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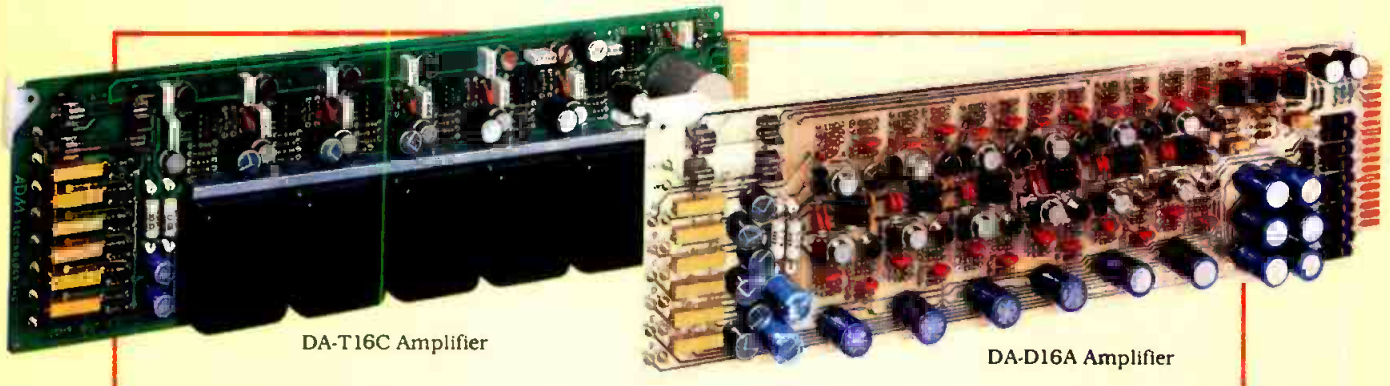

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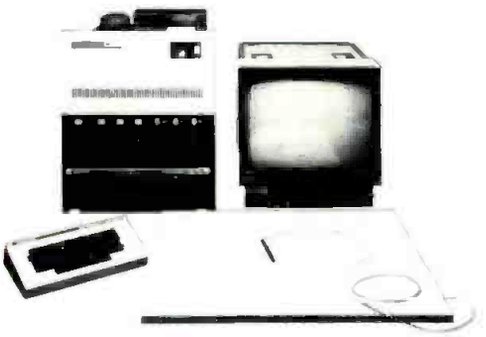

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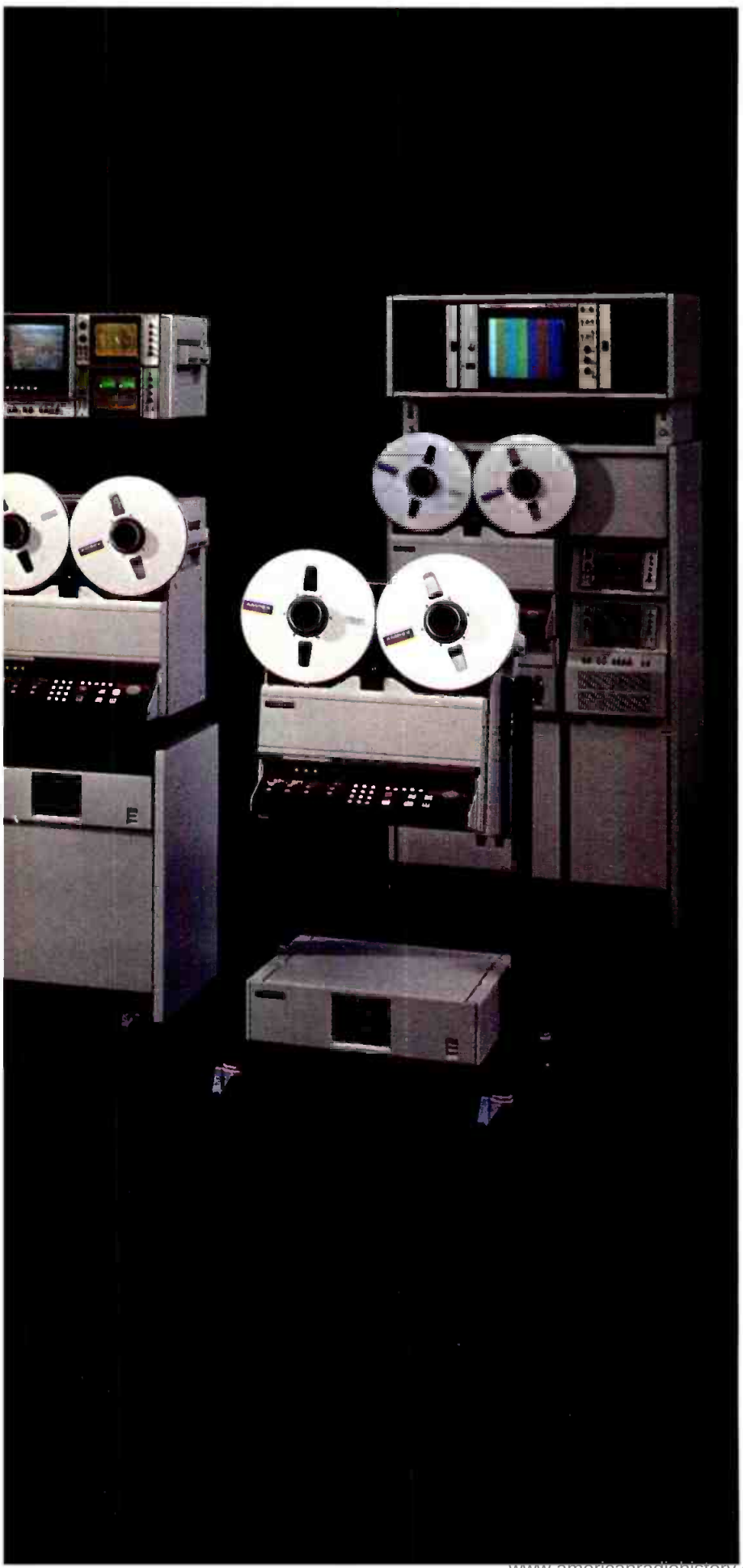

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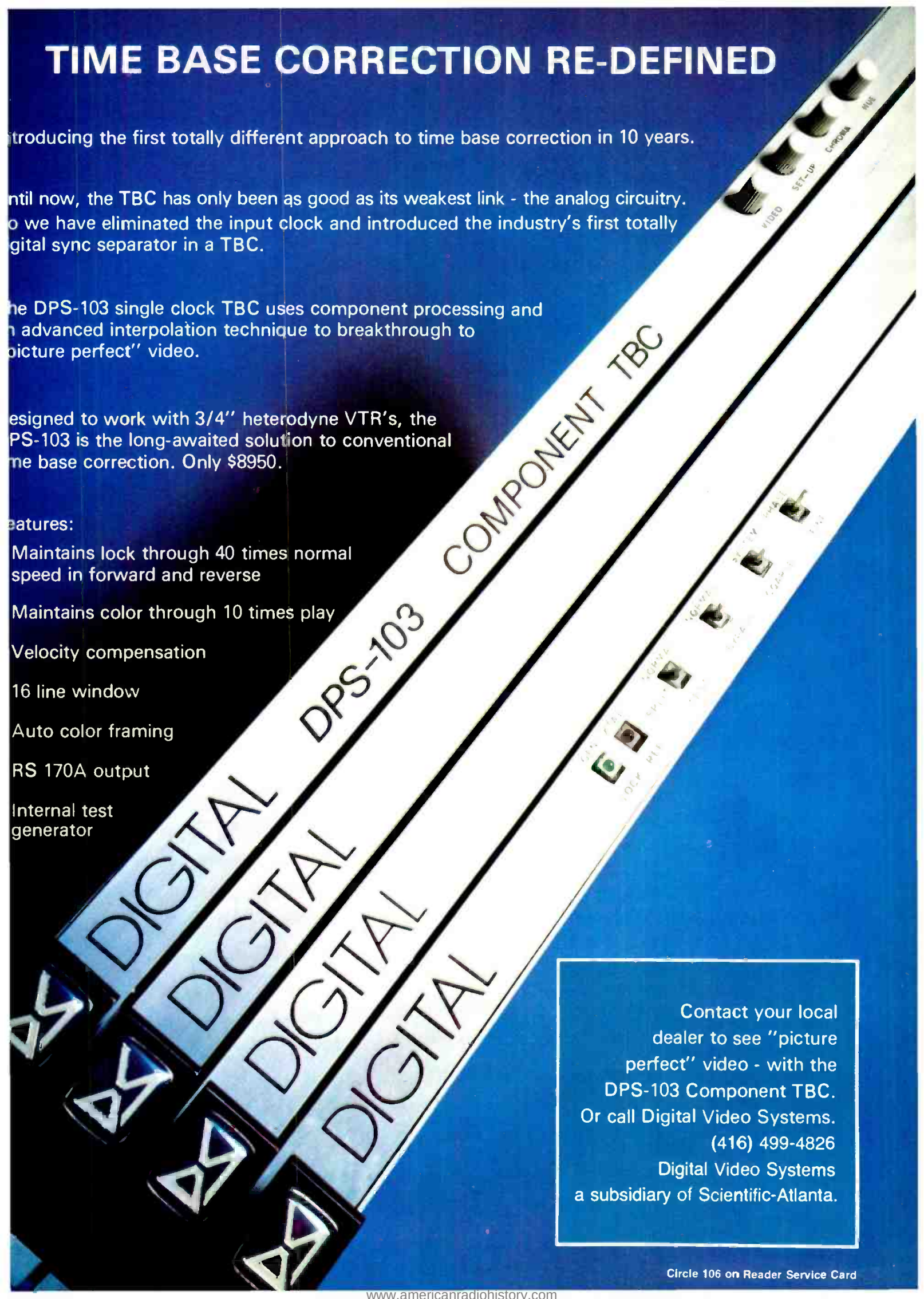

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MARCH 1984 VOLUME 20/NUMBER 3

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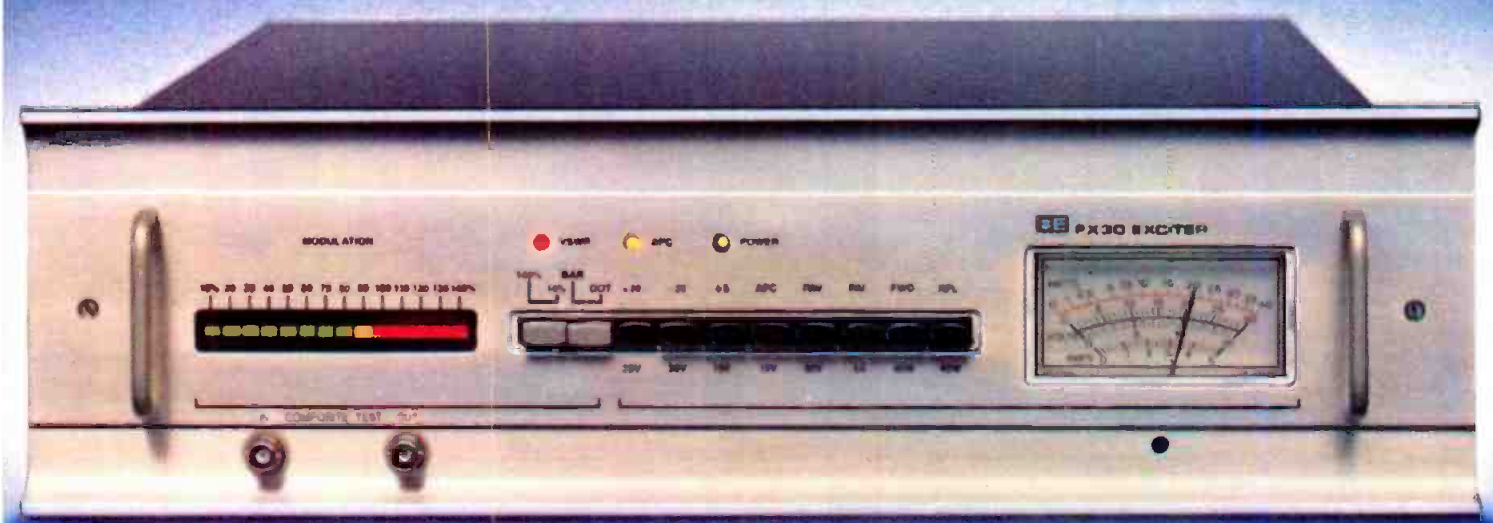
The FM Exciter That Can't Be Copied.



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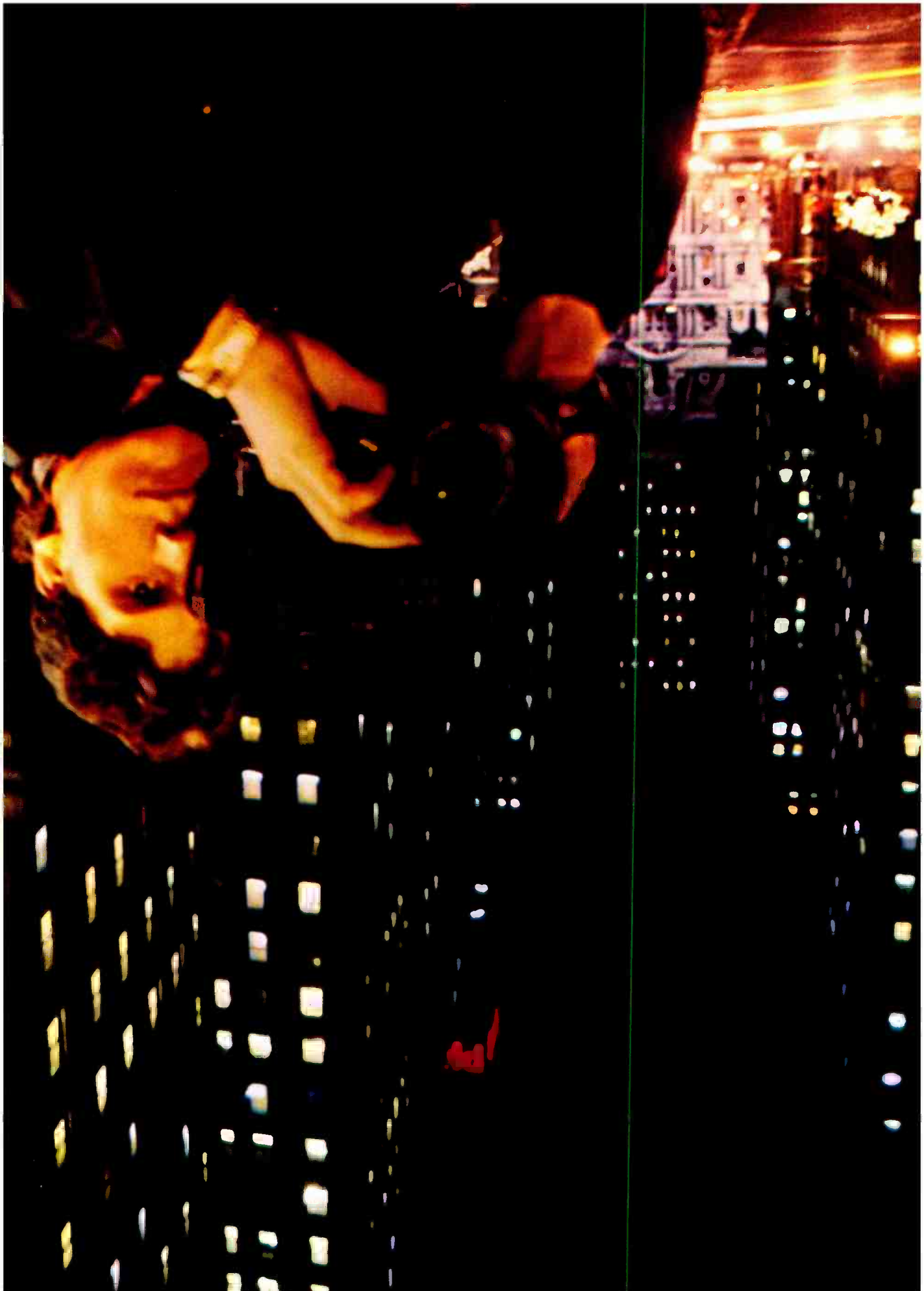

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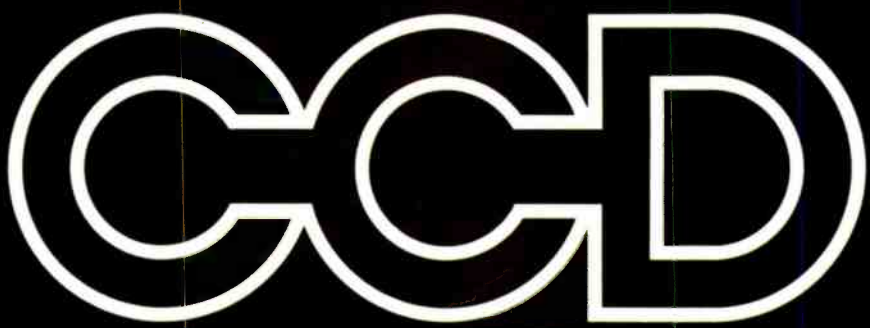
RCA Leads the Way with New Camera Technology



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EDITORIAL

A Time for Decisions

The economy is up, business is good, and for most broadcasters things are going well. But in the words of one industry observer, the future is rushing toward you, but when it arrives, its duration is only a moment—then it speeds into the past. Today, managers have to make a continuing series of decisions in order to be able to act when the moment is right.

This observation was particularly apt during the SMPTE Winter Conference in Montreal last month. And the message—a time for decisions—applies equally to radio as it does to the television engineers who attended. The future is indeed upon us and crucial decisions that will affect the next five to 10 years need to be made by broadcasters now.

Yes, it would be easy to sit back in the belief that, because things are looking good, there is no need to "make things happen." However, is complacency really the way? The title of the SMPTE keynote address by Canadian broadcaster Alexander Day would suggest otherwise: Studio to Home, How Good Is the Electronic Highway?

There are new technologies about to sweep over broadcasting aimed at improving that electronic highway and with them will come changes in the industry. Changes that require decisions. For television, SMPTE looked at three areas: New recording technology, new distribution technology and new display technology. This agenda is significant because it means that broadcasters must be involved with how enhanced performance receivers are designed as well as keeping up with the production and transmission end.

But this involvement with the total system is inevitable as DBS service, high definition television, enhanced/extended NTSC and digital production equipment reach the marketplace. The key to the use of these technologies will be standards, and that is where the decision-making effort must go. Moreover, all of this change is coming at a time when the Federal Communications Commission is taking less and less of a role in dealing with technical standards.

As the investment stakes for new technology increase, the hardware designers and manufacturers need more and more information from the users—another critical decision-making path for broadcasters. When the NAB Show opens next month, you may be inclined to celebrate your successes, but you had better go prepared to work.

