the exact sound they want, but they will usually be able to compensate for adjustments you're making to the audio chain.
- Take a lot of time making your processing adjustments,

Block diagram of a processor shows where "soft clippers" fit into the audio chain.



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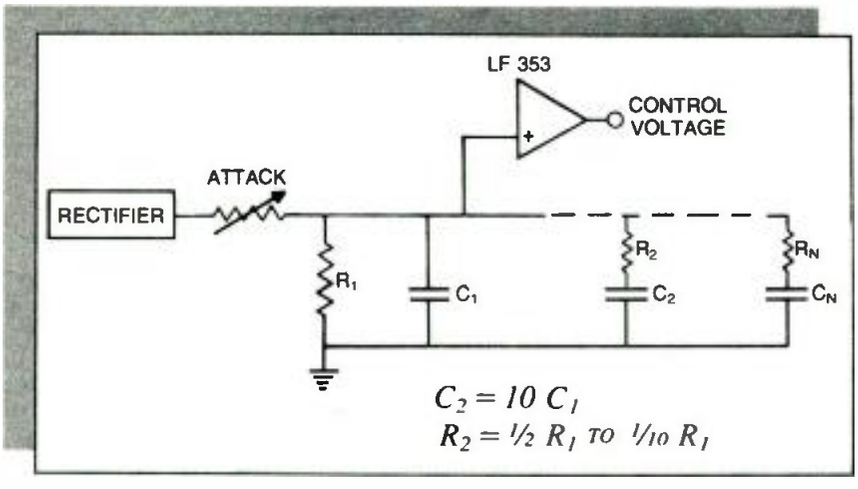
evaluate them carefully, then *leave the system alone!* Not all records will sound right on a highly processed station. And you can go crazy returning every time you hear a problem.

- No one has hearing retention. It's not possible to say "that's the way it sounded yesterday," and be accurate. So many factors affect the way you hear that the only valid way to make comparisons is by direct A/B switching.
- The highly processed station will usually sound different on a $29.95 portable than it does in the studio or at home on a carefully balanced reference listening environment. Be careful to ensure that your adjustments are evaluated on all types of receivers in differing ambiances.
- Nearly all processors are dependent upon controlled input levels. When you process even moderately, you need to hold board levels within a 6 to 10 dB window; balances start to change in most multiband systems.
- Once you've established your "listening standards" and references, stick to them! Nothing is more mutually defeating than the old push button-warfare battlefield. If you compare yourself only to your competition, and he pulls his high end up or down to match yours, you might compensate for the change *you* perceive. Pretty soon you're chasing each other around.
- Remember that subjective impressions are more important than ever. It's important that you know how other people perceive your sound. It may not be "adjustment-by-committee," but you owe it to yourself to listen to how other people perceive your station.



An example of a program-controlled release timing circuit.

RMS PROCESSORS

The RMS processor deals with energy, not peak values. It's responsible for maintaining the average level of the audio, and it's in this section that the good station sound can be created or destroyed. The simplest RMS processor is the wideband compressor. It is used today only in those applications where little control is needed. Because it has a single attack time constant, it works properly only in one portion of the energy spectrum. Even with program-controlled release time circuitry, the wideband compressor creates a lot of the "ducking" problems we have had to live with for so long.

The solution is the parallel or multiband processing system. It divides the audio into two or more segments and deals with each according to its own time constant requirements. And the sum of simple parallel processors can be made to sound quite pleasant.

PEAK CONTROL

It's possible to fine-tune an RMS processor to create incredibly good audio, but there are such systems on the air today whose sound is characterized as "smashed" or "squashed," and it is likely the RMS section is being bum-rapped because of what's happening in the limiter. The speed of the peak limiter makes it possible to gain a decibel or two of loudness by completely eliminating any peak-to-average difference. It's hard to find a single box in the audio chain which can do more damage to the sound than a limiter adjusted for 3 dB or more gain-reduction. Because most limiters are wideband, it's easy to punch instantaneous holes in program material and unless release time is infinitely short, the action is quite audible.

The part of the peak limiter with extremely short attack and release time is the peak clipper. We use diodes in various schemes of hard or soft clipping as a way to remove short-duty-cycle transients, but even the clipper can be abused. Properly adjusted, a peak clipper will make turn off no audible difference. Its only effect should be to turn off the mod monitor peak flasher. The peaks it handles should be those undetectable by the human ear.

A clipper driven to the extreme will approach a square-wave generator. Sooner rather than later you'll hear the action of the clipper, even if the post-filtering is right or the audio path following the clipper is too slow to pass the square waves. So it must be adjusted to be undetectable. And if composite clippers were set up that way, there'd be little furor about them. Pretending for a moment there were no other ambitions for those boxes, let's assume they were designed for one purpose—to eliminate ringing or overshoot in microwave STL systems. A clipper in the composite baseband which was adjusted to do just that and no more probably *would* be undetectable. But many aren't used that way. Composite clipping is one of the abuses worth mentioning but not kicking to death here; it's been the subject of many well-reasoned articles and its effects are well-known.

Many processing abuses can be controlled by the integrated-system approach. Such systems have fixed parameters which make it difficult to misadjust; they are usually more effective and better-sounding but lacking in flexibility. A processor manufacturer designs his box with the best of intentions. He wishes to eliminate all processing artifacts. But he still wishes his unit to be of maximum effectiveness for all format applications. Chances are if he designed a black box that was all things to all people, he'd find it would cost too much to market. His partial solution is the integrated approach.

The integrated system recognizes the limitations of each section, and carefully interfaces each with its neigh-

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bor under more-or-less controlled circumstances. An example of a very good integrated system is the Orban Optimod 8100 FM system.

The "separates" or component approach, on the other hand, provides maximum flexibility and allows you to create a few processing tricks not otherwise obtainable. A good example of a maximum-knob system is the board offered by Audio + Design Recording.

GOOD FOOD

We've all heard the phrase "garbage in, garbage out." This is a processor manufacturer's way of telling you most systems will accentuate noise and distortion and that you should feed a processor with good clean audio or else. There's an incredible amount of truth in that hackneyed phrase. If you are in a position to evaluate several different processors, you'd do well to measure your program chain prior to feeding it into these black boxes. Certain minimum standards *must* be met. In addition to the usual flat frequency response, hum and noise must be held to at least 70 dB below that level established as "0 VU" on the console meter. And at that same level, a minimum of 16 to 18 dB headroom before clipping is important.

Another measurement beyond the norm is square-wave response. A number of good and inexpensive oscillators allow you to generate square waves. A simple scope allows evaluation. Use a dual-trace scope if you wish to compare input and output. You can learn a great deal about the audio performance of your board, particularly as you move to the extreme low end or up above a few kHz.

If your console and source equipment noise and frequency specs are reasonable, if distortion is low and the square wave looks reasonable, you ought to be able to accomplish some meaningful evaluation. If you're fortunate, processor manufacturers will ship you their gear on approval for you to evaluate at your station. To give you some suggestions for what to try, let's construct a hypothetical system, referring to Figure 1. This is admittedly the most complex system you are likely to put together, but it affords the opportunity to discuss each part of the system, and more importantly, how it will relate to other components.

The front-end is a very slow broadband AGC amplifier, stereo-coupled. This AGC serves to iron out major console level imbalances and delivers a somewhat predictable level to the following processors so their action will be more uniform. This AGC has adjustable attack time, on the order of hundreds of milliseconds; its release time is program-controlled and should be fairly responsive.

Following the AGC is an optional equalizer, which is used when a station wants emphasis on certain frequencies without having to resort to the adjustment of the output control of a multiband processor. If, for example, a station wants more than 10 kHz for its format to sound "right," the equalizer is really the only way to accomplish this boost. Simply turning up the high-band processor output brings up *everything* above the crossover

point (and quite a bit of audio below). The same thing can happen to the low end and with an equalizer you can deliver punchy kickdrum audio without having to bring up *everything* below 200 Hz.

The crossover filter can be responsible for a lot of phase-shift problems, particularly if it's variable and crossover points aren't matched exactly in both channels. We recommend a passive odd-order filter. You may not find one for sale but you can build your own, quite easily, right out of an OpAmp handbook, using 5% capacitors. Crossover points depend on the processors and the sound you're after, but it's usually safe to cross over the low/mid sections at 250 Hz or so. High-band crossover might be anywhere from 2500 to 6000 Hz. The other components in the filter section are an optional high-pass filter (20 Hz or so), low-pass (18 kHz), and an L + R summation/low-pass filter output for the "subwoofer" section. This usually rolls off quite steeply at 80 to 90 Hz. Then the high-pass filters in the left and right channels are moved to the same point and skirts are made symmetrical to the subwoofer filter.