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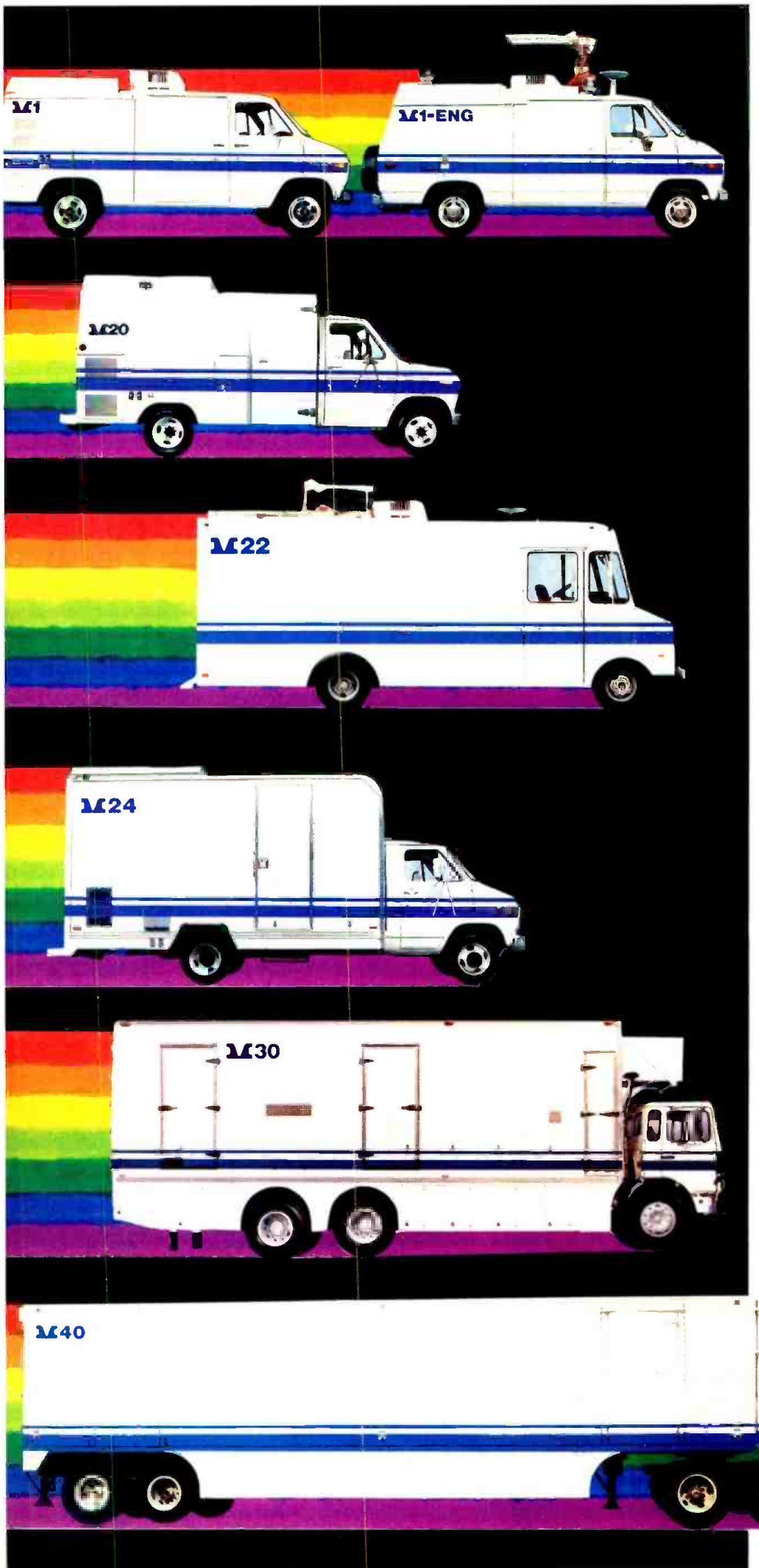

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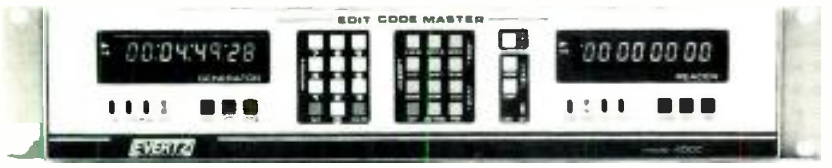

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LETTERS

SATELLITES

To the Editor:

It is regrettable that *BM/E* chose not to mention the technological achievements of the PBS network in an otherwise excellent review of satellite systems ("Invasion of the Satellites") in the July 1983 issue.

In February 1978, PBS completed installation of 150 10-meter antennas to provide public TV stations from Alaska to St. Thomas, VI, with a high-quality, high-reliability video service with digital multichannel sound (DATE). PBS, with four leased transponders on Western Union's Westar I, became the world's largest full-time satellite network, providing programming for the Eastern/Central, Mountain, Pacific, and Alaska/Hawaii time zones.

At a time when many could not spell the word "satellite," PBS and the Corporation for Public Broadcasting were designing and constructing the system that today provides satellite quality service to over 280 public TV stations at significant cost savings compared to equivalent services provided by terrestrial facilities. I was part of that project and I remember the educational processes involved in learning the "new technology." PBS over the years has continuously improved its programming services and led the way in finding new uses for satellite-distributed services.

Edmund A. Williams
NAB Staff Engineer
Washington, DC

FAN MAIL

To the Editor:

Yesterday we received our December issue of *BM/E* magazine. I was most delighted at the quality of all the Radio Stations in the running for the "Best Station" awards. I felt your magazine did an outstanding job of presenting information on KNSI/KCLD AM and FM. Should we win or not win this fine award, my sincere thanks for this excellent article on us.

John Moline, GM
KCLD/KNSI AM
St. Cloud, MN

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Now there's even more to look into

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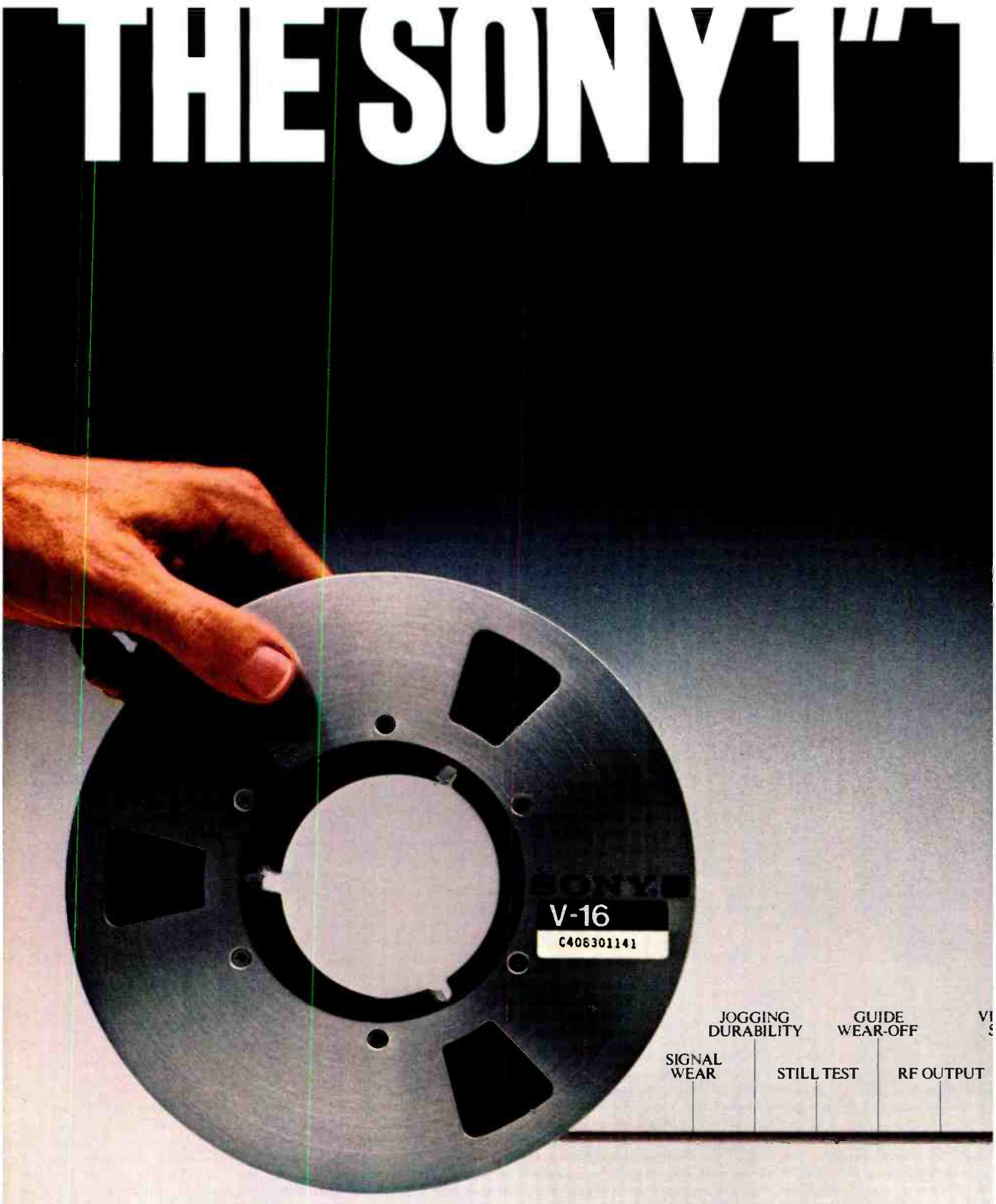

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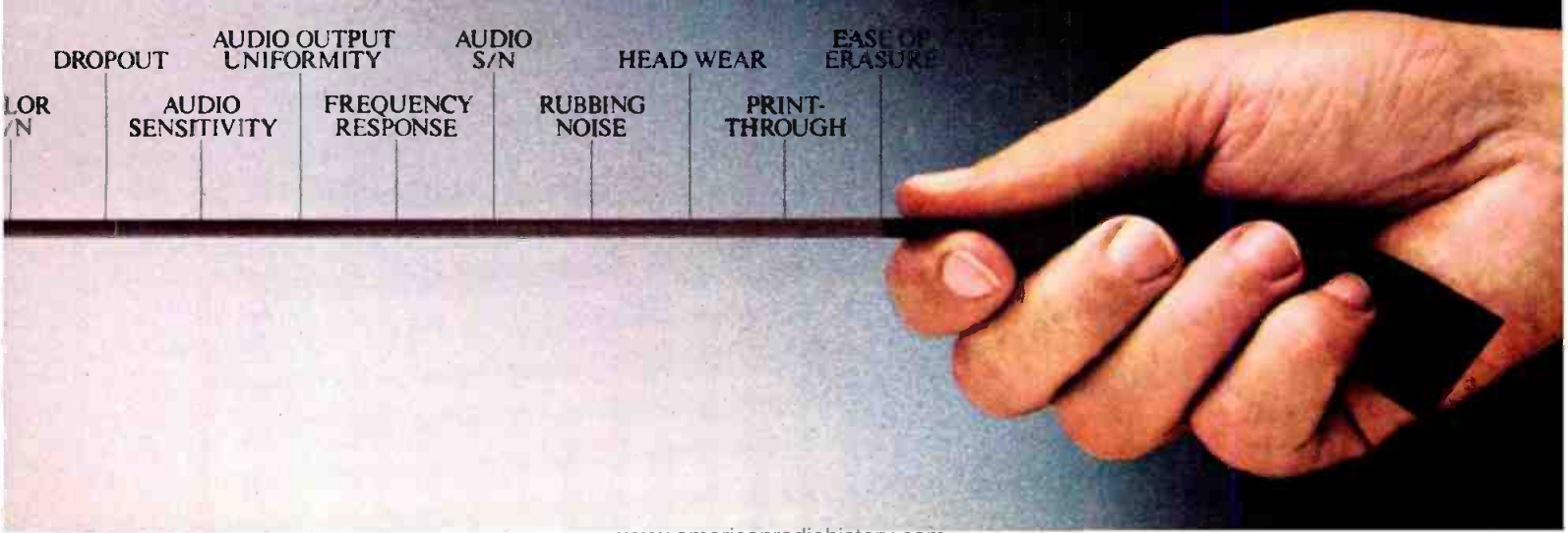

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FCC May Deregulate Station Ownership

The NAB and NRBA have come out in support of FCC plans to eliminate its regional concentration rules and to relax those governing group ownership. If implemented, the two proposals for rulemaking would greatly change the station buying market.

The ownership rule under consideration, known as the 7-7-7 rule, limits owners to a maximum of seven television, seven AM, and seven FM stations. The NRBA has filed a statement suggesting the Commission increase the limit to 18 AM and 18 FM stations per owner to reflect the current number of broadcast stations, but that it not drop the limit completely. The NAB supports a liberalization, but is not asking for total repeal of the 7-7-7 rule.

Repeal of the rule would leave the FCC's existing local ownership rules and federal antitrust laws to limit group owners other than the networks. The Justice Department has cleared changes in the quota, finding no risks to competition.

Current regional concentration rules prohibit operators of three or more broadcast stations from owning stations within 100 miles of each other. Before passing these rules in 1977, the FCC determined acceptable concentration on a case-by-case basis. The NAB petitioned the Commission to reexamine these rules, declaring not only that increased competition made them unnecessary, but that unused channels would be activated since a regional owner could operate more efficiently. This, the association asserted, would also increase minority ownership. The NAB says it is "delighted" that the FCC has agreed.

In its proposal on regional concentration, the Commission reasoned that new distribution systems such as cable, subscription TV, and DBS have spread out economic control of the electronic media enough that larger broadcasting groups will not monopolize the viewer's programming. Commissioner Rivera disagreed, however, with the majority's assessment, calling it "speculative at best." His dissenting statement also noted that "there is no dearth of applicants" for unused channels.

Home Taping is Legal, Supreme Court Rules

With the Supreme Court's recent ruling that home videotaping of copyrighted television programs does not violate U.S. copyright law, the motion picture industry has vowed to shift its fight to Congress. The justices, in overturning a ruling by a lower court, found that "time-shifting," or taping programs for later viewing, constituted a "fair use" exemption under the copyright law, and that neither consumers nor makers of home videotaping equipment were liable for any violation.

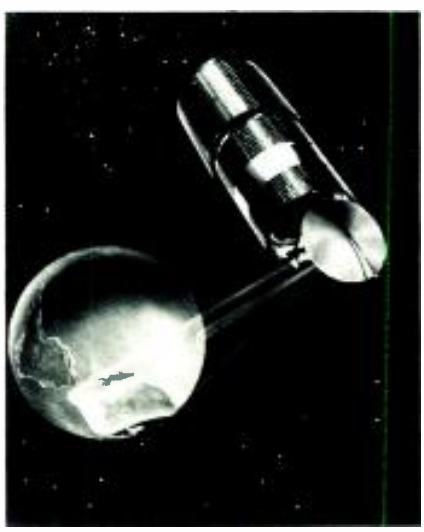
The court's decision ended the long-standing "Betamax case," brought in 1976 by Universal City and Walt Disney Studios against Sony Corp., four retailers, an advertising agency, and a Betamax user. The studios had hoped the case would result in some method of collecting copyright royalties for shows taped by consumers.

Now, with legal avenues closed, the studios must turn to Congress if they wish to obtain royalties. Jack Valenti, president of the Motion Picture Association of America, has vowed to press for legislation imposing a royalty fee on the sale of VCRs and blank tapes. Most observers feel he has little chance for success, however, at least in this election year. Home VCRs are already owned by 10 percent of U.S. households, and penetration is expected to continue to rise.

In his majority opinion, Justice John Paul Stevens was careful to distinguish between time-shift recording for later viewing, which he interpreted as a fair use, and recording for any commercial or profit-making purpose, which he said "would be presumptively unfair." He said the plaintiffs had failed to demonstrate convincingly that they would be harmed by home taping.

The decision did not deal with another controversial area—home audio taping of music from a radio. Many feel that such taping presents different legal problems from home videotaping, in which viewers generally erase pro-

Westar 6, Palapa Birds Fail to Achieve Orbit



Westar 6's failure to reach proper orbit will keep it from performing its communication functions.

The satellite industry reeled in shock last month as two communications satellites launched by the U.S. Space Shuttle failed to achieve geosynchronous orbit and were written off as complete losses.

Even after the loss of Western Union's Westar 6 bird, NASA and the Indonesian government decided to go ahead with the planned launch of Palapa 2B, the fourth satellite in Indonesia's space communications system. Booster rockets on both satellites failed to raise them to 22,300 feet above the equator, the necessary altitude for geosynchronous orbit. Although both satellites were contacted within hours of launch and appeared to be in good working order, their improper orbits make them unusable.

Both satellites were insured, for approximately $75 million each, as are all communications satellites. Many industry observers fear that the twin mishaps may raise the already high cost of insuring satellites.

The accidents also cast a pall on the Space Shuttle program, although the launches themselves apparently went off without a hitch. This mission of the Shuttle has been plagued with problems; in addition to the loss of the payload, a target balloon that was to be used by the astronauts exploded as it was being launched.

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The Harris TV-30H does it better at 30 kilowatts than any other high band TV transmitter. By design.

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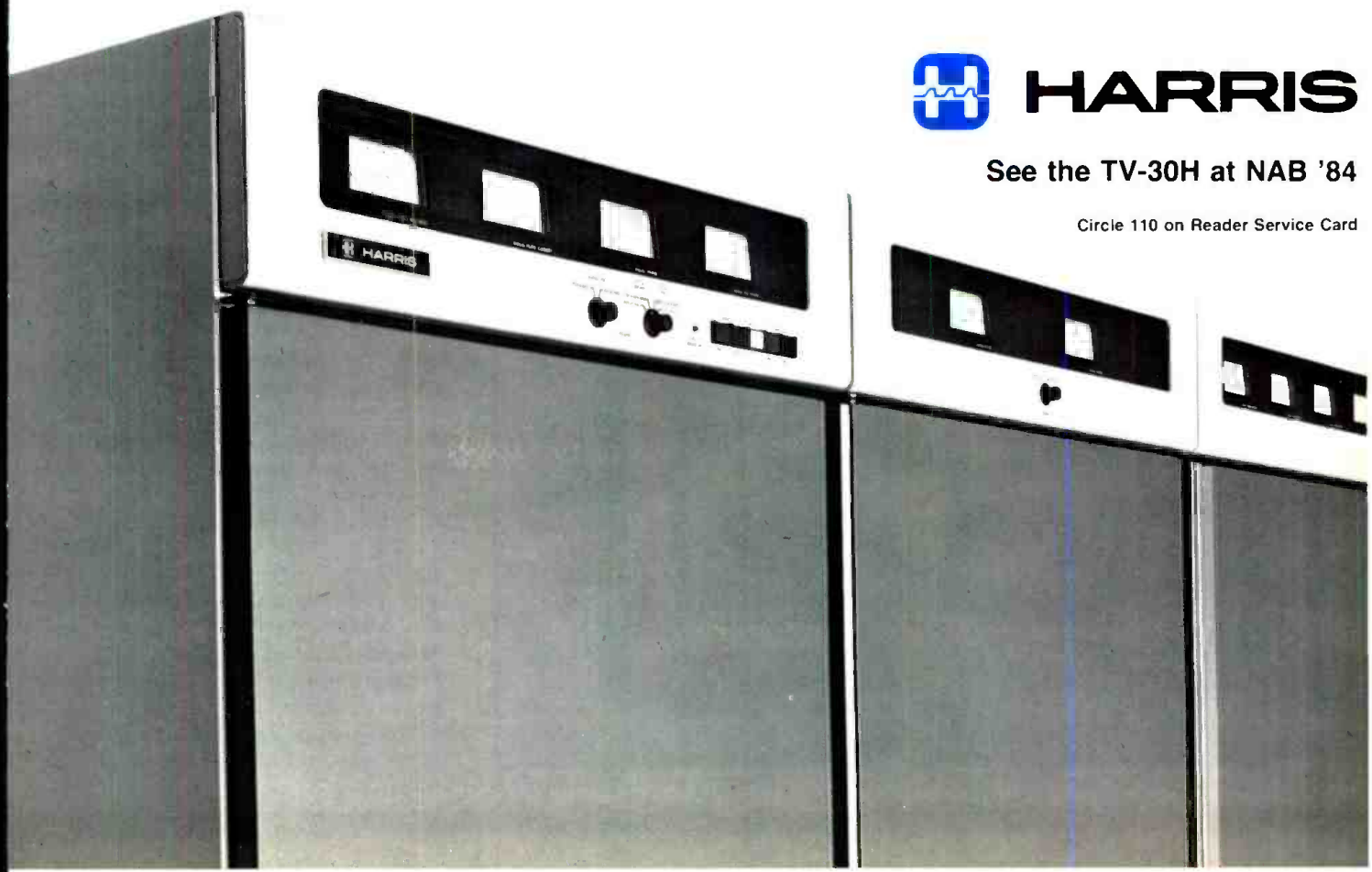

HARRIS

See the TV-30H at NAB '84

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grams after watching them. Broadcast music, however, is often recorded for archival purposes as an alternative to buying records.

NAB, NRBA to Merge Radio Conferences

In a significant move toward cooperation, the two major broadcast-industry trade associations have voted to merge their annual radio conferences. NAB's Radio Programming Conference and NRBA's annual conference will be combined into a single meeting, to take place September 16 through 19 at the Bonaventure Hotel in Los Angeles. The dates and venue are those originally planned for NRBA's conference.

The negotiations that resulted in the conference merger announcement also generated a pledge by the two groups "to work together on legislative matters including, but not limited to, deregulation." In a joint statement, both groups expressed "confidence in a smooth and harmonious working relationship," trusting "that they have addressed the overall best interest of radio."

While the announcement seemed to many a possible precursor of a merger between the two organizations, which have often been at odds, NRBA president Bernie Mann was quick to squelch any such rumors. "Nothing could be further from the truth!" insisted Mann in an open letter to broadcasters, although he noted that NRBA has been considering a merger possibility with the Daytime Broadcasters Association (presently thinking about joining forces with NRBA or NAB). "The need for a separate, radio-only organization . . . has never been greater," Mann added.

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S-A Receives Major CBS Sat Antenna Order

Scientific-Atlanta has received an order to supply the CBS television network with 150 to 200 satellite antennas, including an as yet undetermined number of transmitting sites.

Dwight Morss III, manager of information services for CBS TV, states, "We are recommending to our affiliates that they employ the Scientific-Atlanta hardware since CBS has endorsed its use and because we wish to keep the network uniform in its capability and quality as we make modifications in the future." Among those modifications will be a master remote control and automatic switching center located in the network's New York headquarters, now under construction. Until the master control is complete and operating, the antenna sites will be controlled locally by manual operation.

In the conversion plan to take the network from a terrestrial carrier to a satellite-delivered system, each station will have a seven-meter primary receive dish and a 4.6-meter backup unit. The network's O&O's, as well as several geographically strategic affiliates, will be equipped with transmit ports that will accept a portable transmitter hookup for uplinking from those sites.

The system conversion began in November 1983, when nine stations in the Southwest switched over to satellite receive systems. An additional station

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all three companies at the FCC, the battle's outcome may hinge on Warner and Chris-Craft's one-day edge in proposing this sale and on their being based in the U.S.

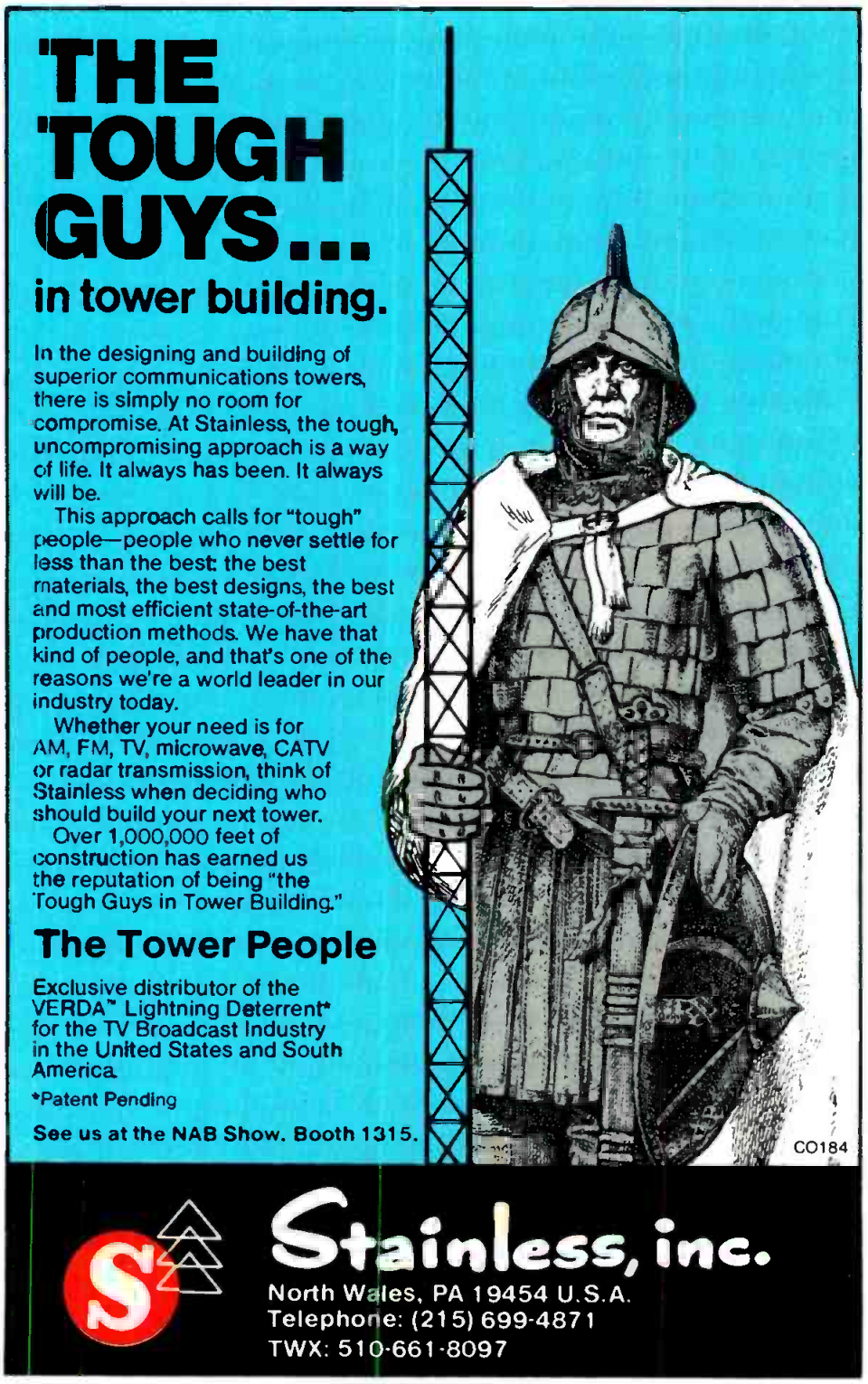
Meadowlands Announces AT&T Sat Agreement

Meadowlands Communications, a new company operating out of Rutherford, NJ, has announced that it will begin complete uplinking and downlinking services in April in cooperation with AT&T Communications.

The new company, involved in the design, implementation, and operation of a nationwide system of satellite stations, will use AT&T's Skynet digital audio service. Meadowlands' satellite program, called Starlink (for Satellite Television and Radio Link), began in January with two uplink dishes at its New Jersey headquarters and will expand to additional locations including Washington, DC, Chicago, Dallas, Kansas City, and Los Angeles, all to be fully operable by April 1.

According to John Chanin, senior VP of administration, "Our marketing is geared, though not exclusively, to sports and to the major networks." Accordingly, the company plans to add two markets per month, after the official April startup date, until the top 26 markets are covered. "Most of these facilities," says Tony Masiello, senior VP of operations, "will be concentrated at professional stadia and on some college campuses."

In addition, Meadowlands will offer transmitting and receiving capabilities to individual broadcasters, as well as providing services to the entertainment industry. Distribution programs will also be offered to corporations requiring data and teleconferencing communications.



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Harris Stereo Exciter Re-Approved by FCC

The Harris Corp. AM stereo exciter, languishing in regulatory limbo for four months, has been rescued by a rule waiver from the FCC. The Commission had rescinded its original acceptance of the exciter upon finding that the model Harris was shipping to radio stations differed in several respects from the model it had originally tested.

Upon completion of laboratory tests of the newer model, the STX-1A, the FCC found the exciter in accordance with its requirements except for provisions that harmonic distortion not exceed five percent as measured by an envelope demodulator. The Commission found no evidence that the STX-1A would cause co-channel or adjacent channel interference to other stations, and noted that stations using Harris's AM stereo system have received no quality complaints from the public.

E.W. Jaeger, vice president and general manager of Harris Broadcast Transmission Division, said that Harris would start to ship back orders for the exciter immediately and expected to be able to fill new orders soon. He added that the company "expects to quickly recapture its leadership position" in AM stereo and has waived all licensing and royalty fees for receiver manufacturers.

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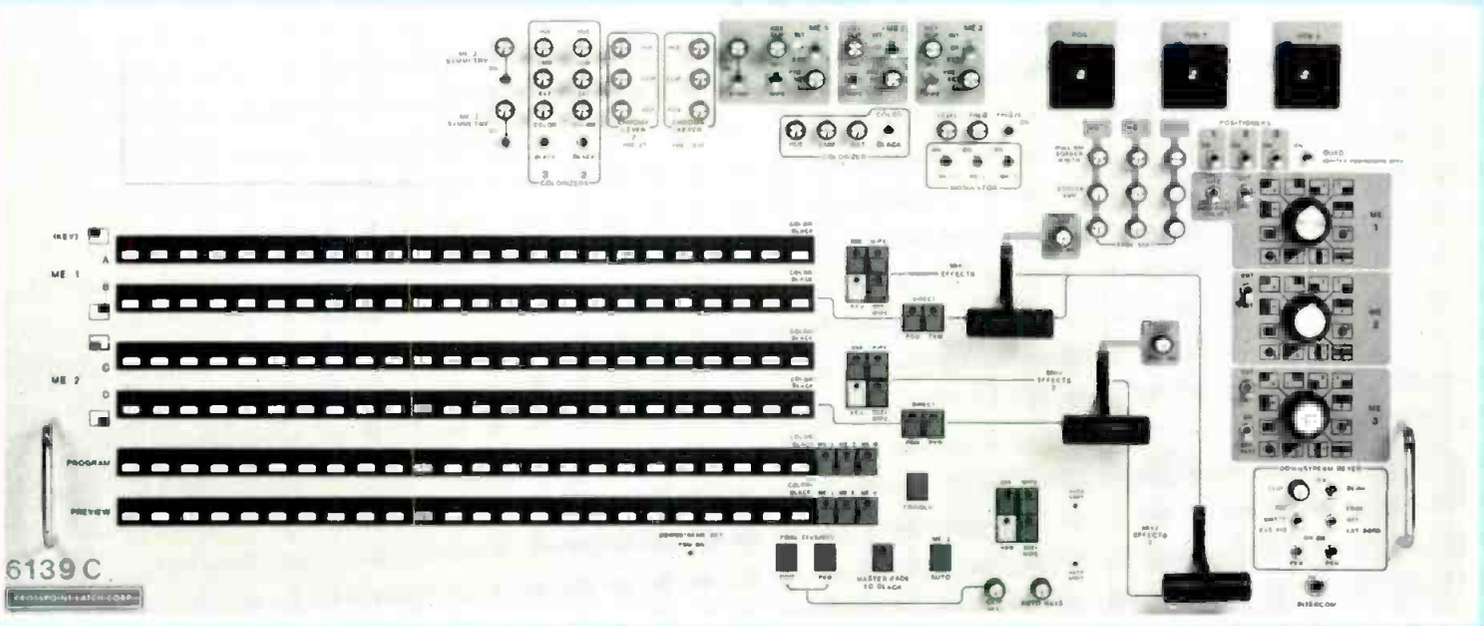

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The three mix-effects systems, each with its own independent pattern generator, quad split, downstream keyer and full preview, provide a tremendous production power. The optional extended effects pattern generator can be switched into any ME system to produce matrix wipes, multiple patterns, etc. There are two optional chroma keyers, RGB or encoded. The 6139 can produce wipes over, behind or between keys. The five keyers allow portions of six video signals to be displayed at the same time. The downstream keyer has matte as well as an insert key mode.

POST PRODUCTION

The 6139 will accept commands directly from the keyboard of most editors when interfaced with the CROSSPOINT LATCH 6403 Editor Switcher Interface, or 7200 AUTO DRIVE™. The CROSSPOINT LATCH Interfaces produce FRAME ACCURATE TRANSITIONS with very accurate start and end points, and without the conventional delay in the start of the transitions. These interfaces also permit the user to perform transitions which stop at an accurate point set by the user anywhere on the screen, reducing the number of edits in a production.

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Basys Inc. Acquired by British News Producer

Independent Television News (ITN), the British news organization, has acquired a controlling interest in Basys, Inc., the maker of newsroom computers for radio and television. ITN, which produces news programs for independent broadcasters in the U.K., has been a major user of the Basys News Fury system since 1981.

As 51 percent owner of Basys, ITN plans to encourage further product development as well as marketing support. ITN assistant general manager David Lyon, who has been named president of Basys Inc. and managing director of newly formed Basys International Ltd., says the company plans to add more staff on both the support and development ends. The three major aims for this year, according to Lyon, include enhancing support, marketing, and development for the U.S.; setting up a marketing and support team in Europe; and developing new products.

ITN is enthusiastic about prospects for Basys products both in the US and internationally, and plans to show some new enhancements at this spring's NAB show in Las Vegas. Areas for expansion may include graphics, still stores, and laser videodiscs, according to Lyon.

ITN is the developer of the VT80 computer graphics system, used for news graphics by the U.K.'s Channel 4 and for election coverage by NBC here.

Varian Joins Effort for Power-Saving Klystron

Any UHF readers who help pay the station's electricity bill may recall a NASA invention that could cut klystron power usage in half (*BM/E*, April 1982, p. 14). The device has taken a significant step toward practical use. NASA has awarded Varian, Inc. a contract to adapt the multi-stage depressed collector to klystrons, due largely to a unique alliance between Varian, NAB, PBS, and the space agency.

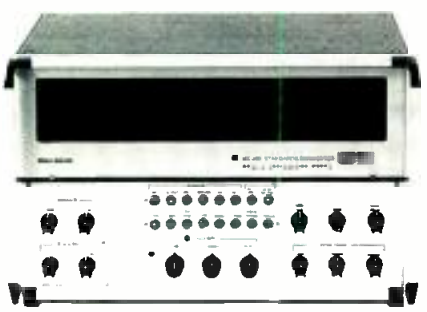
When NASA first announced the device, prospects for building the super-efficient tube appeared slim due to the high cost of R&D. However, according to Sandy Felder, engineer for NASA's Technology Utilization program, the agency arranged with NAB, PBS, several OEMs, and Varian to sponsor a three-year, million-dollar effort to develop the new klystron. Varian's work will be the project's first stage.

NASA calculates that a 200 kW UHF station in a medium-to-large metropolitan area typically spends about $300,000 a year on electricity, and prices are rising. Thus, klystrons based on new design should pay for themselves in a year.

Correction

In January's special report, "Weather Graphics—The Sky's The Limit," two photos were inadvertently misidentified. Dubner Computer Systems supplied the pictures on p. 37 (far right) and p. 38 (far left).

ME-288 PAL/NTSC Standards Converter



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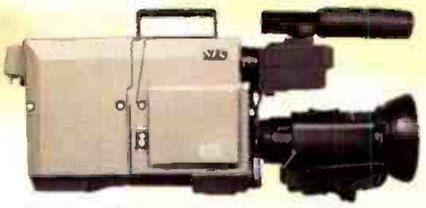

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NEWS BRIEFS

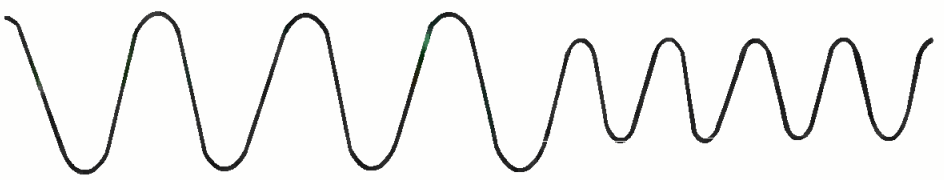
Nationwide **employment at broadcast stations** rose 0.75 percent or 1207 employees in 1983, says the FCC, compared to a 1982 rise of 0.89 percent. Based on employment reports from stations with five or more persons, the Commission compiles an annual profile of the broadcasting job market with state-by-state and five-year figures broken out by class of service. Copies can be purchased by calling (202) 296-7322.

Metromedia has accepted chairman John Kluge's offer to buy the company. As approved by Metromedia's board and an independent group of directors, Kluge and his backers will pay $30 per share plus $22.50 in subordinated debentures (see *BM/E*, February 1984, p. 14). No date has been set for the sale as of press time since Metromedia was filing for approval by the FCC . . . **CPB** has reported a 9.9 percent rise in income for the 1983 fiscal year, or 3.7 percent when adjusted for inflation.

U.S. radio grossed $5 billion in 1983, the Radio Advertising Bureau estimates, up 12.1 percent from $4.47 billion in 1982. This estimate includes $268 million for network radio, $996 million for national spots, and $3.745 billion in local and retail commercial sales. For 1984 **RAB projects 15 percent growth** in radio revenues or $5.75 billion . . . The RAB has joined NAB and NRBA in asking that its members supply **revenue data** to a CPA firm of their choice for consolidation and forwarding to the associations. Since the FCC dropped financial reporting requirements in 1980, no industry or local sales figures have been available.