Next come the parallel processing—merely a group of compressor/expanders working in parallel, each with its own attack and release times, summed back together. Attack times are adjusted for the "sound" you want; longer attack times will increase definition and punch. As a basic guideline, work out the time constant for the middle of the band of interest and adjust attack time so a couple of cycles get through. Example: 1000 Hz has a period of 1 ms. A fair attack time adjustment to handle 1000 Hz might be 2 to 5 ms, again, depending on the sound you're after. It's important, too, to remember that you should be adjusting for the energy midpoint of the band under scrutiny. RMS processors will have attack times varying from 0.1 ms (high) to perhaps 50 ms (low-band).

Release time affects loudness and is responsible for dynamic range illusions. Too slow a release time means pumping and holes in program material; too swift an adjustment causes "breathing," intermod effects, very high average level but awful dynamics. The reasonable answer to a release-time-for-all-seasons is the program-controlled release time enforcement. An electrical approximation is shown in Figure 2. This circuit begins with the usual resistor/capacitor network and the capacitor charges and discharges in accordance with its designed time constant. This works well and is predictable when sine waves are used as the test signal.

But real-world program sources consist of complex waveforms and uncertain energy distributions so we add a second (third, fourth, fifth, ad infinitum) network(s). Repeated high-energy audio begins to affect the additional networks so they become part of the RC equation. A program-controlled release-time circuit is part of nearly every processor you can purchase today because its action is so much smoother. Depending on its implementation, it can help you create the illusion of dynamic range even under severe compression.

Which leads us to two other circuits in the modern RMS processor: the gate and the expander. They are often switched out (that's wrong) or used interchangeably (and that may be a mistake as well). Gates and expanders are different animals, though either is an effective tool against the ravages of excessive compression. Together they can create the illusion of great dynamics even when 15 to 20 dB audio control is employed. The gate functions in the

absence of audio and "freezes" gain at the point audio disappeared. The gate may hold system gain at that point or it may be designed to slowly release the gain freeze. A typical gate might convert release time to a 10-times-slower recovery, when enabled. Such an arrangement means immediate gain recovery doesn't occur during normal short program pauses but becomes effective if the material following is simply lower in level.

The expander can be used as a sort of a gate. Properly adjusted, an expander will "add" gain dynamically, then quickly reduce gain to a predetermined amount during program pauses. Expanders are widely used as noise gates and will make an incredible difference when used properly in mic channels. The expander and the gate both "hold" gain at a preset reference. But the expander is meant to quickly open for added gain, usually at a syllabic rate, in the presence of audio.

If the filters are right and the RMS processors adjusted correctly, you should be able to create the sound you want for your station without going any farther. Properly adjusted, the RMS section will do all the level control for you. Very little energy detectable by the human ear should escape the compressor/expanders. But because of the way they are adjusted, particularly when you're after definition, attack times won't be fast enough to catch everything.

TWO MORE STEPS

There are two lids to be put on the audio before it reaches the transmitter. First is a loose lid, called a "soft clipper," which catches most of the escaping stream. The soft clipper should respond to high-energy transients. A soft clipper will usually consist of a symmetrical diode network with current-limiting. The output of the soft clipper should consist of well-controlled audio, and the only peaks which should escape are those undetectable to the human ear. It remains for the safety clipper to catch these short-duty-cycle peaks. The action of the safety clipper should be totally inaudible.

Some processor manufacturers feel a wideband limiter must be installed in front of the safety clippers so those final diodes don't get overworked. But it's very easy to abuse a wideband limiter by driving it into too much gain-reduction. We're left with holes punched in the program. One solution to this problem is to look at the drawing boards of some of today's processor people; there you'll find *multiband* limiters! Sound familiar?

FOR MORE FLEXIBILITY

Our final attention is given to the multilevel parallel processing approach, not a new concept, but certainly easier to realize with today's technology. It's the idea of processing some of the audio separately from the main program audio, then delivering it to the final limiter. We hinted at one example with the subwoofer filter. This low-pass output is fed to a special compressor, then recombined with the output of left and right program channels, just before being fed to the limiters. Some broadcasters process their mic channels in this fashion, treating them totally separately from the music. It's a way to complete flexibility in audio processing. If you're a Beautiful Music station you might be doing this with your commercials as a way of keeping the lid on loudness. Many popular processors have an input port for just such an application and if you're investigating new processing, you'll do well to consider this option.

And what of the future? If after careful evaluation of all the machinery commercially available today you decide it just doesn't go far enough, do you have to build your own? Or are there some advances, not yet popular, that you might be interested in observing?

Phase rotation is not new . . . it became a useful tool with the original Symettra-Peak. But it wasn't until recently that the electronic phase rotators began working correctly, with an understanding of just where extreme phase-rotation should be used. And with the realization that the phase response of the box, input to output, should be very correct, phase rotation schemes have been developed which not only work well but sound decent . . . some even on FM! It's a part of a new awareness of filter topology which has also resulted in some new crossover and distributed filters.

This last has brought us the distributed-clipper system which works so well in today's newest processors. The idea is to divide the filter into sections, then take advantage of the laws of integration to use each filter section as part of a clipper. Some clipping is done before each filter section. The overall result is much less offensive, providing the filter is designed properly. Look for this sort of arrangement and the "multiband" limiter or clipper to be perfected so that their action can be made totally inaudible.

Interband-referencing has its fans and detractors. In a very basic way, an interband-referenced system couples control voltages between two bands in one direction only. Energy detected by the mid-band rectifier, for example, controls both mid-band and high-band gain, while energy received by the high-band rectifier controls high-band gain only.

Processors for AM stereo will work a bit differently than their FM counterparts. Zero phase shift is an important goal in AM Stereo, so sum-and-difference processing will be used, and you may have to get used to an entirely new way of watching processor action.

Digital is coming to the broadcast plant. The time-squeezers, delays, and echo machines take advantage of digital handling techniques. In analog transformerless (active) inputs should by now be standard, except perhaps in transmitters. Overshoot compensation ahead of stereo generators still hasn't reached perfection but incredible advances have been displayed in the past 24 months.

How the processing system fits into the rest of the transmission plant is something you must consider before you make the not inconsiderable investment in equipment. Perhaps nowhere in your operation is the interfacing of equipment to the outside world more important than in the choice and design of the audio processing system. In many cases the integrated-systems approach will solve most of your problems. For other applications, the ninety-knob component/separates is the only answer. Whatever the course you choose, don't neglect the fact that the audio chain determines your station's sound, and because it is so vital the audio chain must receive the attention it deserves. **BM/E**

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The A810 also introduces a new generation of audio electronics, with your choice of either transformerless or transformer-balanced in/out cards. Both offer advanced phase compensation circuits for unprecedented phase linearity. The new transport control servo system responds quickly, runs cool, and offers four spooling speeds.

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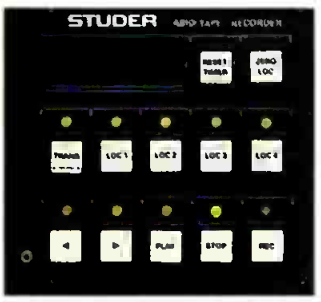

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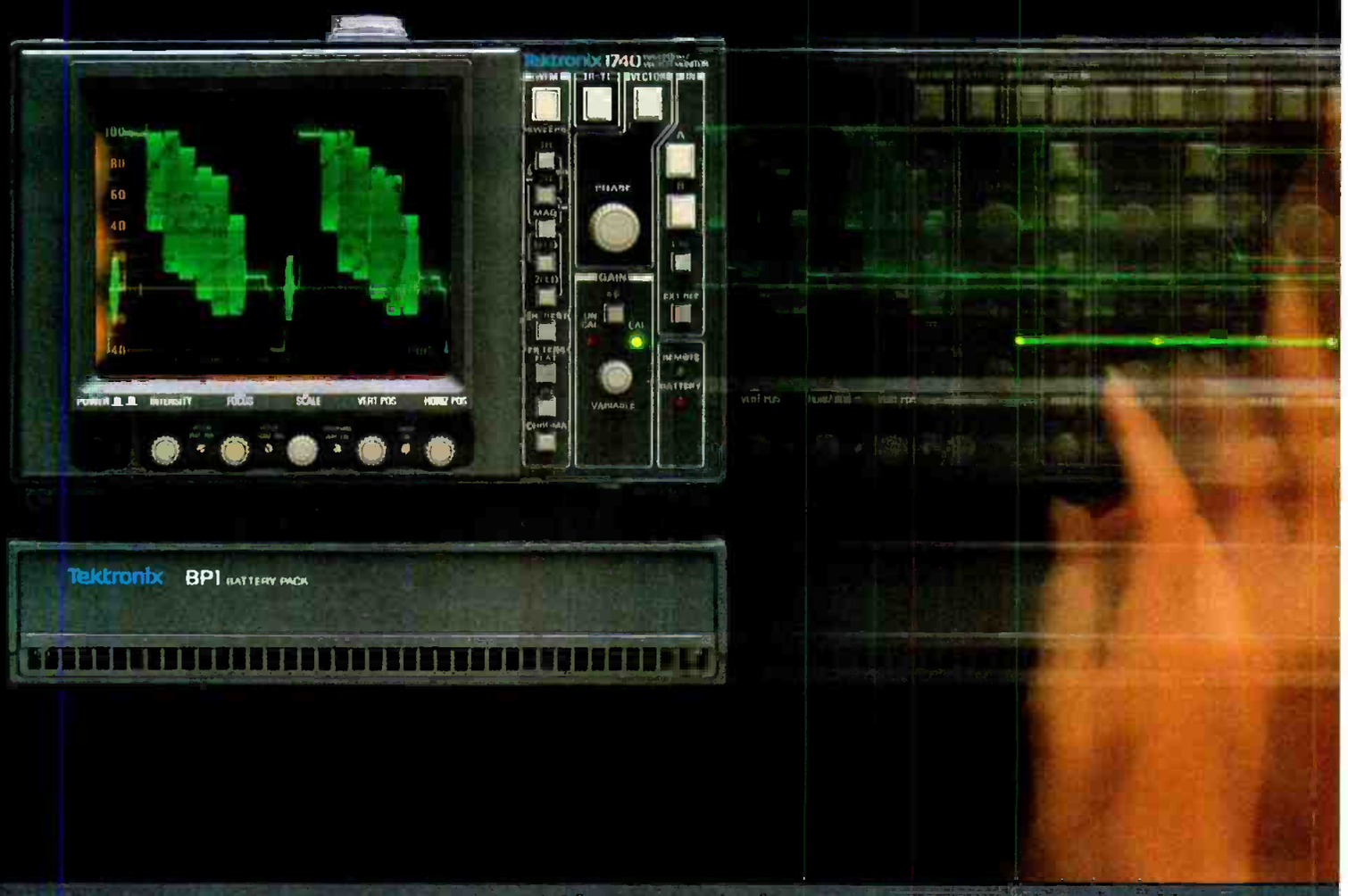

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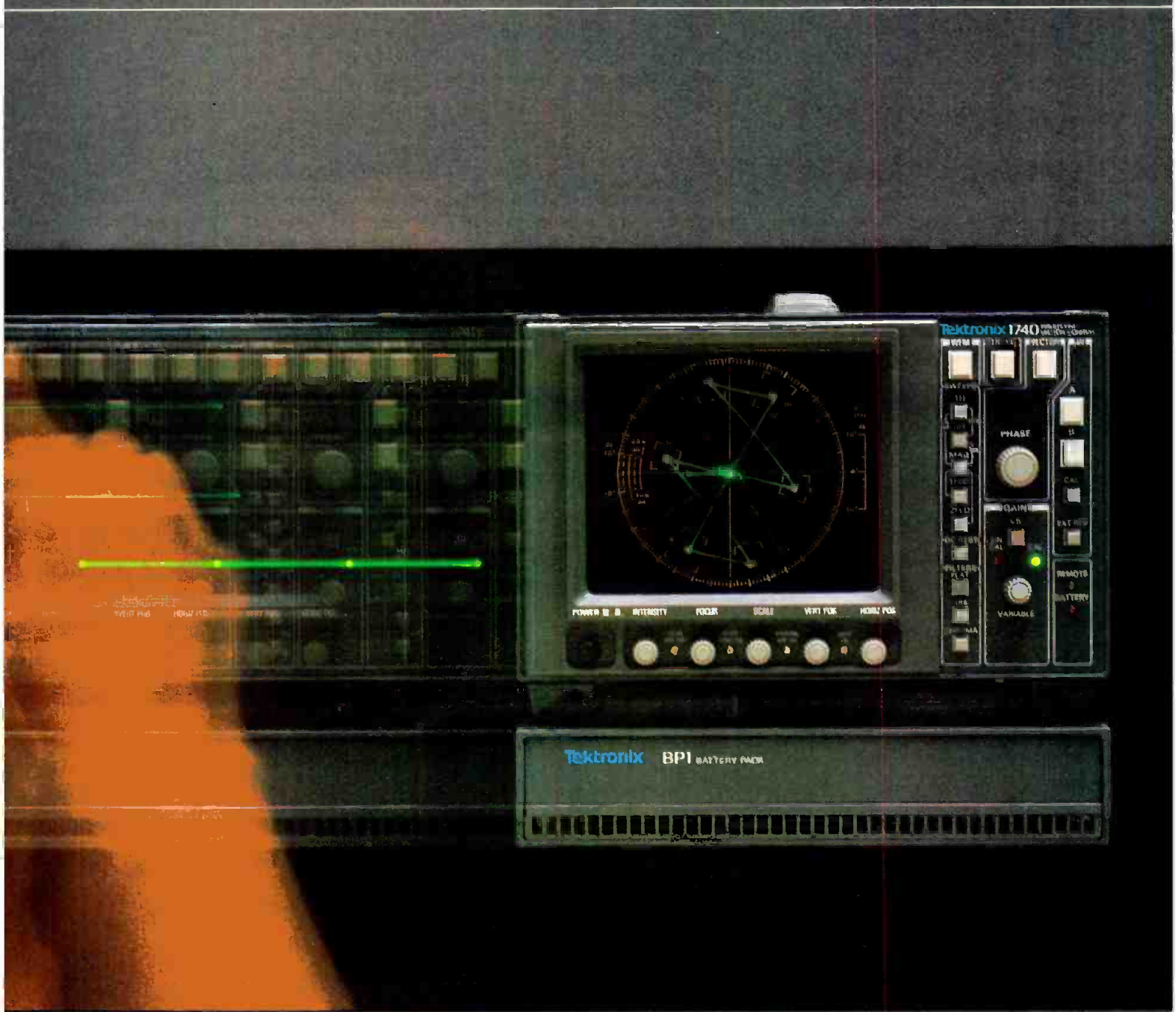

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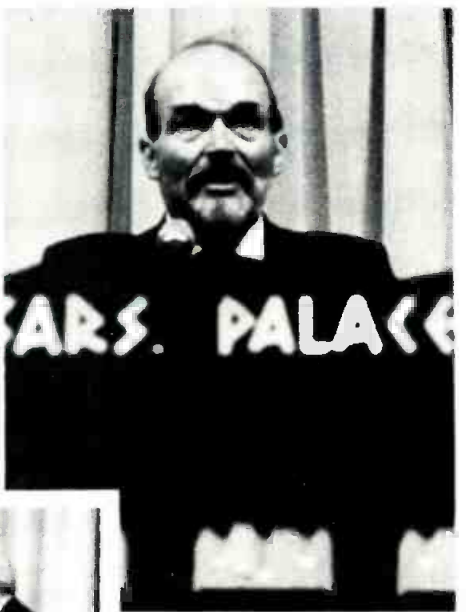
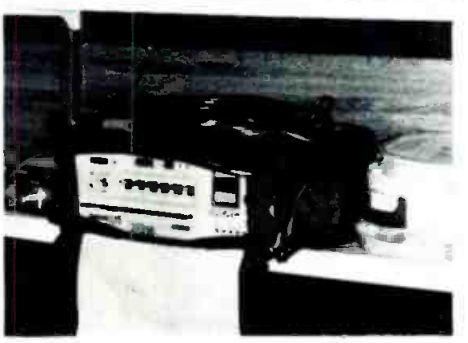
RTNDA THE NEWS

New RTNDA president Ed Godfrey of WAVE-TV, Louisville, KY welcomes delegates to the 38th annual conference held in Las Vegas in late September. Emphasis of his remarks was on "a new approach" to news. ▶



The Bosch Quartercam and Lineplex quarter-inch VTR were among the highlights of the equipment exhibit. Also drawing crowds were RCA's Hawkeye, displayed alongside the Emmy it received last month; JVC's ProCam; and the Sony Betacam. ▼



Congratulating Sig Mickelson for receipt of his distinguished service award are Godfrey and keynote speaker Ed Joyce, appointed to the presidency of CBS News just before the convention. ▼