The FCC has asked AT&T and local carriers for details about their **proposed tariff changes,** which include large hikes in land line prices. In order to determine why prices should rise, NAB had suggested that divestiture-related tariff changes be examined separately from the huge number of rate changes now awaiting approval by the Commission . . . NAB has asked the FCC to tighten the **multi-city identification rules** it recently deregulated. The Association wants some signal coverge requirements back, along with the defunct process for reviewing multi-city requests. It also wants the Commission to check complaints about coverage of communities identified . . . NAB will file to get the FCC to resume regulation of **call letter disputes** instead of letting local courts decide . . . Meteorologists who had hoped to buy their very own **NOAA weather satellite** will have to make do with their radar screens. Congress pushed through legislation forbidding the satellite sale, though the Landsat-Earth picture system is still up for grabs.

Those interested in the **1983 Armstrong Awards** can enter AM or FM programs until April 1. Categories are music, news, news documentary, public or community service, education, and creative use of medium. Contact Ms. Munire Terpis, Office Manager, Armstrong Foundation, Rm. 1342A Mudd Building, Columbia University, New York, NY 10027 (212) 280-8703 . . . The new **Society of Satellite Professionals** has elected a board and is organizing local chapters. For information write SSP, Box 19047, Washington, DC 20036.



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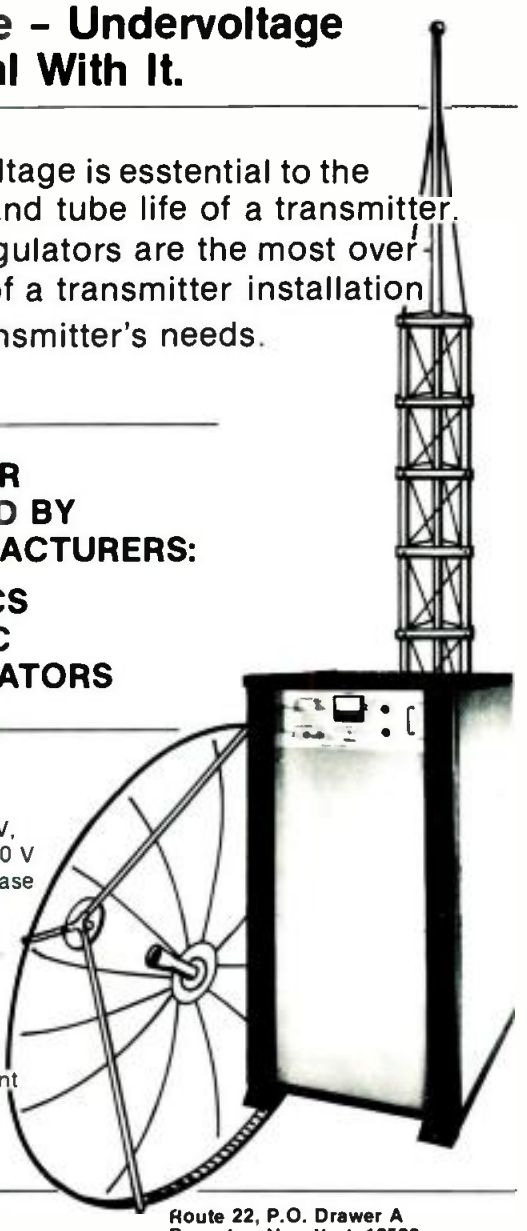

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H9386D	18	106	Magnetic	Magnetic	60	1,000	0.9	1.8	ENG and EFP cameras

Electrostatic deflection type SATICON III

H4125	18	90	Magnetic	Electrostatic	65	1,100	0.9	2.5	ENG cameras and studio subcameras

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Independents Bring Electronic Sound to Public Radio

Diliberto in the small studio that serves Pennsylvania Public Radio Associates.

Electronic sound—from the beginnings of taped music to the development of synthesized compositions—is one of the most important, but least understood, aspects of twentieth century music. It was to set the record straight that two independent public radio producers, Kimberley Haas and John Diliberto, journeyed to Europe and back to produce *Totally Wired: Artists in Electronic Sound*, a 26-part series for public radio.

"Electronic sound is an area of music we're particularly interested in," explains Haas. "It's very diverse, and people don't get to hear very much of it. We're convinced it has a lot of appeal, even though it's not proven." Unproven or not, Haas and Diliberto were able to convince Yamaha International Corp., Sequential Circuits, Inc., the Pennsylvania Humanities Council, and the Pennsylvania Council on the Arts that the series deserved funding. For Yamaha, a manufacturer of electronic keyboards and synthesizers, "Underwriting this program was logical in many respects," according to Bill Hinely, manager of the company's Combo Division. Sequential Circuits, as maker of the Prophet synthesizer, also has a vested interest in promoting electronic sound.

"The state councils have been very supportive," Haas notes. "In some states, the arts councils don't fund media projects at all, and in others they don't fund audio."

Producing for public

The coproducers of *Totally Wired* initially met at public station WXPN, Philadelphia, where Haas was music director for four years and Diliberto, an independent producer and music journalist, worked as a volunteer. Their work on the series eventually took them both away from the station and led to the formation of their own public radio production organization.

Totally Wired is one of the first productions—and the first of this length—by Pennsylvania Public Radio Associates, the production and distribution group incorporated about a year ago by Haas and Diliberto. "I had become more interested in producing than in being an administrator," Haas says. "We formed the organization so we could devote all our time to producing shows and distributing them nationally."

Although the two producers are the only full-time members of the group (two others devote some time to it), Haas hopes that 1984 will see additional growth, both in personnel and production. "A number of production groups like this are springing up around the country," she notes, citing as examples Western Public Radio in San Francisco and the Public Radio Cooperative in Boston.

Avoiding the LCD

From the beginning, Haas and Diliberto felt that to treat electronic sound fully, they had to avoid a lowest-common-denominator approach. "We decided at the outset that we weren't going to compromise," Haas states. "Some electronic music is hard to listen to, but we decided not to waiver." Choosing as the primary thread the voices of the artists themselves speaking about their work, the producers conducted a total of 38 interviews, which they edited down and interspersed with the artists' music and narration by Haas.

The first stage of the work, then, was a four-week trip to Europe, where many top electronic musicians are based. The first stop was France, followed by England; they finished with two full weeks in Germany. Interviews were conducted in English, although Haas and Diliberto, in the excitement of the project, sometimes failed to no-

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Haas at work at the Otari ATR. The studio also has a small Tascam console and Otari and Tascam half-track ATRs.

tice how poor some of the artists' English was.

"We got very acclimated to people's accents," Haas explains, adding that her knowledge of German made it easy for her not to notice that some of her subjects were speaking mixed German and English. "When we got home, we realized that some of the interviews were really bad in that respect." One or two interviews were actually unusable in their recorded form, and others required very careful editing. "In some cases, we wrote the narration to prepare listeners for what was to come, or to reinforce what they had just heard," Haas adds. Eighteen of the interviews were conducted overseas.

For the remainder, conducted in the U.S., logistical problems were far fewer. "Almost everybody passes through New York sometime," Haas laughs, "so we were able to do the interviews in a less concentrated way by just waiting for the artists to visit New York," just an hour and a half from Philadelphia. In addition, Diliberto made a week's journey to the West Coast to talk to California-based artists.

Initially, the producers used a Nakamichi 550 cassette deck for interviewing, but switched midway during the year and a half production to a Sony TCD-5M. "When we started out, the Nak was the best machine around," Haas relates. "Its problem, though, is bulk and weight. Half of its volume is taken up with batteries, and it runs for a very long time, but it's heavy." The Sony machine, with comparable audio quality but shorter recording time, is about half the size of the Nakamichi, according to Haas. The recording microphone was a Shure SM58.

Although most of the interviews passed without unusual incident, a few contained surprises. "While we were in his studio, Vangelis [one of the featured artists] suddenly offered to demonstrate some music," Haas recalls.

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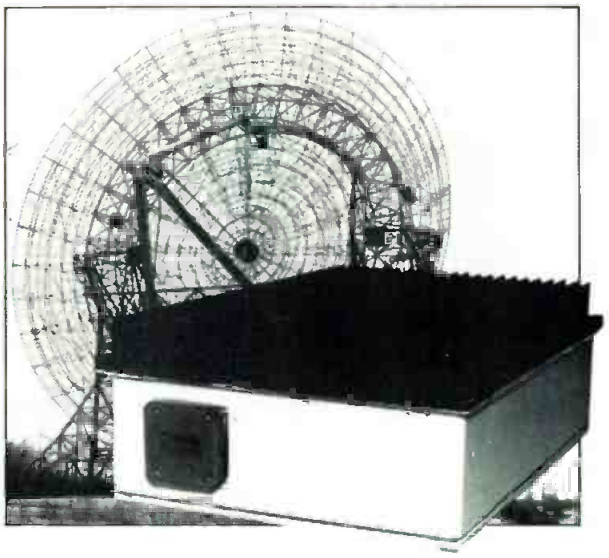

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"He ran around for 15 or 20 minutes at his various keyboards while we tried to follow him with the mic." The result, despite a few dropouts, was a "very visual" piece that gives listeners a good picture of how the composer actually works.

Format choices

Once interviewing was complete, Haas and Diliberto started combining the many pieces into 26 half-hours. "Originally, we had wanted a one-hour format," Haas says, "but we switched to half-hours because they're easier for stations to schedule." Formats varied for the segments, which usually featured one or two artists and explored a particular facet of electronic sound. Often, more than one segment was needed to deal adequately with a topic. For example, the "Electronic Dreams" section spent three and a half hours on "cosmic music," a variety of electronic music that was developed in Germany a decade ago and has remained popular in Europe. As Haas describes it, "The pieces tend to be 15 to 20 minutes long, very melodic and flowing—sort of minimalist, but more serene, with a feeling of floating." Three artists, including the popular European group Tangerine Dream, were featured in "Electronic Dreams."

As the project neared completion, it lost its original leisurely pace and worked up around-the-clock steam. Mixdown took place at Pennsylvania Public Radio Associates' four-track studio, equipped with an Otari 5050 BQII four-track recorder, Otari and Tascam half-tracks, a small Tascam console, Denon turntable, and Technics amplifier. The Nakamichi and Sony cassette decks, which Haas calls "the best quality on the market," also do double duty in the studio. Equalization for the studio was built by Dean Languell, the engineer who maintains the equipment.

Interviews and narration were recorded in mono, but the music—mostly on records or on tapes donated by the artists—was stereo. This sometimes led to a tight squeeze on the four-track recorder. "A lot of times, four tracks weren't enough," Haas says. "If we had to crossfeed music, we'd take up all four tracks, with no room left for voice." She and Diliberto sidestepped the issue the few times it arose by first mixing the music down to stereo and then adding the voices.

"At the end, we worked around the clock," she adds. "We're hoping that we'll be able to do our next series straight through, instead of taking time off for other projects as we did this time." That next series, a 13-week sequel called *Totally Wired Mark 2*, has received preliminary funding from the National Endowment for the Arts.

If Diliberto and Haas have high hopes for the second series, it's because the first has received such an excellent response from stations. "We originally set a goal of 30 to 40 stations," Haas says. "Now we're up to 52 in the U.S., Canada, and Australia—and we keep getting inquiries." According to Haas, the series, which started last month in most markets, has cleared every major market, including such major public radio outlets as WGBH, Boston, Minnesota Public Radio, and WNYC, New York. "A lot of public radio stations have tiny staffs and no time to do such extensive productions," Haas concludes. "They have a real interest in things like this." **BM/E**

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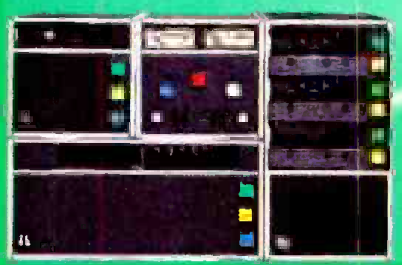

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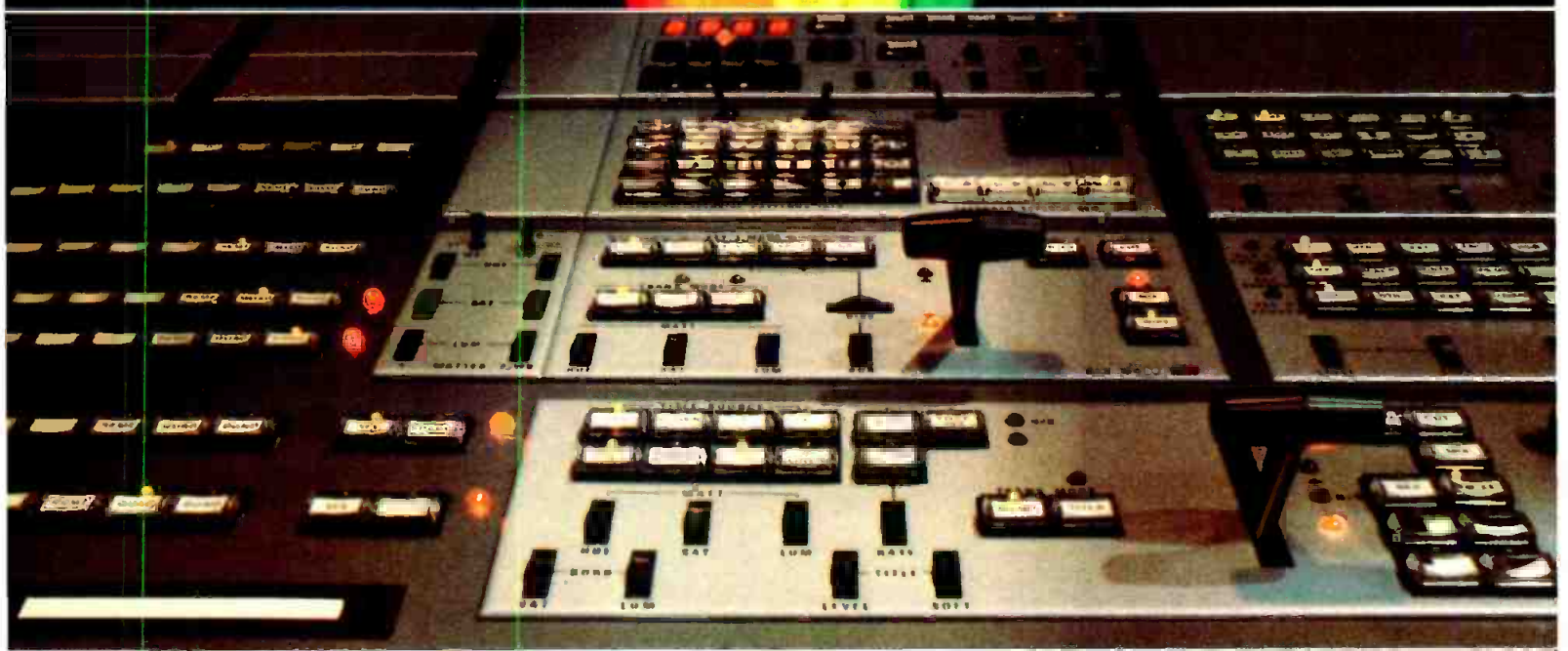

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Sports Academy Builds Younger Viewing Audience

When Douglas M. Schustek, head of CCR Video's production department, created the *Scholastic Sports Academy* two-and-a-half years ago, his aim was to produce a series of half-hour programs for the USA Cable Network that would both win younger viewers as loyal fans and also associate Scholastic Books with the finest in TV programming.

Schustek's formula was to set up and tape a series of sports clinics, taught by famous pro athletes. Each week the permanent host is joined by a guest pro as the production travels to noted arenas and practice grounds. There, a group of kids with whom the young viewers can identify—some good at the sport, some not so good—follow an outline of skills to be taught that let the eight to 10 kids who appear in all 13 weeks of each series explore some basic procedures.

Each half-hour *Sports Academy* show is broken into three segments. During the first two, the guest pro, who's usually noted for that show's particular sport, helps demonstrate particular positions or skills. These skills are then reviewed in a blackboard or talk-only session with the series' host, guest host, and children. Each child has his or her turn to practice and receive advice from the host, and can also ask questions during the review session. In this way the viewer gets a manageable amount of concrete information repeated two or three times by the end of the show.

The result is an ACT award-winning show as fun for youngsters to watch as it is informative.

Baseball Bunch predecessor

Schustek had created another children's program earlier, *Baseball Bunch*, but became dissatisfied when it "developed into something of a showcase for the San Diego Chicken instead of Johnny Bench." He felt that an instructional program could succeed, however, and took his idea for the *Sports Academy* to the USA Network, which gave him an OK. Scholastic Productions, of Scholastic Books, Inc., lent its name, and CCR hired Bruce Weber, publisher of the technical journal *Scholastic Coach*, to research the teaching outlines and write scripts with Shustek.

"I had been working with Little Leagues," says Shustek, whose daughter was 10 at the time, "and felt that an instructional program for average kids was more important than the emphasis on winning." He wanted the show to encourage kids to pick up a basketball or tennis racket and learn enough to enjoy the sport without worrying about turning pro. "You will never see any of these kids on an all-American team," Weber states. "While we concentrate a good deal of our attention on instruction, we never lose sight of the fact that the game should be fun."

Sometimes, when the pros or kids are a little self-conscious, the viewer has the feeling of intruding on a good lesson rather than watching an instructional show. *Sports Academy* is not edited for a slick look or to make the kids appear professional. Weber recalls that after a lesson on sliding taught by Tim Raines, one student dove "about six feet in the air like a dive bomber." But rather than being embarrassed, the kids are eager to learn. "A hands-on lesson on bunting from Bill Madlock, who probably is the best bunter in baseball right now," says Weber, "or a home-run hitting contest with Mike Schmidt—that can't be duplicated."

Roscoe Tanner and cameraman Charlie Hundley wait beside one of two Ikegami HL-79DAL's used in shooting Sports Academy.

This advice straight from the horse's mouth attract kids at home, too. Schustek tires to get the biggest name available as guest host, someone with personality who also wants to do the show. The last requirement cannot be omitted, he says: "The kids see right through any false enthusiasm. But if the guest is enthusiastic, the end result is a free-and-easy thing where the kids are excited to meet the stars and the stars are excited to meet the kids."

Notable sports stars

Over the past five series, *Sports Academy* has featured basektball with Hubie Brown, now head coach for the Knicks; soccer with Werner Roth, former Cosmos captain; hockey taught

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by Gary Green, a former captain of the Washington Capitols who now operates the most extensive hockey school in North America; baseball with third-baseman Mike Schmidt of the Phillies; and, starting last fall, tennis lessons with Roscoe Tanner.

Weber feels that lining up athletes for recent series has become easier due to the "totally positive" response to the show from coaches and the pro sporting field. Hubie Brown, he adds, started getting autograph requests as "the guy on *Scholastic Sports*."

"Stars have emerged, people you never would have dreamed of," Weber recalls. "Gordon Jago, who at the time was the coach of the Tampa Bay Rowdies, was unbelievably good. Frank White of the Royals turned out to be one of the most dynamic teachers in baseball. Sometimes you'll sit with a guy in the locker room going over the script before shooting and you'll think: 'Boy, are we in big trouble today.' But then the guy goes out, the camera goes on, and he's unbelievable!"

Since pro sports now exposes many star athletes to televison, and since clinics are quite familiar to them, most hosts and guests handle the introductions and topic outline easily. In the occasional case where a guest falters or isn't talkative, the host can back him or her up. The two can arrange remarks about previous games or just ad lib, and Weber often works any differences between the pros' playing techniques into the outline. "It depends on the host," Schustek observes, "how much input he wants to have, how much time he wants to put in."

In past series, the younger talent has come from Babe Ruth leagues, a hockey camp, a tennis academy, and local schools where CCR is shooting. Schustek asks an organization for a group of about 50 to 60 kids from which he can choose both average players who need the skills to be demonstrated and more advanced kids who can use the skills successfully. Generally the kids know each other, but newly assembled groups have gotten along fine also. As for the long hours involved in shooting, Weber says the kids don't get tired. "Every time they have a break they're playing the sport. They have a pretty good attention span. I've never had any problem with the kids."

A key point, one which demonstrates why a knowledgeable coach or sports teacher is a basic requirement for doing this show, was the age limit at which youngsters can correctly learn each sport. Weber researches such matters as part of preproduction. "I don't think anyone under age 10 should play basketball, unless they have a reduced court and a reduced ball," claims Weber. "An eight-year-old boy or girl cannot possibly shoot a basketball without doing it all wrong and creating bad habits. And it creates a high frustration level. So our target area in that series was 11–14." In soccer, on the other hand, the skills can be simpler, and many high schools don't have soccer teams. Accordingly, that series of shows was aimed at a younger bunch, down to ages six and seven.

Shooting on location

Schustek himself spends about a month preparing for each series before taking off with one of CCR's vans. Each shoot, during which all produc-

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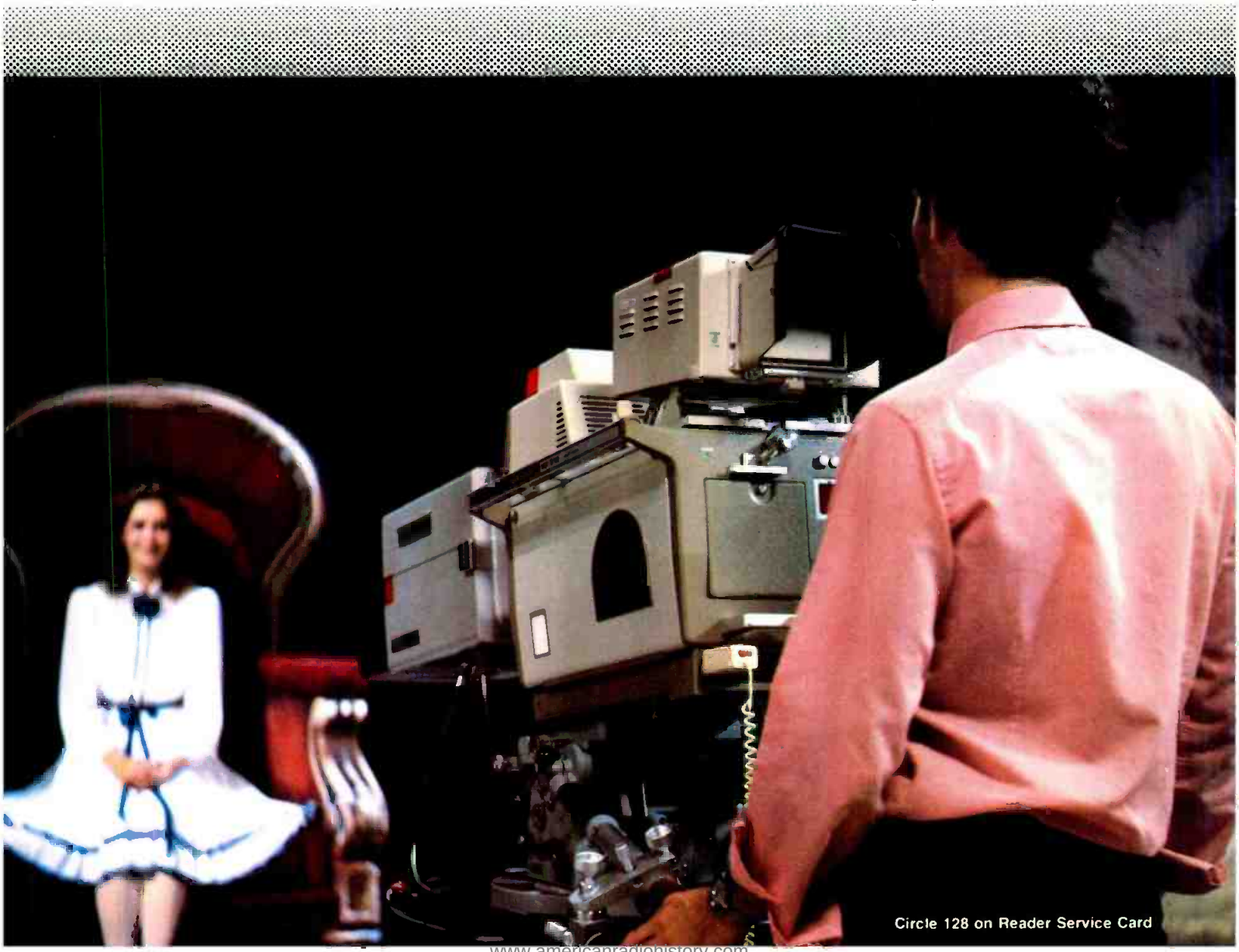

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TELEVISION PROGRAMMING

In CCR's New York offices, Tom Forbes, chief of post-production, uses a CMX 340X editor and CDS 4800 switcher to assemble an Academy *show.*

tion is completed, is at some notable location such as the Olympic stadium in Lake Placid for hockey or the Phillies' training center in Clearwater, FL. (In the latter case, Schustek wanted to do a baseball show in Puerto Rico where they would have better weather, but Mike Schmidt wanted to stay home with his family. It rained in Clearwater, so Schmidt took the kids to a local shopping mall for the day.)

With a staff of about 14, half production and half engineering, Schustek shoots 13 shows in 5 days. Video is handled with two Ikegami HL-79DAL cameras and Sony BVH-500 recorders, with a Cypher Digital time code generator coding both tapes. For extra angles, the cast runs through certain portions twice. Generally the cameras are stationary, although for hockey one went onto an aluminum crane that could slide. "The cameras are very unobtrusive," Schustek notes. Since the show is taped either outdoors or in a pro stadium, existing light is usually sufficient with reflectors.

The audio crew wires both kids and pros with Nady's RF diversity system, and also uses a Sennheiser directional mic to pick up questions during the review session. Minor distractions, such as airplanes, go into the soup, though cicadas have had to be toned down in the mixing room.

Back in New York at CCR, Schustek makes copies to digest at home, where he also writes up a paper cut. CCR's East coast facility has two on-line editing suites, each equipped with Sony BVH-1000 and 1100s, a CDL 4800 switcher, and CMX 340X editor.

After adding a few special effects using the Chyron IV, and scoring with some popular songs to jazz up the pros's demonstrations, an editor assembles the tapes with the standard intro and commercial bumpers. Shows are delivered to USA Cable Network on one-inch tape at the rate of four a month.

The USA Network buys each Academy series from CCR for a half-year period. This gives them 13 weeks of original programs and another three months of reruns, which the network carries during either the summer or the winter. For USA to continue playing a series longer, or distribute it outside cable or overseas, however, involves a separate deal—what Schustek calls CCR's "equity position." (Other *Academy*-related income is derived from CCR's production of a high school level basketball lesson, *Basketball With Hubie*, which CCR sells on 90-minute videocassettes.)

The one wish Schustek has for *Sports Academy* other than shooting a track and field series this spring to coincide with the summer Olympics, is that it run another three years. "It's really very simple. We know what we're doing, and we do a nice shot . . . We're trying to teach the kids, to teach them a little sportsmanship." **BM/E**

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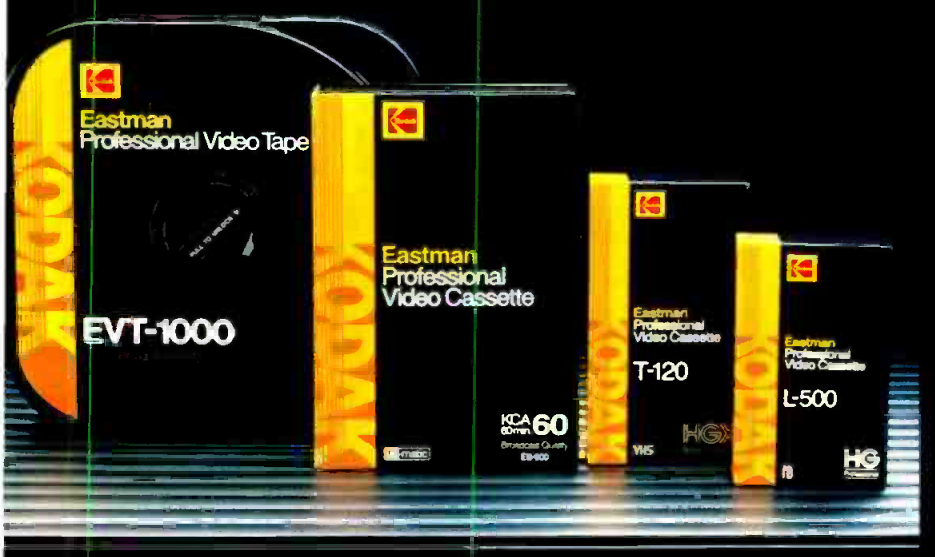

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	VHS	T-30 T-60 T-120	E-30 E-60 E-90 E-120 E-180	T-120	E-30 E-60 E-180	T-30 T-60 T-120	E-105 E-120 E-180 E-240
	BETA	L-250 L-500	L-125 L-250 L-500 L-750	L-500	L-125 L-250 L-500 L-750	L-250 L-500	L-250 L-500

OTE: All ¾-inch and 1-inch ape products are available r PAL/SECAM or NTSC uses.		EASTMAN PROFESSIONAL VIDEO CASSETTE EP-900 (PROFESSIONAL)	EASTMAN PROFESSIONAL VIDEO CASSETTE EB-900 (BROADCAST QUALITY)	EASTMAN PROFESSIONAL VIDEO CASSETTE/BP (BULK PACK)
¾-INCH	STANDARD U-MATIC	KCA-10 KCA-20 KCA-30 KCA-60	KCA-10 KCA-20 KCA-30 KCA-50 KCA-60	KCA-5 KCA-10 KCA-20 KCA-30 KCA-60
	MINI U-MATIC	KCS-20	KCS-10 KCS-20	

	EASTMAN PROFESSIONAL VIDEO TAPE EVT-1000	
1-INCH	C-FORMAT	B-FORMAT
	VT-34	VT-34
	VT-64	VT-64
	VT-96	VT-96
	VT-105	VT-105
	VT-126	VT-126
	VT-157	
	VT-188	

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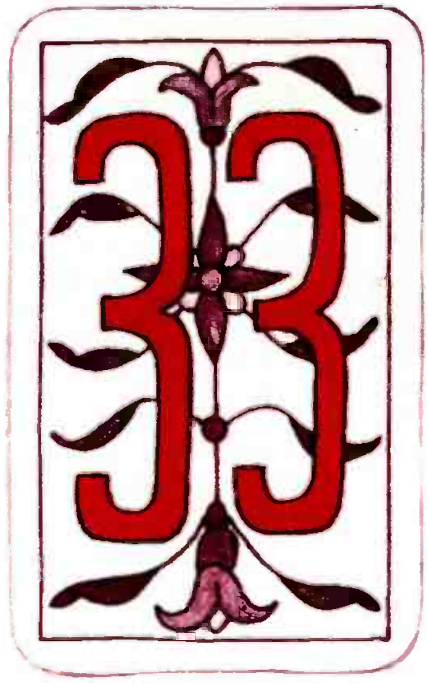

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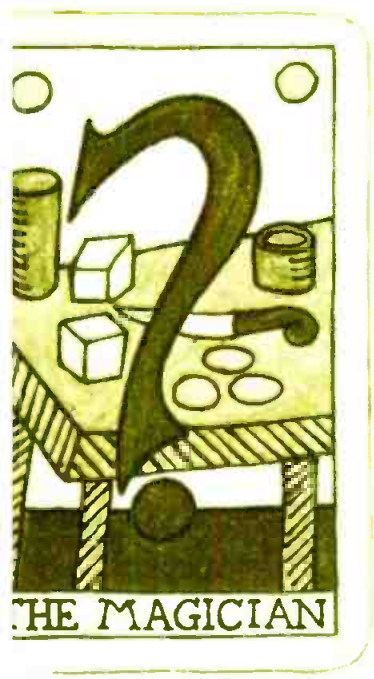

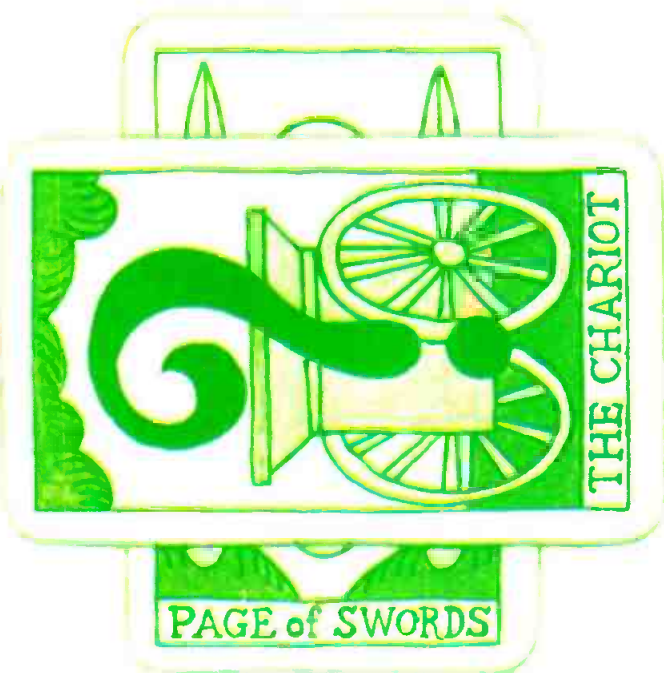

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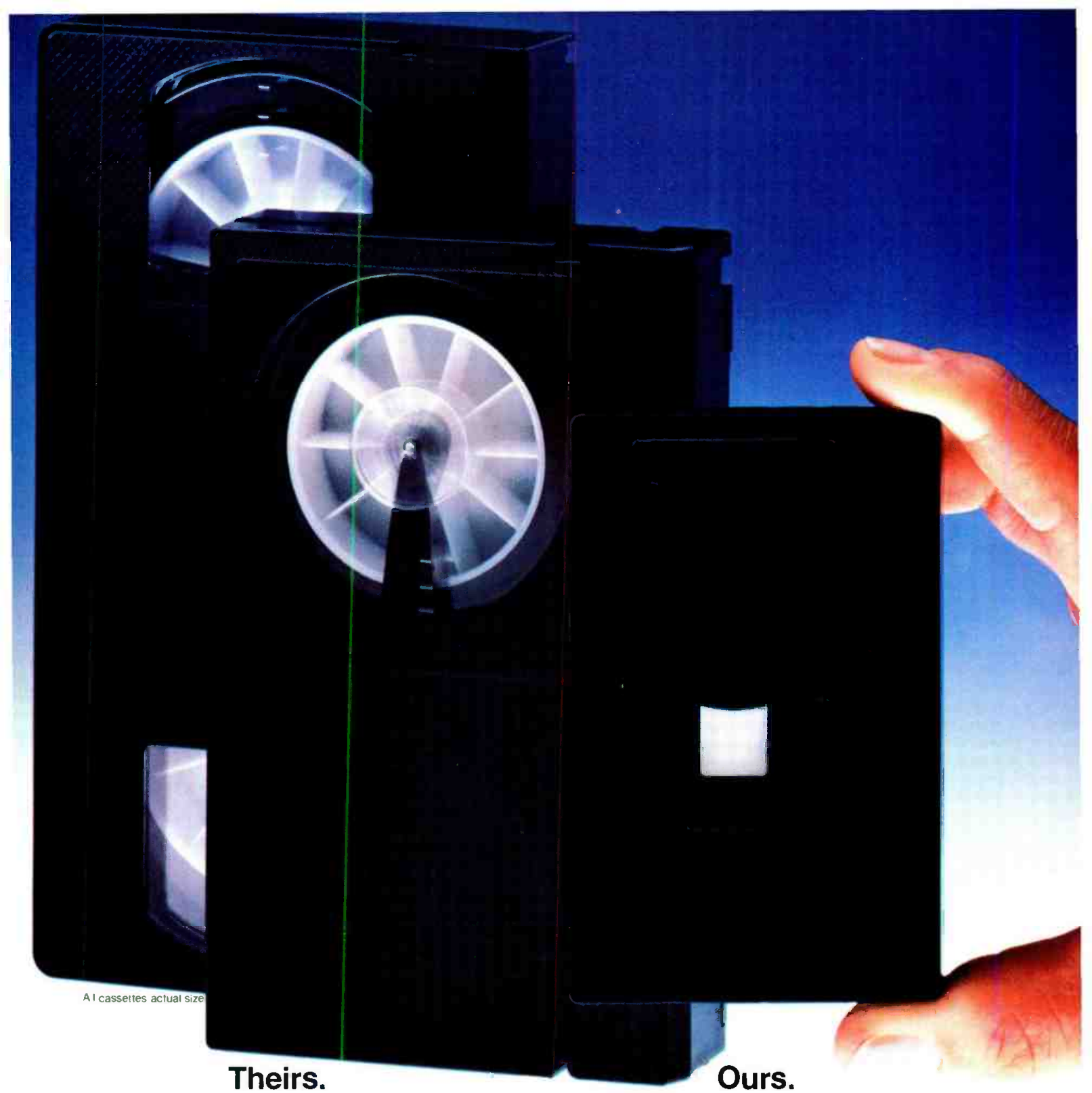

Theirs. **Ours.**

In the current debate concerning ½-inch and ¼-inch recorder-camera videotape formats, we ask you to consider these simple facts:

There are two ½-inch incompatible formats, VHS and Beta. And the broadcast quality ¼-inch Quartercam™ from Bosch.

Quartercam 20-minute cassettes occupy one-fifth the volume of VHS and one-third the volume of Beta 20-minute cassettes.

You can fit a Quartercam cassette in your shirt pocket. You can't with VHS or Beta. You can save a lot of archive space and shipping costs.