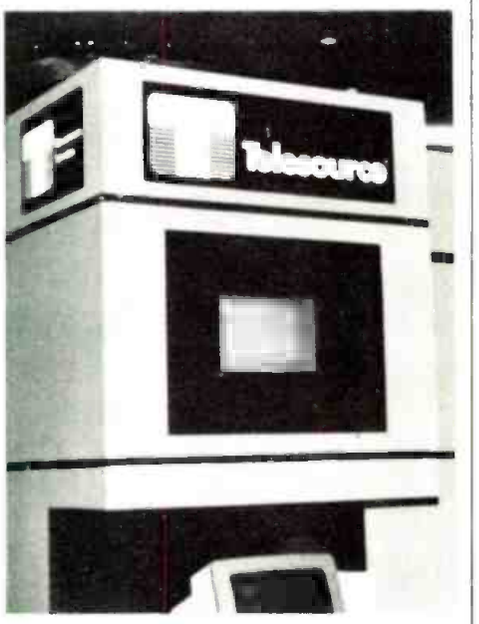
Of major importance at the show was the first public demonstration of the new Beston/McInnis-Skinner newsroom systems. BEI will continue to offer its DataNews news preparation and on-air prompting package but has also acquired the McInnis-Skinner Newscan newsroom computer and Weathergraphics weather presentation/graphics system. ▼

▲ *In a separate room, Pacific Recorders set up a working version of a "state-of-the-art" radio newsroom that is being installed at KSL, Salt Lake City. KSL staffers did regular broadcasts from the booth.*

FROM RTNDA

▲ *Alden put on one of the most colorful weather systems displays. As well as formatting standard data, the terminals are equipped with decoders to handle RRWDS, the government's new free-access live color radar data.*

Telesource featured its election reporting package, a time-sharing system in which stations design their own display packages. The company will shortly have its new newsroom computer system generally available. ▼



▲ *Although there were fewer news vans than in years before (and no helicopters), this Ford Suburban from E-N-G Corp. drew considerable interest from attendees.*

Colorgraphics featured both its extensive weather display systems as well as its relatively new newsroom computer system. ▶

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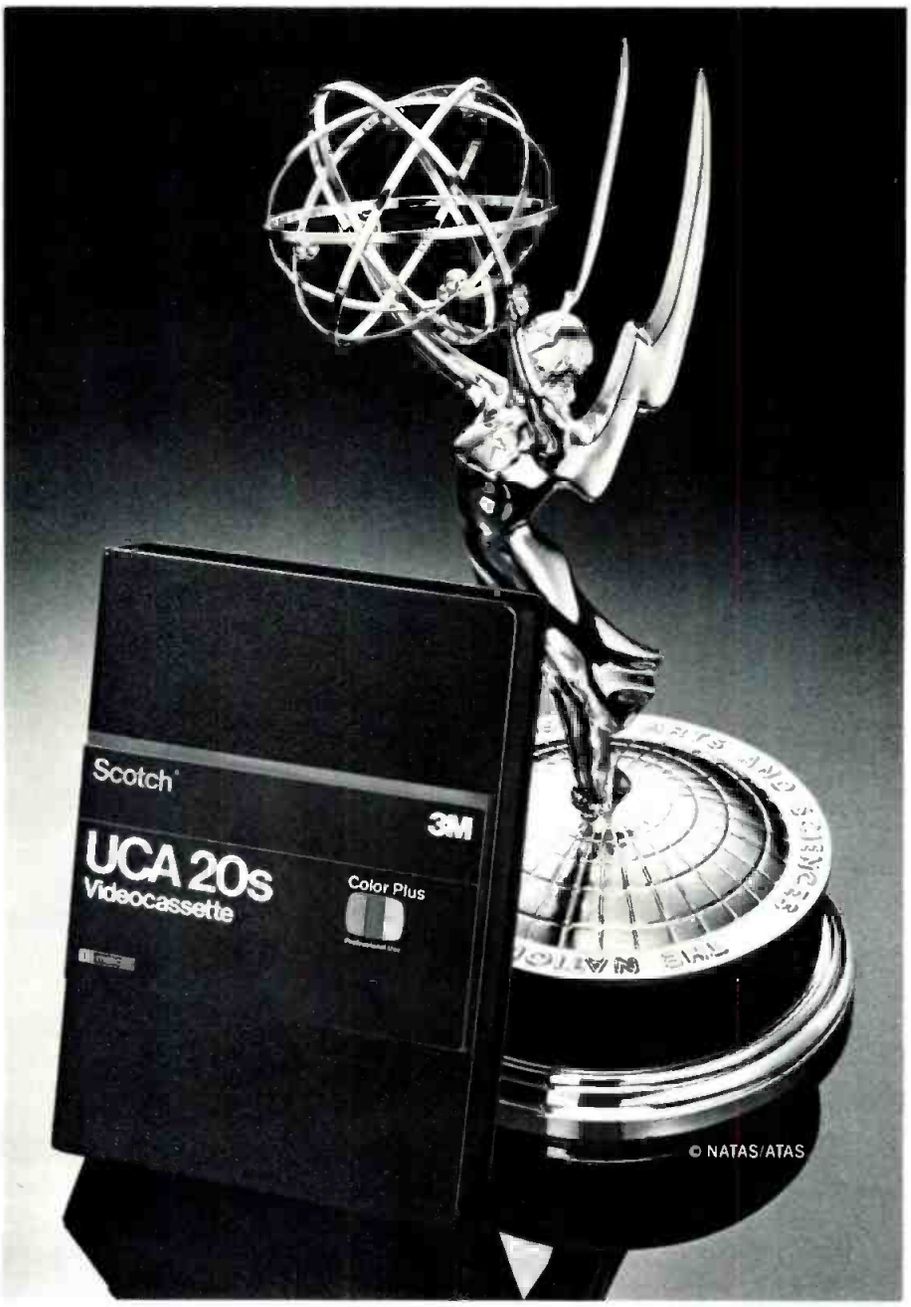

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3M

Daytimers Get a Break

By Harry Cole, FCC Counsel

Making good on predictions made to daytime-only AM broadcasters last spring, FCC chairman Mark Fowler has led the Commission to a 4 to 0 vote adopting relaxed standards for pre-sunrise operation of many stations, and creating a new "post-sunset" authority to permit daytimers to operate after sunset during the winter season. That vote—taken during the first Commission meeting in September after its summer break—may not provide for some time the relief daytime operators have been seeking, however. The new rules cannot be fully implemented until certain international agreements are reached. Progress in negotiations could result in an agreement by mid- to late fall. In any event, authorizations for less than the full extension of post-sunset hours are expected to be issued by the end of the year.

The FCC's concern about use of AM frequencies at night extends far back through the Commission's history. The reason underlying that concern is the skywave phenomenon, which occurs at night. In simple terms, the ozone layer of the ionosphere, which during daylight hours effectively disappears as a result of direct radiation from the sun, re-forms at sunset. That layer then acts as a reflective shield for AM radio waves. During daylight, those radio waves simply pass through the ionosphere and into space. At night, they bounce off the ozone layer and back into the atmosphere, where they can be picked up on standard AM receivers.

The trouble with the skywave phenomenon is that the reflective action of the ozone layer on an AM signal can cause it to "bounce down," and be received at places far distant from the point of transmission. Unfortunately, the precise place or places any particular signal might "land" cannot be predicted with any great accuracy. Thus, depending on atmospheric conditions, it may or may not be possible for a nighttime AM signal to travel hundreds, or even thousands, of miles. This phenomenon, in turn, creates the potential for interference to local AM stations in the area that the "bounced" signal arrives. Since unrestricted nighttime service by AM stations could thus lead to substantial interference problems, and resulting degradation of service, the FCC has historically been extremely restrictive in its treatment of nighttime AM operation. The FCC's concern has been shared by the various neighboring countries with which the U.S. has broadcast-related agreements, and has been reflected in those agreements.

The need to maintain high standards of service is, needless to say, of paramount importance. However, it is undeniable that daytime-only operators find themselves at a significant competitive disadvantage relative to full-time broadcasters. The disadvantage is especially acute in the winter, when daylight represents significantly less than half of each 24-hour day. And, with the continuing expansion of FM service (not to mention the various video services) all of which enjoy full-time capability, the situation is becoming more difficult for daytimers. As a result, they have been forced to press Congress, the Executive branch, and the Commission for relief. The FCC's September action is one of the first signs of success for those efforts.

Recognizing the difficulties of daytime-only licensees and the usefulness of early morning service, the Commission has, since 1967, authorized low-power pre-sunrise service for Class II and III AM stations which do not have full-power nighttime authorization. Under the former pre-sunrise rules, Class III stations were permitted to operate with their daytime antennas starting at 6:00 a.m. local time, regardless of the time of local sunrise. At sunrise, of course, they could shift to full daytime power.

Class II pre-sunrise authority was somewhat more complicated. For Class II stations operating on Class I-B channels, pre-sunrise operation was permitted to start at 6:00 a.m. local time if the Class II station was outside the 0.5 mV/m 50 percent skywave contour of any Class I-B co-channel station operating to the east of the Class II station.

FCC RULES & REGULATIONS

Class II stations within the 0.5 mV/m 50 percent skywave of an easterly co-channel Class I-B station could begin pre-sunrise operation at the time of sunrise at the easterly I-B station. Class II stations operating on Class I-A channels and located wst of the dominant co-channel Class I-A station could commence at the time of sunrise at the dominant station.

All of these Class II and III pre-sunrise operations were subject to a maximum power limit of 500 W, although this was subject to reduction in order to protect co-channel foreign stations (in the case of Class III stations) or co-channel Class I-A or I-B stations (in the case of Class IIs.) Class II stations operating on Class I-A channels and located east of the dominant co-channel station were out of luck—the FCC prohibited pre-sunrise operation in such instances.

The pre-sunrise changes adopted in September did not alter the rules governing Class III operations or those of Class II stations on Class I-B channels. The changes did lighten the load for Class II stations on Class I-A channels. The new rules provide that Class II stations located to the east of the dominant co-channel Class I-A station may obtain pre-sunrise authority, subject to appropriate protection to be accorded to the dominant station. For Class II stations located to the west of the dominant co-channel Class I-A station and outside its 0.5 mV/m 50 percent skywave, pre-sunrise authority with power up to 500 W (subject to reduction for protection purposes) will be permitted to commence at 6:00 a.m. local time as long as the I-A's 0.5 mV/m 50 percent contour is protected.

The more radical change in daytimer restrictions involves the establishment of a post-sunset authorization. Previously, nothing of the kind existed. As a result, daytimers simply had to shut down at sunset. The new rules, however, provide that Class II stations on Canadian, Mexican or Bahamian clear channels will be permitted to operate with post-sunset authority for two hours after local sunset. Class II stations on U.S. clear channels may operate with power up to 500 W for two hours following local sunset if they are located outside the 0.5 mV/m 50 percent skywave contour of any co-channel Class I station. Class II stations east of, and inside of the 0.5 mV/m 50 percent contour of, a co-channel Class I station may operate after sunset only two hours following local sunset *or* the time of sunset at the westerly Class I station, whichever comes first. Class II stations located to the west of, and within the 0.5 mVm 50 percent skywave of, the dominant station will *not* qualify for post-sunset operation. Any Class II post-sunrise operation must protect co-channel U.S. Class I stations and some foreign stations, but not co-channel Class IIs.

The new post-sunset rules for Class III stations are a good deal simpler. Class III stations will be permitted to operate for two hours after local sunset with up to 500 W, reduced as necessary to protect any co-channel full-time Class III operations.

It must be noted that the "two hours after sunset" turn-off time specified in the new rules may be somewhat premature. In view of international agreements currently in force, the U.S. cannot authorize post-sunset operations for daytimers beyond 6:00 p.m. local time. Thus, while the rules adopted in September appear to provide for longer post-sunrise operation, the authorizations which will be

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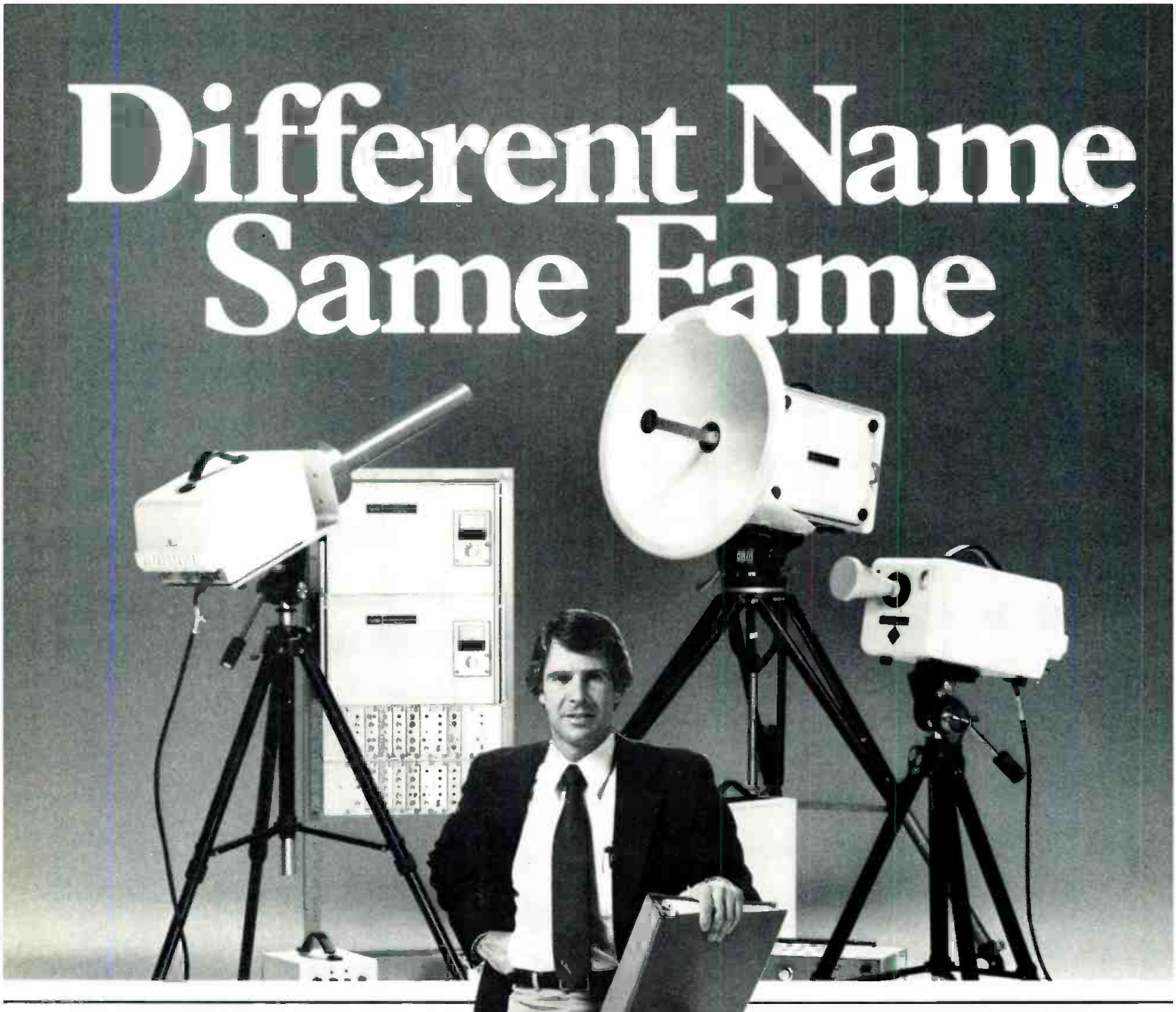

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Circle 179 on Reader Service Card

sent out initially, i.e., before final adoption of new international agreements, will limit post-sunset operation to 6:00 p.m. local time. And worst off of all are those stations on 1540 kHz, the Bahamian clear channel. Because no understanding at all has been reached with the Bahamas, no U.S. stations on that channel can be accorded any extended hours for the time being.

In addition to relaxing these aspects of pre-sunrise and post-sunset operation, the FCC also adopted the use of diurnal curves for calculating protection requirements for pre-sunrise and post-sunset operation. Use of such curves had been proposed by the National Telecommunications and Information Administration. Diurnal curves are simply graphs or charts which depict the effect of sunrise and sunset on different frequencies. The idea is that, in calculating the reach of a station on a particular frequency, the FCC should utilize a formula based on factors as close to "real life" as possible. The diurnal curves adopted by the Commission will permit it to determine with greater accuracy where a station's pre-sunrise or post-sunset signal is likely to reach. And the more accurate that determination is, the more likely it is that the station will be authorized to use more, rather than less, power.

There is a "good news, bad news," ending to this story. The good news is that AM daytimers in a position to benefit from these changes will not have to file any applications, wait in any processing lines, or even hire an engineer to determine what their appropriate pre-sunrise or post-sunset operating parameters will be. Instead, the Commission will do all the work and simply notify the affected licensees. The computer work necessary to make the various calculations was already under way in September.