The logical ENG/EFP successor to ¾-inch is ¼-inch—not ½-inch. If you're going ½-inch you're only going half-way.

Call your local Bosch-Fernseh office, or Fernseh Inc., P.O. Box 31816, Salt Lake City, UT 84131, (801) 972-8000.

BOSCH

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For the second year BM/E's editors have spread out their tarot cards, looked into their crystal balls, contacted dozens of manufacturers, and compiled their predictions for what promises to be the most exciting NAB in years! You will find a complete booth-by-booth listing in the upcoming April issue, but you can use this first-information-in-print as an advance planning guide.

1

Things will never be the same in the camera world again—expect major announcements from virtually every known camera manufacturer, and some new ones, too. RCA is likely to make the biggest splash with production versions of the CCD camera shown only in prototype before . . . . Sony said to be ready with studio version of BVP line, outgrowth of work on NHK HDTV camera . . . . Ikegami unveiling HL-95 ⅔-inch tube handheld camera to work with Bosch quarter-inch integrated recorders (but camera is adaptable for

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M-format as well) . . . . Philips also coming out on Bosch Lineplex side with a new entry incorporating ⅔-inch camera, plus brand-new LDK 614 ENG "companion unit" for LDK-6 and "scaled down" LDK-6, the LDK-26 . . . . Hitachi, too, to offer ENG/EFP version of SK-110, the full auto-setup, computer-controlled SK-120 . . . . Canon plans intro of J40x lens, latest entry into the ENG category.

Other small format developments: Bosch to bring production and editing packages to round out the Quartercam line . . . . On-Cam regular VHS cassette adapter said to be selling well from Frezzolini and distributor PEP (six went to Yugoslavia for the ABC Olympics) . . . . Dark horse may be Kodak, which might bring consumer version of 8 mm metal tape recorder/camera to test the professional waters.

Big interest in audio processing area may be attracted by Audio + Design's radical concept: Ambisonic surround sound. Not another FM quad system, it's fully compatible with present mono and stereo systems. Separation is said to be excellent, signal quality comparable to regular FM. The system is comprised of an encoder and decoder feeding up to four discrete channels.

Expect developments in digital programmable parametric equalizers with new Orban model selling for $4500, with 32 nonvolatile memories; Orban also to introduce compressor/limiter in mono or stereo for remotes and basic radio use . . . . Circuit Research Labs will introduce SG-800 FM stereo generator which works with FM4 audio processor.

Excitement brewing over Convergence EditDroid (super video editor developed with LucasFilm), to make debut at show (three units). Billed as "absolutely new approach to editing," it's said to be extremely fast, extremely easy to use. Speculation is that keyboard has been replaced by touch screen or digitizing pad (mouse) or other "user transparent" device. Control Video, recently acquired by ADDA Corp., also heating up the waters with new entry into high-end disk-based editor market to rival EditDroid and CMX 3400—real-time access to any point on disc within 2.5 sec . . . . Videomedia working to ready user-programmable keys to Z6000 editing system, and new software including slow-mo control, time compression/expansion, other functions.

McCurdy to unveil digitally controlled intercom with enhanced disk storage system for crosspoints. And whole new line of audio routing switchers . . . . Well known for its high-end digitally controlled intercoms is RTS, which will be introducing a low cost single channel intercom along with a new series of amps, System 2500.

Digital Services Corp., previously into low-end digital efx, to go after full-frame and dual-channel effects manipulation market with Illuminator—available with perspective option for well under $50,000. Flexi-Key, too, to offer perspective, with combined price at less than $30,000. Flexi-Key can also be tied to the Illuminator for two channel system.

MCI/Sony adding to JH-110B series recorder/reproducers with 110B-3-TC, offering center stripe time code or pilot signal on quarter-inch tape capability. MCI also to debut new synchronizer, with separate keyboard/display unit and processor rack. Also look for Option 23, a video editor interface for JH-800 compact console, plus SOAR frequency-synthesized RF mic with 24 available channels.

Weather graphics to be big hit at show. Alden plans introduction of new color weather graphics display . . . . Kavouras to feature real-time radar colorization system with Doppler radar, high-speed weather data transmission service via Westar III, and Radac color weather radar interface to RRWDS transmitter.

Expect Studer to introduce production models of TLS-4000 SMPTE synchronizer for inboard or outboard ATR control. Also 10 new module options for 900 Series consoles . . . . Ward-Beck, in unexpected move, to introduce new series of special applications consoles never before seen from the company . . . . From Yamaha, look for new REV-1 remote con-

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No matter how you define your color camera needs, you will want to be certain you have chosen the best tube for the job. And no technical appraisal can be complete without EEV Leddicons.

Take lag or smearing. Because Leddicons incorporate a unique light bias arrangement, shading is minimal. So is differential lag. The result is that a football in flight will always look like a football — not a flying saucer!

As for color imagery, you simply cannot improve on Leddicons. Extended reds have a precisely-engineered response with an infra-red filter providing cut-off exactly where you want it.

Or compare the highlight image performance of Leddicons with other tubes. The difference is that the retention effect is minimised by a unique target manufacturing process — even in the very difficult extended red channel where other tubes are simply unable to cope.

You'll certainly want to avoid blemishes. That's why all Leddicons must satisfy the most exacting manufacturing, testing and quality control standards. And it shows — in the fact that Leddicons average less spotting than other tubes!

Then there's geometry. The optimised electron optical design of Leddicons ensures the best possible geometry. Registration too is equally distortion free — we can, in fact, supply computer-matched sets for all three channels.

And what about microphony? With EEV's unique anti-microphonic mesh assembly, Leddicons provide the cleanest pictures — even from cameras operating in areas of high ambient acoustic noise.

As for choice, there's simply none better than Leddicons. That's because the range covers fully-interchangeable sizes and types to suit virtually every type of studio, EFP and ENG camera used in the world today.

When you add up all the facts about Leddicons, there is only one conclusion — namely, the definition of the best tubes for your camera.

But don't leave it at that.

Next time specify Leddicons for your new equipment and as replacements and find out what that definition really means in practice.

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trol reverb unit as well as complete new console line . . . . Auditronics aiming for the complete production package for 300 Series consoles.

Rank Cintel will take aim at the U.S. broadcast station market with its new ADS-1 solid state on-air telecine, described at last fall's SMPTE. The telecine is also being marketed by RCA as TKS-100 . . . . Bosch to add color/gamma corrector to its established FDL-60, digital CCD telecine.

Colorgraphics plans expansion of newsroom computer line with Mini Star; also plans surprise entry into art/paint system market with new unit that handles multiple terminals . . . . Also look to Aurora for new Model 200, "a new concept in digital video graphics," as well as updates for the existing 100 system . . . . Bosch continuing to make major headway with software for FGS-4000 graphics system, seen at SMPTE with real-time manipulation of highly detailed 3D objects.

Asaca plans working version of four-frame video viewer for editing, plus multi-cassette player (described in Station Automation story elsewhere in this issue) . . . . Sony to intro new multi-cassette deck . . . . Lake Systems to expand M-format multi-cassette players beyond the six and 10 machine systems. Question as to whether brand-new systems for Betacassettes will be ready.

Bosch will bring over complete new line of production switchers . . . . Ross Video plans to unveil Encore memory system for video switchers with serial interface for computerized video editors . . . . Look for component switchers from Grass Valley, Shintron, Crosspoint Latch.

Vectrix, with own booth for the first time this year, is offering graphics terminal to be used for broadcast computer and weather graphics. WITS now receives RRWDS radar and WSI data. Brand-new is Midas computer graphics system—with efx including 3D rotation, zoom, squeeze, font generation, paint brush styles, etc.—similar to other digital art/graphics systems but using two card slots in existing IBM XT computer, putting price under $10,000 . . . . 3M, too, expected to make major push with its art/graphics system introduced at SMPTE for the D-8800. Also look to 3M for new "economical" character generator.

Acrodyne, in major realignment of product line, will now offer medium power transmission products in 10 and 20 kW categories while still expanding LPTV line with new 1 kW transmitter/translator . . . . Comark will make splash with no less than eight new lines of equipment—from 110 kW UHF transmitters through new power combiner with switchless bypass system, and including BCD/ABC pulser, and new exciter system . . . . Harris will show new, high-efficiency 30 and 60 kW transmitters, both VHF and UHF. Making its American debut, the PYE TVT line of FM transmitters ranges from 100 W to 20 kW, and features common modular drives.

TEAC/Tascam bringing Series 50 two-track, eight-track ATRs; major feature of production-designed consoles is built-in SMPTE time code sync capability . . . . Denon likely to make waves with its professional model CD player, joined in CD department by Sony unit, newly redesigned for pro market and accompanied by a Sony CD analyzer.

Electro-Voice to make new inroads in broadcasting with internally powered Sentry 100A speaker line providing balanced or unbalanced line level inputs. Also watch for brand-new E-V 4x1 ENG/EFP mixers—shoulder carried or rack mounted . . . . Shure will also introduce new FP 31 field mixer, as well as brand-new SM83 lavalier microphone . . . . JBL/UREI, meanwhile, will unveil a direct, radiator loudspeaker system, Model 4411, with three transducers arranged in a tight cluster to provide sound coherency for close-in monitoring in the studio.

What does MCI/Quantel have in store for its hospitality suite this year? Unlikely to break seven-year tradition of new product intros, it is hard at work on the next Cypher or Paint Box or Mirage . . . . Big news in effects will be Harris introduction of brand-new digital effects system, $50,000–$125,000 range, being manufactured exclusively for Harris in Japan and said to feature extremely precise key follow feature.

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Harris also concentrating on effects composition capability for its Iris still store with graphics compose station. And look for new entry in digital signal processing market—component coded . . . . ADDA will add smaller, digital switching effects capability of ESP-II to ESP-C. ADDA has expanded its horizons by acquiring Control Video.

Look for new airborne helicopter microwave mount with Loran-C controlled automatically steered directional antenna from Nurad, plus new circularly polarized relay antenna and digitally synthesized 13 GHz portable transmitter and receiver . . . . First NAB viewing of frequency agile, multifunctional SCPC demodulator from Comtech Data.

British manufacturer Protel, whose line is distributed in U.S. by A.F. Associates, to make NAB debut with initial phases of complete station automation system, including all aspects of a technical automation design in addition to business/management programs, integrated into a single system package.

ITC to introduce a brand-new line of economy type cart machines designated the Omega Series which will be offered with a stereo playback unit . . . . Telex intends to premiere a new expansion capability for the Model 6120 high speed cassette tape duplicator. Telex also plans to reveal a new super light headset, designed specifically for handheld landmobile transceivers, the ProCom 352-IC.

Relative newcomer to digital still store market, Abekas may have a surprise in store in a related product area. Abekas adheres to a design concept that leans away from the large, distributed processing systems, favoring instead a configuration of individual work units dedicated to doing a specific task well.

United Media will introduce new, compact, computer-assisted A/B roll video editor—fully upgradable, including SMPTE time code, list management, switcher interface modules; $10,000–$16,000 range. Also look for developments in Commander II video editing system with two user-definable keys each capable of recalling up to 120 keystrokes, automatically recharged batteries for memory loss protection, plus "go-to" mode.

Surprising development from Otari will be preproduction version of "totally new machine design"—new one-inch tape transport for a line of audio recorders with interchangeable eight- and 16-track head stacks. The machine design will come standard with tape speeds of 15 or 30 ips.

Neve plans to mount an assault on the audio/video interface with the introduction of VCA controllers for its console channel strips, allowing operation with video editors. Also from Neve: a four bus version of the 542 range of consoles for video post-production, and additional new gear for its digital console components. There will also be new enhancements to the Necam computerized automation systems.

From Dolby expect new noise reduction systems for Ampex VPR-3s and VPR-80s . . . . Lexicon will come through with stereo version of its audio delay synchronizer, plus new digital reverb. Also plans to introduce a new version of its 1200C audio computer with RS422 capability in addition to greater time resolution for expansion/compression accuracy.

Moseley will unveil PCL 606 1.7 GHz STL for AM stereo in addition to new options, a CRT and a logger, for MRC 1600 remote control system . . . . McMartin is expected to reveal information on its SCA networking equipment arrangement providing an FM station with a new transmitter in exchange for lease payments on the station SCA.

New entry from Tektronix will be 1750 waveform monitor/vectorscope/sch meter—a combo measuring unit featuring unique sch phase display with resolution down to one degree, color framing measurement, and digital line select; other Tek products to include 2400 portable scope with TV measuring option, 1740 combination waveform monitor/

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Shure's new FP31 Mixer takes a big weight off your shoulders.

Introducing the most innovative field production mixer of its kind. Shure's FP31. You won't find another mixer this small with these features, dependability and ease of operation.

The FP31 measures only $6\frac{5}{16}$" x $5\frac{5}{16}$" x $1\frac{7}{8}$", and weighs just 2.2 pounds! Incredibly, it offers the same important features as much larger mixers. Plus, a few of its own.

Every channel has a mic/line level and a low-cut filter switch. And to prevent overload distortion, there's a built-in limiter with adjustable threshold.

The FP31 can be powered by two internal 9-volt batteries, or from an external 12-volt source. A green LED flashes to remind you that the mixer is on. Phantom and A-B power are also provided to operate lavalier and shotgun microphones.

A slate tone can be laid down on the tape for locating specific takes, and there's also a built-in mic for voice slating.

The mixer also has two separate mic/line outputs for 2-camera shoots and a tape output to feed a cassette. For monitoring, there are two stereo headphone jacks—one $\frac{1}{4}$-inch and one for miniplugs. The FP31's rugged nylon carrying case allows you easy access to every mixer function and lets you piggyback the mixer on your VCR or other equipment.

For ENG, EFP and film use, Shure's FP31 has everything you need to make your mix a perfect success. Coming from a mixer this small, that's quite an accomplishment.

For more information on Shure's FP31 Mixer, call or write Shure Brothers Inc., 222 Hartrey Ave., Evanston, IL 60204, (312) 866-2553.

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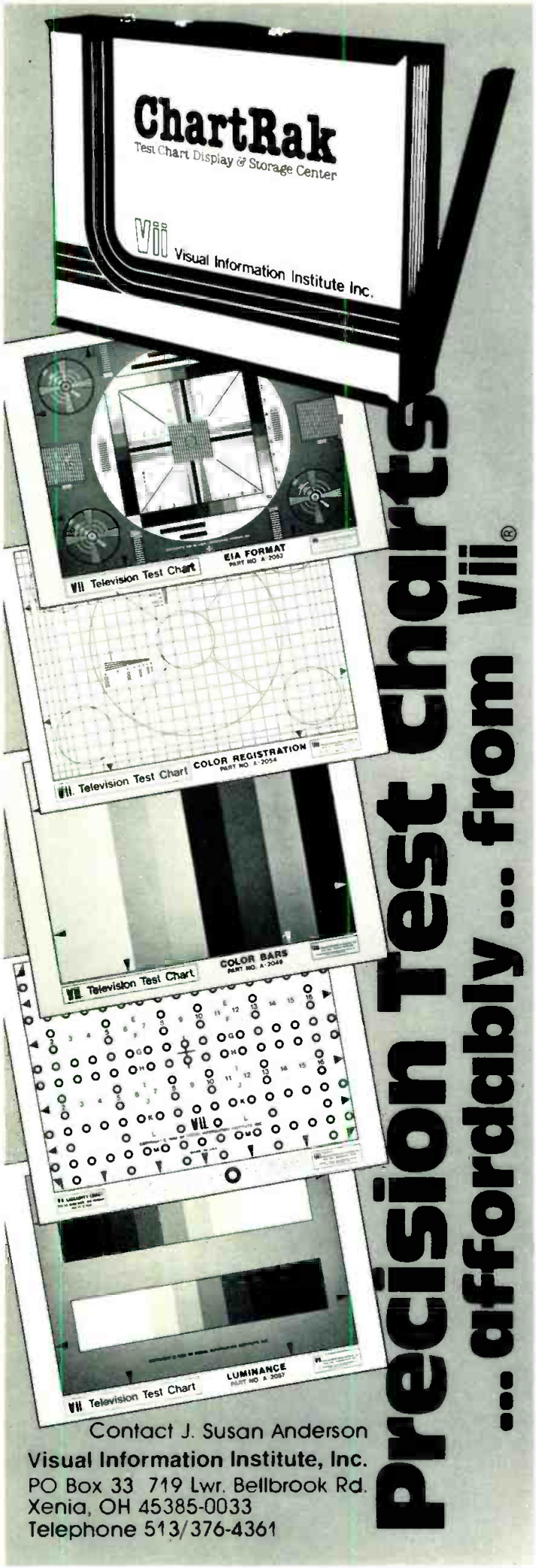

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vectorscope . . . . Videotek to reveal new TSM 5A waveform monitor with switchable line select plus switchable 1H/2H operation modes in half-rack-sized unit; also look for Model 13 rack-mount color video monitor with three looping inputs, split screen mode . . . . Conrac will have its Model 6200 Class 1 in-line-gun color monitor at both its own booth and several camera manufacturers—priced under $5000 and now in full production.

30

IMC (Interactive Motion Control), first-time NAB exhibitor, will unveil Model 3565—computer-controlled animation programmer that allows extremely precise control of move sequences . . . . In other new computer developments, check Comprehensive Video's computerized production system offering scripting, budgeting and work chart formatting using a home computer.

31

Audio tape cart manufacturer Fidelipac will display its own line of high quality audio tape, HOT, for first time—in bulk or carts. Meanwhile the battle rages on fiercely among video tape/cassette manufacturers: Agfa, Ampex, Fuji, 3M, Sony, et al are being joined for the first time by Kodak, which is exclusive marketer of the TDK line in the U.S. including both cassettes and one-inch product . . . . Maxell will introduce new mastering-quality ¾-inch cassette and VHS HGX Pro for Recam and Betacam recorder/cameras.

32

Another surprise: RTS is modifying and marketing Plantronics headsets and will unveil the complete new line at the show . . . . Motorola will introduce a portable repeater base station, an entirely new mobile van communications system, as well as a cellular phone system . . . . Logitek will debut its newest audio DA circuits as well as mounting frame. The MAS-DA will hold as many as 60 outputs in a single card frame in addition to having room for two independent power supplies.

33

Peter Dahl to introduce high voltage rectifiers, to 40 kV, with forward current up to 25 A. Also new primary transient suppressor available in both MOV and selenium configurations . . . . EEV plunges into the show with a new 55 kW high efficiency (beam control device) broadband, external cavity UHF klystron for vapor or water cooled applications. **BM/E**

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With low key lighting, differential lag can be a problem. Amperex Plumbicon tubes with built in bias light increase the speed of response of the layer, and lag is virtually eliminated.

Comet tailing and loss of detail in highlights are minimized by using the Amperex patented Diode Gun or anti-comet tail (ACT) tube. Both solve this problem by providing high beam current to stabilize highlights.

High audio levels can produce the annoying problem of microphonics. Amperex attacked this at its source, and all Amperex Plumbicon tubes have a unique mesh designed to prevent the build-up of mesh vibrations—not just to dampen them.