The bad news is that, as mentioned above, the U.S. must first reach one or more international agreements before the FCC can begin to issue the new authorizations, and it must conclude a number of such agreements before the full extent of post-sunset operation, in particular, can be utilized. The new rules technically became effective on October 20, 1983, and the process looking toward completion of the various necessary international agreements was set in motion in September. Some observers believed at that time that the process could be completed, with authorizations in the mail to affected licensees, by December, possible even by some time in November. Such authorizations would, in all likelihood, be based on a post-sunset limit of 6:00 p.m., rather than two hours after local sunset, but they would at least represent extensions of existing daytime-only service. Thus, the "bad news" is not really all that bad.

Whether or not these changes will actually provide substantial relief to AM daytimers is hard to say. While the changes will give them at least a chance to compete for drive-time audiences on shortened winter days, the changes may turn out to add little to the daytimers' competitively disadvantaged position in the overall competition among all radio stations for audience. If nothing else, the FCC's action in September must be seen by daytimers as only an initial, limited victory in their struggle to improve their lot. The Commission, as well, should recognize that its September action will probably not be the last of its exposure to the questions posed by daytime-only operation. BM/E

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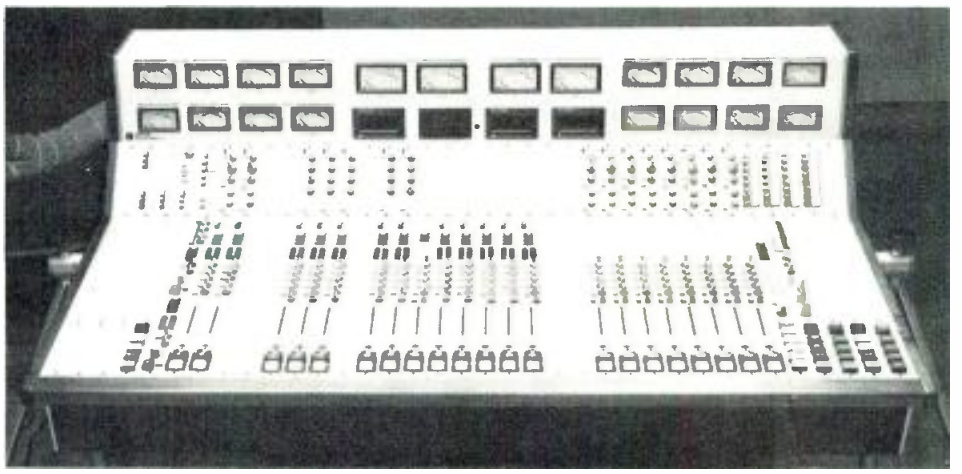
Pacific Unveils New Console



Pacific Recorders has just released information on its newest line of broadcast consoles, the ABX Series. The ABX was designed to provide the features deemed necessary to provide quality audio for both on-air and production functions.

The ABX is designed to offer the full range of features required for all audio, from on-air to full multitrack capability, including multiple stereo outputs, interactive machine control, modular design, and variable mainframe sizes. Components used in the console are Penny and Giles faders, Sifam meters, Jensen transformers, and Honeywell, EAO, and Schadow pushbuttons. VU meters conform to the American National Standard and are driven by isolation bridging buffer amplifiers. Optional PM meters are also available.

The three mainframe sizes offered are 18-, 26-, or 34-input models, with system layout permitting any input position to accept any input module. All active electronics are accessible from the face of the console.

The control logic of the ABX uses CMOS integrated circuits. Miniature sealed-gold contact relays are used for all CMOS logic-controlled audio switching outside of the side chains. The outputs of the control logic to external equipment are buffered by short-proof, discrete transistor circuitry. Logic interface/translator units are available with the console.

For More Information
Circle 250 on Reader Service Card.

Coming in January . . .

GREAT IDEA NOTEBOOK

Our new department will feature the best engineering ideas from radio and TV stations and production facilities around the country. Get out your thinking caps and start working on some new ways of doing things: computer programs, test procedures, transmission, control, production, interface, etc., etc. We require a typewritten description of the idea, double-spaced, up to three pages long. Plus *neatly* drawn engineering diagrams and/or illustrations. Send ideas directly to: Great Idea Editor, *BM/E*, 295 Madison Avenue, New York, NY 10017. For each idea published we will pay the author $50.

NEC Announces Microwave Link

The new TVL-800-6F ENG microwave link system using solid-state components has just been announced by NEC. The system uses CMOS and FET devices as well as simplified circuit designs to reduce power requirements and enhance performance.

In its basic configuration, the system consists of one transmitter and one receiver, with standard options including 0.3 m and 0.5 m dishes, a 5 W power amplifier, plane antenna, panhead and tripods, battery power packs, and dc cables. Featuring high power output (1 W standard up to a range of 30 miles) and two audio channels, the microwave system is compact, with the transmitter and receiver each weighing 4.4 pounds.

Ambient operating conditions concerning temperature are in a range of −20 degrees centigrade to +50 degrees centigrade, with relative humidity up to 95 percent in temperature range.

The system provides selection of more than 10 switchable channels in the 7 GHz band. A double heterodyne method of modulation employs an 800 MHz band SAW oscillator at the first local stage of the transmitter and at the second local stage of the receiver. The TVL-800-6F is also adaptable for use as a 70 MHz IF transmission system.

For More Information
Circle 251 on Reader Service Card.

Sony Joins Tektronix for Small Scope

The introduction of the 11-pound Sony/Tek 336 digital oscilloscope for $4500 signifies the development of a small combination nonstorage and digital storage oscilloscope. When used in the store mode, the unit measures signals to 50 MHz equivalent-time bandwidth, with memory length of eight bits by 1024 words. When used in the nonstorage mode, it measures signals to 50 MHz.

The combination allows the user flexibility in analyzing and storing low-rep-rate signals on the digital channel

and making conventional measurements on the analog channel, as well as making comparisons in real time with stored signal information simultaneously. The time base range of this delayed sweep scope is from 20 seconds/div to 10 ns/div. There are two stored waveforms standard, with 18 as an option on a display size of 8x10 div.

The user can add, subtract, or multiply the signals of channels 1 and 2, and can calculate the RMS, peak to peak, and average of acquired waveforms. As a menu-driven system in combination with the alphanumeric CRT readout, the user is offered the selection of many settings, obviating the need for extra front panel knobs.

Because the current parameter settings appear on the CRT, the user never has to look away from the waveform. In either the store or view mode, cursors can be used to make simultaneous voltage and time measurements on the digitized waveform displays. The measurement results appear as a CRT readout.

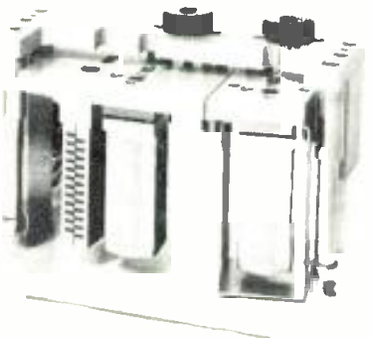
For More Information
Circle 252 on Reader Service Card.

JRF Develops Head Alignment Assembly

The new Promix II is a head assembly designed for precision adjustment of azimuth, zenith, wrap, and track placement. High frequency and peak adjustments are improved.

The assembly is designed to reduce alignment time and to simplify magnetic head maintenance. The complete package includes a new assembly cover with hinged top for easy access. The company is also offering free relapping and mounting with purchase of the Promix II. The unit is available now to fit most MCI JH Series multitrack machines.

For More Information
Circle 259 on Reader Service Card.



Frezzolini Offers Mini-Fill

The Frezzi Mini-Fill is a 75 W, 12 V camera light weighing only 13 ounces, including the attached three-foot cable and plug. The light mounts directly to video and cine cameras, tripods, or handgrips.

The light head has a standard tungsten-halogen 3200-degree K bulb mounted in a reflector providing 40 minutes of light per charge. The head tilts up or down and remains locked in position with a triple-wing knob. The light head is made of aluminum.

The Mini-Fill light is priced at $295, which includes a nicad 4 AH output capacity Frezzi VB-12 battery, matching Frezzi overnight charger, a locking shoe mount camera stud, and a holder strap. Options for the light include an eight-inch handgrip, a multipurpose nicad battery, a fast charger, trickle charger, battery belt, and a selection of 75 W, 100 W, and other bulbs.

For More Information
Circle 253 on Reader Service Card.

Microdyne Premieres Demodulator

The new SCB-2 subcarrier demodulator recovers audio from FM subcarriers transmitted along with wideband satellite television signals. This companion unit for the Microdyne 1100 Series satellite TV receivers provides a method for recovering up to four additional narrowband audio signals.

Demodulators may be ordered with one, two, three, or four subcarrier frequencies between 4.5 and 7.5 MHz. The demodulator video input to the SCB-2 is supplied by the companion

satellite TV receiver. Front panel audio gain controls vary the 600-ohm balanced audio output levels from 0 to 6.8 volts. This self-contained unit mounts in a standard 19-inch rack along with the receiver.

For More Information
Circle 254 on Reader Service Card.

Auratone Expands Monitor Line

Auratone, long known for its compact

single-driver studio monitors, has added five new models to its line. They range from the T5 ultra-compact two-way to the QC66 quality control three-way.

All monitor systems in the new series feature polypropylene low-frequency drivers, wide dispersion dome midranges, tweeters, and super tweeters. Crossover networks for all models have six or 10 elements with precision premium-quality metalized film polyester capacitors and air core inductors mounted on specially designed fiberglass/resin printed circuit boards.

The above-mentioned monitors are produced in mirror-image pairs for enhanced stereo imaging, while the enclosures are manufactured from a low-resonance, high-density wood-based product with, according to Auratone, acoustic properties superior to particle board. The T5 sells for $250/pair and the top-of-the-line broadcast studio monitor, the Q66, for $695/pair.

For More Information
Circle 255 on Reader Service Card.

Ecos Provides Ground Path Testing

As part of the line of Ecos's ground path testing equipment, the Model 1020 ground impedance tester accurately measures the impedance of the equipment grounding conductor on electrical systems and equipment, regardless of voltage. The Model 1020 is suited to measuring the impedance of equipment ground on circuits supplying electronic equipment, insuring a low-impedance ground.

Operation of the tester only requires that it be plugged into the system to check, automatically, line voltage, continuity of conductors, and wiring errors on 120 V or GFCI protected power systems. The front panel of the 1020 contains the meter and push-buttons to effect the proper test. By pushing the ground test button, measurement of impendance of the equipment grounding conductor from the receptacle back to the service entrance (not ground loop) can be performed.

Portable tools and equipment can be tested by using the probe and adaptor supplied. This is accomplished by pushing the leakage current button and reading the milliamp scale on the meter. The instrument has dual range X1 0-1 mA, X10 0-10 mA, measuring both dc and ac leakage currents to 100 kHz.

Grounding conductors of all equipment can be tested for impedance using the test probe. All impedance measurements are made under live circuit simulated fault conditions unaffected by line noise or capacitance. All 1020 Series of instruments contain a ground voltage detection circuit that automatically detects the presence of signals on the grounding conductor.

For More Information
Circle 256 on Reader Service Card.

For-A Reveals Video Typewriter

The new compact and self-contained video typewriter, the VTW-210, can be integrated into any video system. The unit employs a 16x 20 dot matrix format, using 32 characters per line and up to eight lines per page, with memory

for four pages standard.

In addition to normal display modes, it provides roll and crawl display with speed adjustable on the front panel. Other features include auto centering, line stop and word correction, edge and wipe control, previewing, sequential page switching at 0-99 second intervals, and malfunction detection alert.

The title display feature permits a

typed line where the cursor is set on the preview monitor to be instantly superimposed onto the line monitor by depressing the title key on the keyboard.

Interface components are available for For-A for expanding the system and include a preview unit, memory unit, and magnetic card and floppy disc memories. The VTW-210 is priced at $2300.

For More Information
Circle 257 on Reader Service Card.

RE Develops Audio Analyzer

Making use of an FFT analysis process and a CRT display, the new RE201 dual-channel audio analyzer provides a completely digital instrument designed for rapid, repeatable, and accurate testing of most audio equipment. The measurement capabilities include total harmonic distortion (-90 dB), intermodulation, transient intermodulation distortion, difference frequency distortion (-70 dB), and ac levels (up to 75 kHz).

Each of the 10 basic measurements can be defined to be performed in 10 different ways. The unit gives the user nonvolatile storage capability for up to 90 such measurement definitions. It also allows the user to define and store multi-measurement sequences. The sequences may be recalled by a single keystroke to simultaneously display up to nine two-channel measurement results on the CRT. The RE201 is IEEE-interfaceable and also has an RS232 port for mass storage or hard copy documentation.

The unit is designed on a modular construction using two individual 16-bit microprocessors. EMI shielding includes a separately shielded IEEE interface port, digital section, and CRT section. A full range of plug-in options is available for increased capability. Basic instrument price is $14,465.

For More Information
Circle 258 on Reader Service Card.

BUSINESS BRIEFS

Harris has announced a deal with **VG Electronics** of the U.K. whereby the broadcast division of Harris will become the exclusive U.S. distributor of the British company's line of teletext equipment. Harris will also offer complete turnkey installations for the teletext origination equipment.

Wold Communications and **Metrosports** of Rockville, MD, have signed a three-year agreement allowing Wold to provide all satellite transmission services for the sports syndicator's college basketball and football television events.

The SL6000E console from Solid State Logic with 40 inputs is the center of the CFTO-TV audio post-production room in Toronto. Otari and Ampex ATRs fill out the complement of equipment. The room is based on the live end/dead end theory and is totally symmetrical.

C.B.X., a Los Angeles-based broadcast systems designer, has been selected by **ABC** to assist in the design and installation of ABC's international broadcast facilities for the 1984 Olympics . . . . **Modulation Associates** announced that it has signed a contract with the Portland Trail Blazers of the National Basketball Association to provide a two-phase satellite system. The first phase involves the installation of uplinks for transmission of the basketball games to the Portland affiliates; the second phase calls for an undisclosed number of downlinks for the affiliates.

Bay Area Mobiletape and **KNXT,** a CBS station in San Francisco, announced the use of the **Abekas A42** video slide projector for live sports coverage . . . . **Concord Electronics** of Tarzana, CA, has decided to build AM stereo receivers for **Motorola.**

3M is selling the service support capabilities and spare parts inventory for its professional analog audio recorders to **Electro-Technology Corp.** of Menlo Park, CA. The sale includes a licensing agreement to manufacture spare parts to repair or rebuild the recorders last manufactured in 1979 . . . . **Leader Instruments** has made available all of its complete catalog of products on a rental or lease basis.

Nortronics has announced a reorganization of the company's sales territories and support structure. The changes divide the U.S. into four territories, where formerly there were only two . . . . **A.F. Associates** has been awarded a contract to design and build a film-to-tape/tape-to-film facility for **Manhattan Transfer,** a new company organized by Howard Burch, who recently resigned as head of the EUE/Editel tape transfer department.

People in the industry have been moving too. William Butler has resigned as president of **Fernseh** and will act as a consultant to the company . . . . Pradman Kaul has been promoted to executive VP and CEO for **M/A-Com** . . . . Joseph Leon has been appointed marketing director for professional markets for 3M's Magnetic Audio/Video Products division.

Noel Parente has been named director for West Coast **Audio Plus Video International** . . . . Artel has named Joseph Laskey as GM of the company . . . . George Treneer will be the new marketing manager for video products for EECO, Inc . . . . The new director of marketing for **Oak Satellite Systems** is David Beeching . . . . **Philips Test & Measuring** has named Ken Wheeler to the position of national marketing manager.

The studio division of Harris's Broadcast Group announced the appointment of H. Kenneth Regnier to VP Video Systems operation in Sunnyvale, CA . . . . George Currie has been tapped to be VP and GM for the Sony Pro Audio Products . . . . New VP sales at **Unitel Video** is Garth Gentilin . . . . **Control Video** announced the new director of sales and marketing as Mike Lang . . . . William Barkley recently joined **Econco Broadcast Service** as VP marketing . . . . Tritronics appointed Don Dunbar to the position of VP marketing for the sales division, and Max Ellison as manager of broadcast sales.

"I want the world. Consistent .05% corner registration and full auto-setup of up to 96 cameras on computer command."

HITACHI HEARD YOU.

AUTO SETUP

Don't want much, do you?