Six of TV's toughest shots and how

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Low output capacitance Amperex Plumbicon tubes help maintain high signal to noise performance. This helps prevent loss of detail and increased video noise in low light areas of high contrast scenes.

Because of special photoconductive layers for each color and an optimized electron optics design, the Amperex Plumbicon provides the highest resolution for each image format. This resolution is measurably higher than earlier tubes.

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Ordinary pick up tubes can handle ordinary TV shots. But when you have to contend with low light levels and bright highlights...the glare of reds and the blare of trumpets...you need the extended performance of Amperex Plumbicon camera tubes.

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For more information call or write Amperex Electronic Corporation, Slatersville Division, Slatersville, Rhode Island 02876. (401) 762-3800. Made in Rhode Island, U.S.A. Delivered to you in twenty-four hours or less.

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SPECIAL REPORT

STATION A

IN THE PALM OF YOUR HAND?

Failures in a quad cart deck can cost a major market broadcaster $15 million a year in lost revenues. But controversy is brewing over an NAB report defining user requirements for future ACR- and TCR-type multicassette players.

By Robert Rivlin
Editor

In the past five to seven years, virtually every major type of equipment used in TV stations has undergone profound technological change. This includes everything from the imaging stages to transmission, and every step in between. Amazingly enough, however, the one piece of equipment upon which commercial broadcasters rely for the bulk of their revenue—the on-air commercial playback system—has remained virtually unchanged since its invention in the late 1960s (the TCR-100) and the early 1970s (the ACR-25). And many decks in operation today are at least five to seven years old.

This is why so much interest is being generated by a new user group report

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UTOMATION

from the NAB's Engineering Advisory Committee's subcommittee to develop users' performance objectives for a Multi-Event Record/Playback System (MERPS). The subcommitee, chartered in August 1983 (a *BM/E* editorial in the April 1983 issue called for the formation of just such a group) described for manufacturers what industry-wide users consider "must have" features of any new

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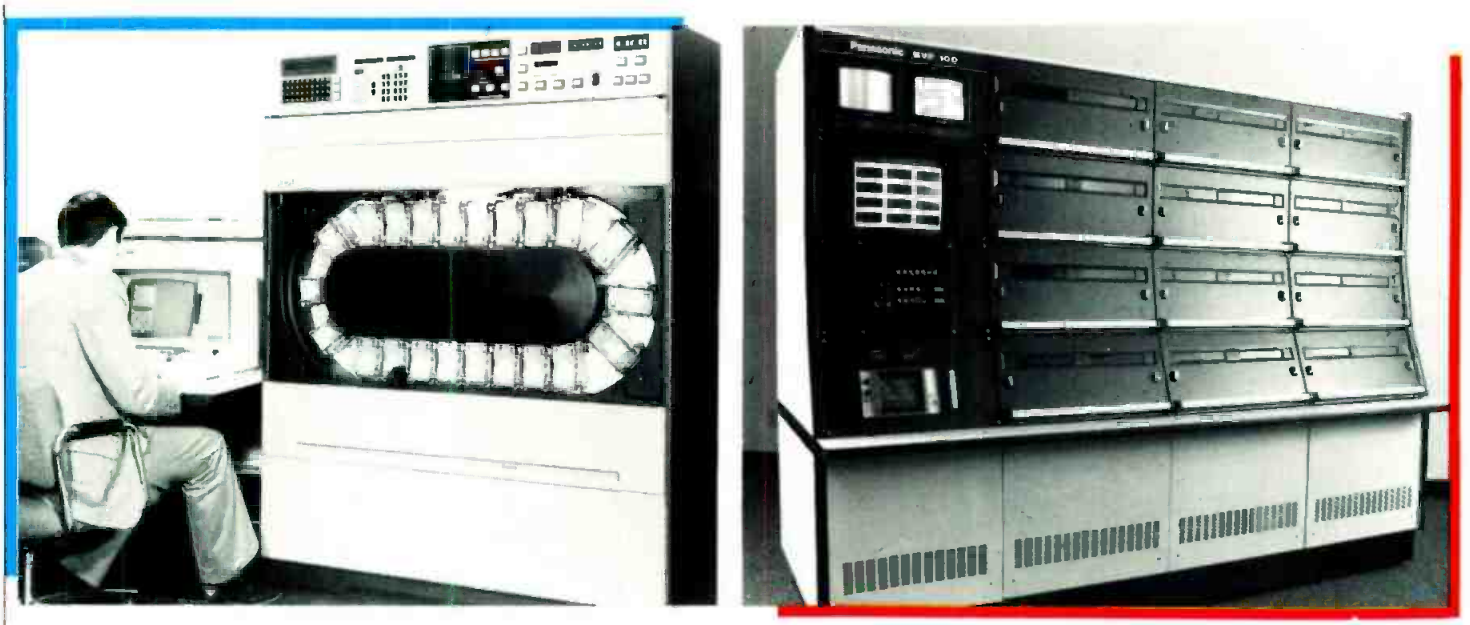

The old and the new. At left, RCA's TCR 100, developed in the late 1960s. At right, Panasonic's new M-format MVP-100 MERPS.

multitransport/multicassette system.

But, while the report is a positive step forward for some—especially network engineering people such as Joe Flaherty of CBS, who is internally pushing to get a new system developed—for others it is a highly controversial issue. Seeking extremely high signal quality standards, the report all but rules out the possibility of any current equipment meeting its needs, and forces manufacturers back to the drawing board. It comes at a time when several major manufacturers have just introduced or are about to introduce multicassette systems that many in the industry feel are quite adequate for the job. "Do we need yet another standard?" is the question many are asking.

Timely development

For those who favor the subcommittee report, the developments could not come at a better time. Despite the fact that some station engineers will defend them to the bitter end, the truth is that quad cart machines—both the Ampex ACR-25 and the RCA TCR-100—are outmoded. With some claiming that the failure rate of today's quad cart plays is one in 200, this means an estimated *yearly* revenue loss to a major-market broadcaster of around $15 million.

The problem with quad cart decks lies both in the demise of the quad format itself as well as some inherent design problems with any device using pulleys, forced air, gears, and a rubber band or two. Neither RCA nor Ampex makes the decks any more. Parts are becoming scarcer and scarcer. And the machines require more and more maintenance—not so much a problem on the electronic end but requiring extensive mechanical troubleshooting as well. Those who know these "mechanical dinosaurs" inside out are becoming a rare commodity, and hence the popularity of the Diagnostic Online Monitor (DOM) from Studio Film & Tape, which provides early warning of upcoming electronic and/or mechanical malfunctions.

There are, of course, some solutions designed to back up the quad cart systems. Many stations keep at least two running simultaneously so that if one should fail, the other can be brought on line immediately. Another approach is to either back up the quad cart with a one-inch spot reel, or else to use two checkerboarded one-inch decks as the sole program origination source. This is becoming more and more feasible with the introduction of some brand-new computer systems which make spot reel assembly a snap. The most recent is from British manufacturer Protel, being distributed in the U.S. by A.F. Associates. Part of a larger, fully integrated operations/management computer system, the spot reel assembler works with a master tape onto which are dubbed all incoming spots in the order they are received. Following instructions from the program log, the master tape dubs the day's commercial schedule, in order, onto a second VTR. One of the system's highlights is that, rather than shuttling back and forth through the lengthy master spot reel, the system automatically creates slugs in the daily spot reel into which it drops the appropriate commercials once they are reached on the master. The system will also tie into a commercial library management system in a fully automated operation, which will pull desired spots from an extensive collection based on a business automation interface.

The same kind of approach, it might be noted, can also be achieved with some relatively simple ¾-inch decks and simple checkerboard controller—as is true for a two-machine system from Microtime and also a newly introduced sequence controller from United Media.

But these solutions are only interim steps towards what many feel to be one of broadcasting's most pressing needs: a new video cart or cassette system to replace quad carts, hopefully one as standardized as the quad cart was in its day and certainly as reliable, one not requiring the time-consuming process of creating spot reels, nor the inconvenience of constant cassette loading and off-loading.

MERPS report

It was with these needs in mind that the MERPS committee began its study under the chairmanship of Rupert Stow, director of production systems analysis for the CBS network. Stow was the author of the CBS engineering report issued two years ago in which Joe Flaherty's office began investigating possible replacements for the network's six ACR-25s. And Flaherty himself is largely responsible for having urged the creation of the MERPS committee as an industry-wide group representing the interests of everyone involved in the commercials distribution process, a mix of network repre-

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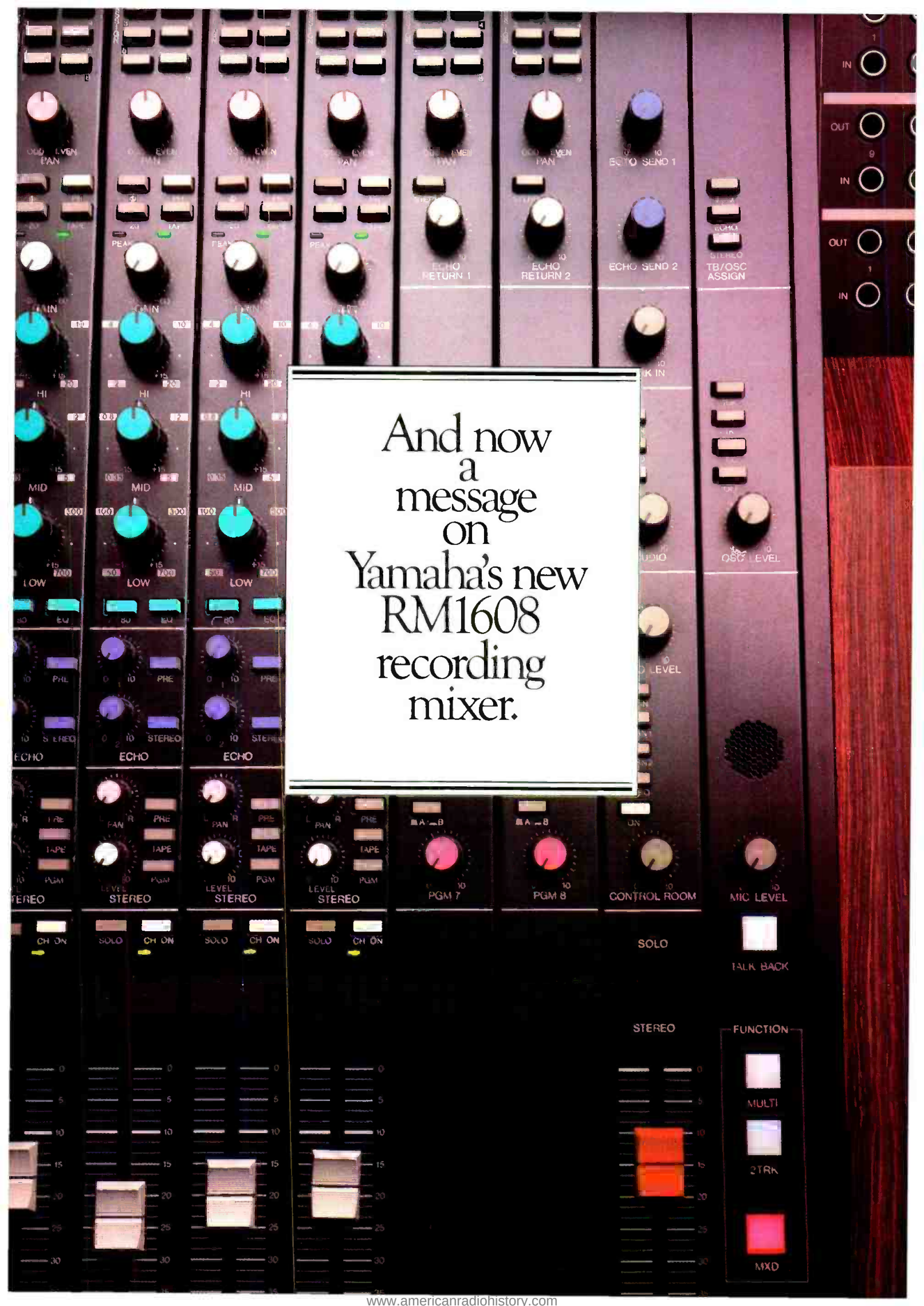

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RM1608

SPECIFICATIONS

TOTAL HARMONIC DISTORTION (T.H.D.)
Less than 0.1% at +4dB *output, 20Hz to 20kHz (all Faders and controls at nominal)

HUM & NOISE (20Hz to 20kHz) Rs = 150 ohms
(INPUT GAIN "–60")

–128dB	Equivalent Input Noise (E.I.N.)
–95dB	residual output noise: all Faders down.
–80dB	(84dB S/N) PGM Master volume control at maximum and all CH PGM assign switches off.
–64dB	(68dB S/N) PGM Master volume control at maximum and one CH Fader at nominal level.
–73dB	(77dB S/N) STEREO Master Fader at maximum and all CH STEREO level controls at minimum level.
–64dB	(68dB S/N) STEREO Master Fader at maximum and one CH STEREO level control at nominal level.
–80dB	(70dB S/N) ECHO SEND volume at maximum and all CH ECHO volumes at minimum level.
–75dB	(65dB S/N) ECHO SEND volume at maximum and one CH ECHO volume at nominal level.

CROSSTALK
–70db at 1kHz: adjacent Input.
–70db at 1kHz: Input to Output.

MAXIMUM VOLTAGE GAIN (INPUT GAIN "–60")

PGM	74dB: MIC IN to PGM OUT.	ECHO	70dB: MIC IN to ECHO SEND.
	24dB: TAPE IN to PGM OUT.	C/R	74dB: MIC IN to C/R OUT.
	34dB: ECHO RETURN to PGM OUT.		24dB: 2 TRK IN to C/R OUT.
	14dB: PGM SUB IN to PGM OUT.	STUDIO	74dB: MIC IN to STUDIO OUT.
STEREO	74dB: MIC IN to STEREO OUT.		24dB: 2 TRK IN to STUDIO OUT.
	24dB: TAPE IN to STEREO OUT.		
	34dB: ECHO RETURN to STEREO OUT.		

CHANNEL EQUALIZATION
± 15 dB maximum
HIGH: from 2k to 20kHz PEAKING. MID: from 0.35k to 5kHz PEAKING. LOW: from 50 to 700 Hz PEAKING.

HIGH PASS FILTER –12dB/octave cut off below 80Hz.

OSCILLATOR Switchable sine wave 100Hz, 1kHz, 10Hz

PHANTOM POWER 48V DC is applied to XLR type connector's 2 pin and 3 pin for powering condenser microphone.

DIMENSION (W x H x D) 37-1/2" x 11" x 30-1/4" (953 mm x 279.6 mm x 769 mm)

Hum and Noise are measured with a –6dB/octave filter at 12.47kHz; equivalent to a 20 kHz filter with infinite dB/octave attenuation.
*0dB is referenced to 0.775V RMS.
• Sensitivity is the lowest level that will produce an output of –10dB (245mV), or the nominal output level when the unit is set to maximum gain.
• All specifications subject to change without notice.

The specs speak for themselves. But they can't tell you how natural, logical and easy the RM1608 is to work. All the controls and switches are logically arranged to help you get the job done quickly and accurately.

And in the tradition of Yamaha's sound reinforcement mixers, the RM1608 sets new standards of reliability as well as ease of operation. For complete information, write: Yamaha International Corporation, P.O. Box 6600, Buena Park, CA 90622. In Canada, Yamaha Canada Music Ltd., 135 Milner Ave., Scarborough, Ont. M1S 3R1.

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sentatives; TV broadcasters from smaller, independent stations; cable TV programmers interested in the hands-free programmming a MERPS system would allow; advertising agency executives anxious to insure the maximum on-air image quality for their clients' commercials; and, perhaps most importantly, representatives of the various companies which currently duplicate and distribute spots for the agencies.

According to Stow, the committee recognized three areas of station operations where a multicassette/multitransport system could be beneficial:

- Automation of the station break. This requirement for the MERPS deck is undoubtedly the most demanding. During a typical two-minute station break, there are generally at least four commercials and/or PSAs, and now frequently at least two and sometimes three short bumpers. All have to be able to be run back-to-back, switched as rapidly as the vertical interval.
- Automation of the news show. Although multicassette decks are often used in today's news environment, there is also a requirement for more extensive automation. Here the need is for several channels to operate simultaneously so that two video sources, for example, can be run simultaneously and fed to the switcher for mixing, plus an audio channel or two when audio is kept as a separate element. Although the commercial only runs 30 or 60 seconds, for this application there is the need for a longer-running segment length, up to two minutes or more.
- Total program automation. Although the members of the MERPS committee had advertising on their minds, it is hoped that any new player will be able to handle the longer length program elements necessary for program automation.

Hopefully all three objectives—station break, news, and total program automation—could be met with a single kind of system, such as the one defined in the MERPS user group report.

Specific recommendations

The MERPS report is quite specific in its recommendations. While it does not rule out the possibility that a medium such as videodiscs could answer users' needs, it addresses itself to cassettes. And while it sees program-length cassettes as a desirable possibility, it confines its definitions to cassettes with a minimum six-minute duration, suitable for commercial breaks and news. It also leaves open the option of either using a single event per cassette or recording multiple events per cassette with a random access capability. Two audio tracks and a time code/cue track are specified.

The MERPS deck itself is specified to be of the multiple-transport kind (rather than multiple decks in an array), with a magazine or other device to hold cassettes awaiting record of playback and a device to move the required cassette into position, then remove it again back to the magazine when no longer needed. Though the number of transports is not specified, the MERPS should have the capacity "for at least 36 cassettes and preferably 60 cassettes." Running all this will be a machine control system that can accept a record/playback schedule and control the various magazine/transport functions required to execute it. Cueing accuracy is specified as ±1 frame. Minimum time interval between cassette segments would be only three seconds.

A means of cassette identification is also specified, through a bar code or some other device, providing both a 16-character alphanumeric display to the operation and a coded message to the machine. Included in the information would be start of message, end of message, and running length data so that an operator could simply load the cassette into the magazine in an empty slot; the data on the cassette itself would indicate its position in the program sequence and notify the controller about its location in the magazine. The program sequencer could also determine if a required cassette were missing or if any are loaded into the magazine that are not part of an upcoming sequence. All this information would be tied into a video display monitor which would indicate the status of the event list, if anything were wrong, countdown clocks, and so forth.

The report is full of other user-defined needs, all of them adding up to a powerful cassette automation system, incorporting all of the features of the TCR and ACR quad cart decks but with the benefit of the more modern microprocessor controller. And, indeed, all of this is quite attainable even today, given the current state-of-the-art in automation systems. In places, in fact, the document issued by the user group reads a little like a product brochure describing a currently available automation system from a manufacturer such as Lake Systems (see the description later in this article).