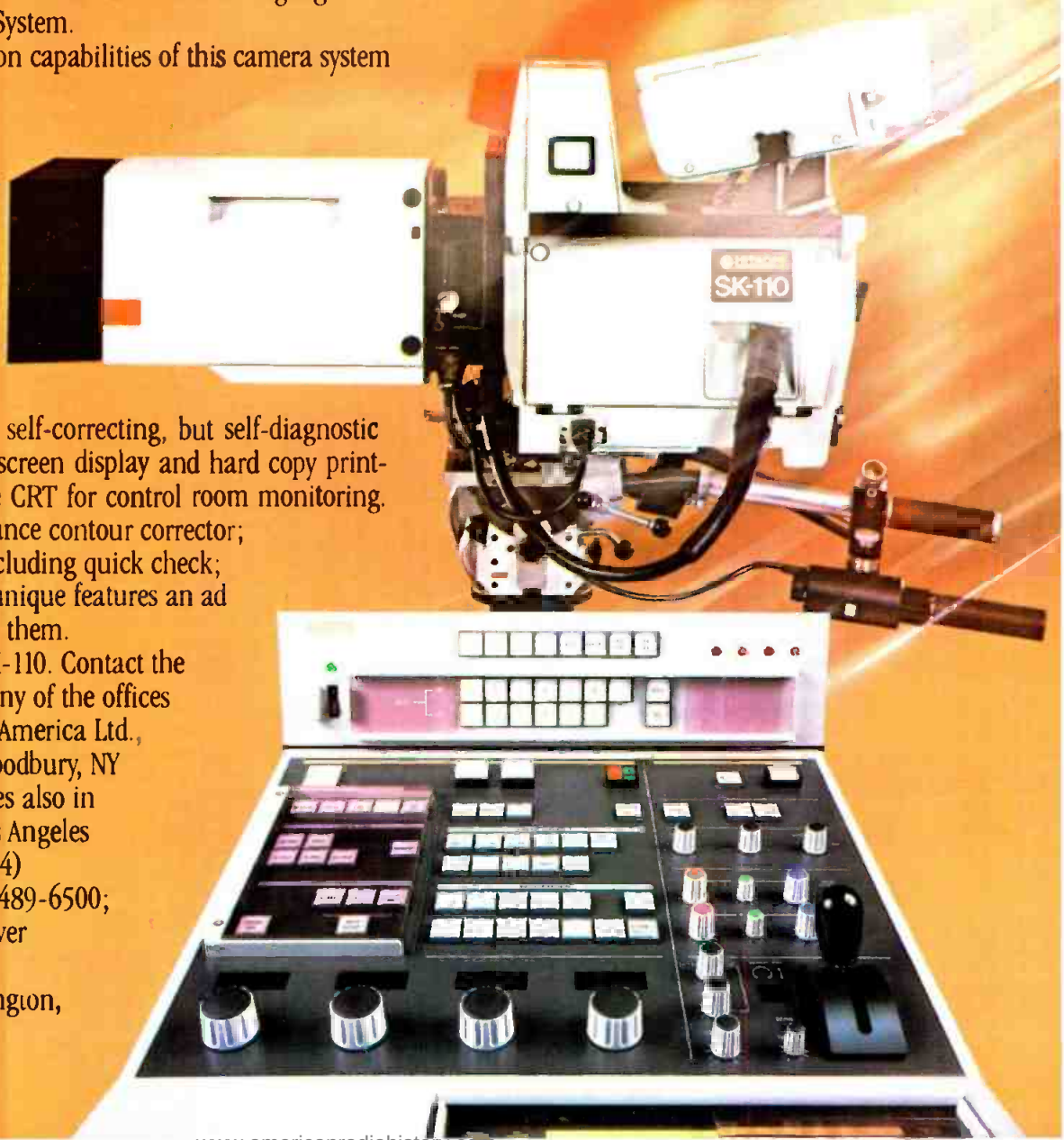
Dynamic registration not just at dead center but at all four corners. Plus 2-minute auto-setup of all those cameras.

You're asking for some smart camera system, networks of the world and top-drawer video production companies.

Well, Hitachi heard you, and has created an outright *genius*—the Hitachi SK-110 Camera System.

The computer registration capabilities of this camera system produce pictures of a clarity and resolution previously unheard of.

And you get auto-setup at the push of just one button, and zero reference, too, where the computer sets the green channel and compares blue and red to it with absolute precision.

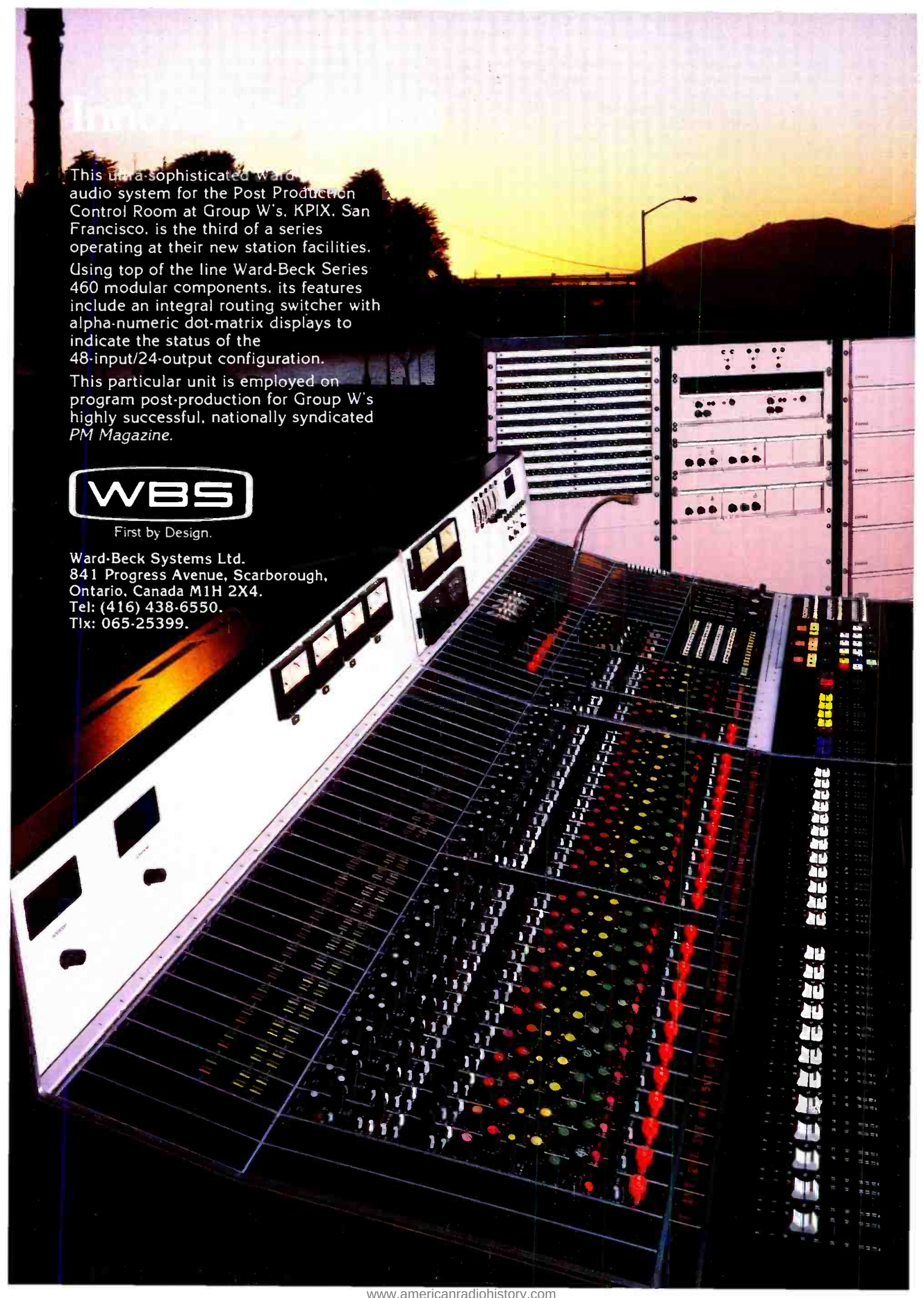


The SK-110 is not only self-correcting, but self-diagnostic as well. It gives both video screen display and hard copy printout; can be hooked into the CRT for control room monitoring.

There's a high-performance contour corrector; 5 automatic setup modes including quick check; 5 data files; so many other unique features an ad can't begin to tell you about them.

The ultimate Hitachi SK-110. Contact the broadcast video division at any of the offices listed below. Hitachi Denshi America Ltd., 175 Crossways Park West, Woodbury, NY 11797 (516) 921-7200. Offices also in Chicago (312)344-4020; Los Angeles (213) 538-4880; Atlanta (404) 451-9453; Cincinnati (513) 489-6500; Dallas (214) 233-7623; Denver (303) 344-3156; Seattle, (206) 575-1690; and Washington, D.C. (301) 459-8262.

Circle 194 on Reader Service Card



This ultra-sophisticated Ward-Beck audio system for the Post Production Control Room at Group W's, KPIX, San Francisco, is the third of a series operating at their new station facilities.

Using top of the line Ward-Beck Series 460 modular components, its features include an integral routing switcher with alpha-numeric dot-matrix displays to indicate the status of the 48-input/24-output configuration.

This particular unit is employed on program post-production for Group W's highly successful, nationally syndicated *PM Magazine*.

WBS

First by Design.

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