Type C quality

But there is one very, very important difference. The MERPS group specification calls for video and audio quality at least as good as one-inch Type C is today. Observes Stow, "The current state of commercials on local television

HBO Network Automates

Work has recently been completed on the installation of a major new automation system at HBO's operational headquarters in Haupauge, Long Island. In this first phase, just completed, each of HBO's five control rooms is wired to a Data General S/120 computer which performs all machine control and MC switcher functions through a control frame designed by Digital Services Corp.

Scheduled logs are entered through a terminal in the control rooms themselves, up to 11 daily schedules at a time. Schedules consist of Program Events (time, duration, video, audio, key, transition type, and event information), Comments, and Auxilliary Events such as machine control codes to address a logger. The S/120 performs the on-air automation scheduling by communicating switching information to the control frame. Tied to the facility's master clock, the controller handles units of time down to one frame, then sends out information to the various machines needed to execute the commands. A control room monitor gives real-time display of the currently running event plus several upcoming events, including a status report on the next-up event. An edit mode allows instant manual override of the automation functions, permitting a change in any element in the log, including machine assignments.

The second stage of the HBO automation system will involve the installation of an Executive Eclipse minicomputer that will be linked to HBO headquarters in the Time-Life building and receive the program log. The log will be received on a floppy disk, then transfered to the appropriate control room's S/120 hard disk where it can be edited and then run. In the event of failure, the floppy disk will act as an automatic backup. After the schedule has run, the data is copied back onto the floppy disk and the as-run information transmitted back to Time-Life for billing.

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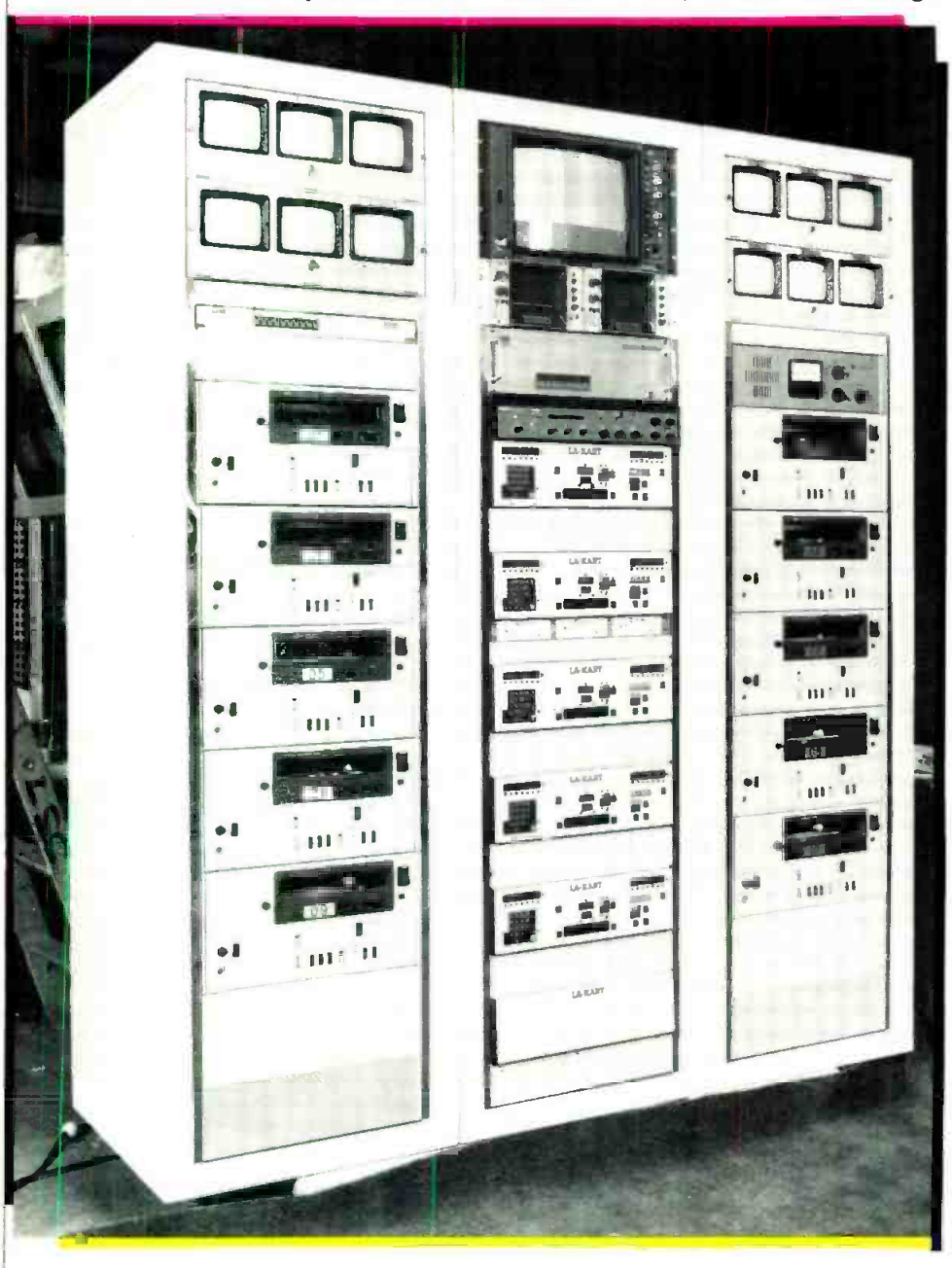
is quite bad. By the time it gets to air, it's often third or even fourth generation. The agency people on the committee wanted to make sure that the MERPS system would give them extremely good multigeneration capability—something that's just not available with the small-format recorders. The situation is even worse with news, where fifth generation is not that unusual."

It is this insistence on image quality comparable to one-inch which lies at the heart of the controversy surrounding the subcommittee report. For although networks demand the quality of one-inch for their operations and although ad agencies would like to see local stations airing their commercials with Type C-style quality, local station operators may just not see the need. Given that there are commercially available small-format systems which already do most of what the subcommittee-specified MERPS deck will, and given that professional half-inch and the improved ¾-inch decks already come close to one-inch quality, what are the advantages in going for yet another tape recorder format to satisfy ad agency and network image quality needs?

Nor are small- and medium-sized station operators the only ones faulting the report. For the manufacturers themselves (200 of those considered most likely to be involved in the various phases of MERPS development received the report in early February) are questioning the report's value. Several, as we shall see shortly, already have systems available which, though not one-inch quality, are certainly broadcast quality. Why, they ask, should they redesign systems to incorporate what amounts to only a little extra image quality? The answer, from Stow's point of view, is that the users' demand may finally push manufacturers towards the long sought-after standardization of small-format recorders.

"It's a question of pushing the manufacturers," he observes. "We already know what they can do today. So we want to see what more they are capable of—we want to push them. And behind everyone's thinking is the idea that if the manufacturers are all working on something that no one has yet, we might end up with a single standard, whereas if we just adopt what is available now we'll end up with the same Betacam/M-format controversy we have today." But whether the industry can afford to wait for the new developments, or whether any manufacturer is willing to address the needs specified by the user group, still remains a fundamental question in Stow's "push" plan.



Lake Systems' La-Kart uses either half- or ¾-inch cassette players with multi-segmented cassettes.

Available today

There have, of course, been several successful station automation systems on the market for many years, tied to the ACR and TCR players. Back in 1974, CDL and Ampex introduced the AVA/ARCH package which offered CDL System 200 control over the ACR-25, with its first commercial installation at Metromedia's WTCN, Minneapolis. Similar stories can be told of the automation systems from companies such as Grass Valley Group and, more recently, Vital Industries' SAM. Designed for large-scale automation of both station breaks and programming, they offer not only the machine control necessary to interface with the quad cart decks but master control switcher automation as well.

The newer automation systems coming onto the market recently, those that come close to meeting the requirements of the MERPS committee except in terms of image quality, are based not on the quad cart but on small-format cassettes. One of the most popular to date has been La-Kart from Lake Systems—originally configured for use with ¾-inch cassettes but now available to work as a controller with both M-Format and Betacam decks. La-Kart works with time code which is prelaid on the cassettes, together with a digitally encoded index that is placed at the head of the tape. The four-digit ID tells the system which tape is in the VCR, while up to 70 individual program segments per cassette are identified by their SMPTE time code start and end points though an index placed at the

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The maximum for the minimum

In designing the HK-302, Ikegami kept the frills —and the price—to a minimum while maximizing the performance. And that helps keep a moderate equipment budget from interfering with first-quality program origination.

However, staying with the basics doesn't mean sacrificing advanced technology. The HK-302's highly efficient optical system coupled to ⅔" low capacitance diode-gun Plumbicon* tubes and high transconductance FET pre-amps deliver sharp, low noise pictures (S/N 57 dB) with excellent colorimetry. And the compact camera head includes a full range of operational automatics to ensure consistent signal quality.

Built-in test, maintenance and operational features are integral parts of this camera's "basics" as well. A comprehensive test pulse system lets you adjust the video with the pick-up tubes off or removed. Complete monitoring circuitry and a broadcast quality sync generator with genlock are also standard features.

To add to the versatility of the HK-302, use the Ikegami automatic highlight compression option. It ensures highly detailed pictures even in high contrast scenes.

With the HK-302 you don't have to mortgage your station to afford prime time performance. So if you're looking for the maximum in studio production capability with a minimum of cost and maintenance, look over the Ikegami HK-302. For complete information and a demonstration, contact Ikegami.

Ikegami HK-302

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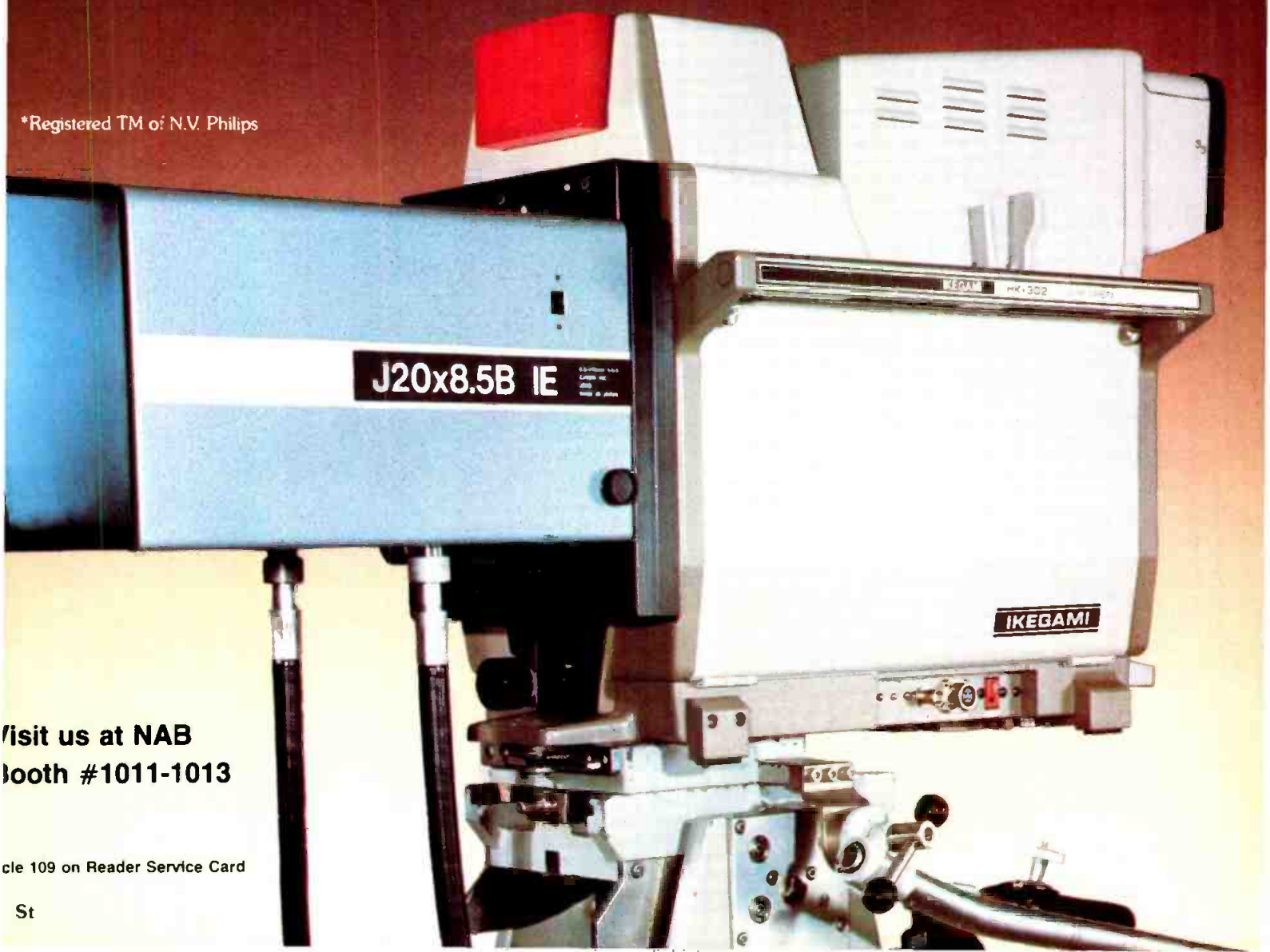
*Registered TM of N.V. Philips



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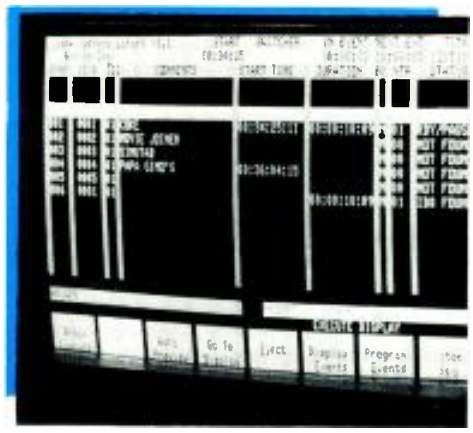
head of the tape. (The indexing is done automatically once the program segments have been recorded).

The Multi Event Programmer has an MC6800 microprocessor at its heart, and works with a disk drive to store and recall data on up to 1000 events stored on as many as 30 VCRs. For on-air operation, the operator simply loads the required cassettes into any available VCR. The deck automatically winds the tape to the beginning and displays the index on the video monitor. Once the index has been checked and confirmed by the operator, the deck is put into automatic operation, and the tape winds to the first cue point on the tape. Five seconds before the event is scheduled to air, the deck is put into standby mode, and the tape either rolls automatically or waits for a manual prompt (ideal for news operations). When the segment is finished airing, the tape rolls to its next cue point and parks; or, if there are no more program segments on that tape, it rewinds and rejects, allowing the operator to insert the next required cassette.

As noted, the system was originally configured to work with ¾-inch VCRs—modified Sony decks in which the Y-C/DOC outputs were used, switched through the Lake vertical interval matrix switcher and into a component TBC to avoid chrominance/luminance delay. The same switcher is also available for the YIQ output of half-inch VCRs, making the system a rather nicely worked-out on-air playback for either station breaks or for operations using half-inch in their news operations.

More recently, manufacturers of small-format recorders themselves have been coming out with their own versions of multicassette players. First on the scene were RCA and Panasonic at last year's NAB with the M-format version. RCA has come out with several system modifications to the TCR-10 since then, now promoting it as the "baby brother" of the TCR-100. It features sequential or random access playback of cassettes loaded into a bank of eight half-inch M-format VCRs, and therefore offers full stereo audio capability as well as the image quality of half-inch. Other values of the M-format players are the 20x rewind speed for fast cueing, plus the capability of full remote control over many other machine functions.

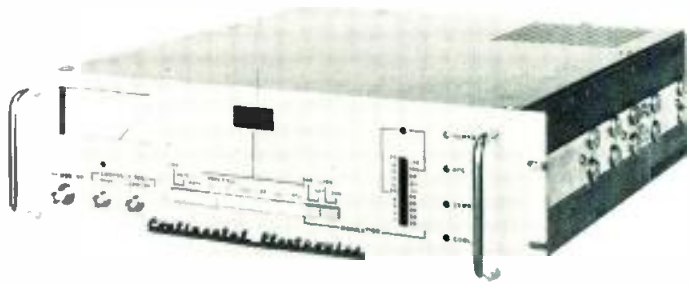
Panasonic has also put considerable time and effort into its M-format



Video display monitor of La-Kart indicates which cassettes are still required to execute the program log.

player, shown at the fall SMPTE in its full production version. The MVP-100 consists of either eight, 16, or 24 ReCam decks stacked together and operated by a single controller. Again, indexing and access to different program elements on the same cassette is through SMPTE time code addressing, with an index to a tape's content provided at its head. The time code track index, more elaborate than La-Kart's, contains information on the spot's title and spot number, house ID, agency ID, directory ID, time code in and out points, number of times aired, agency

Introducing the ultimate FM Exciter!



Continental's Type 802A solid-state FM Exciter offers broadcasters unmatched performance.

Modulation performance of this new exciter exceeds all currently known or marketed FM exciters.

No tuning adjustments are required other than selecting the operating frequency.

Power output is 50 watts into a 50 ohm load at all FM frequencies.

The exciter may be used as a low power transmitter.

Special circuits protect amplifier from mismatched loads. Automatic power control maintains output at preset levels from 5 watts up to the maximum level.

The Type 802A FM Exciter accepts composite baseband signal from a stereo generator, STL system or monaural and SCA programming.

A digitally-programmed, dual-speed, phase-locked frequency synthesis system generates exciter frequency.

Case design is very clean: front panel analog or digital meters and LED readouts give clear, accurate indications of system status and performance. A digital LED display shows true peak level of modulating signal in 5% increments with an accuracy of better than ±2%.

Modular subassemblies may be removed from the exciter without removing the exciter from the transmitter. The exciter moves on slides for easy access from front of transmitter.

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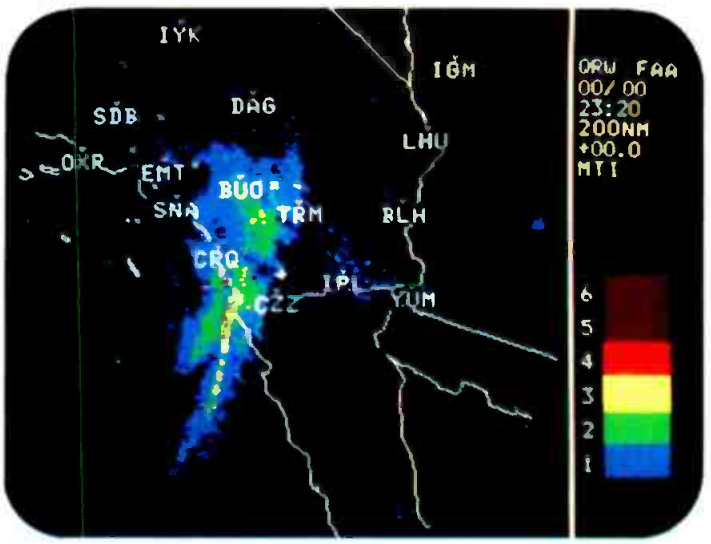
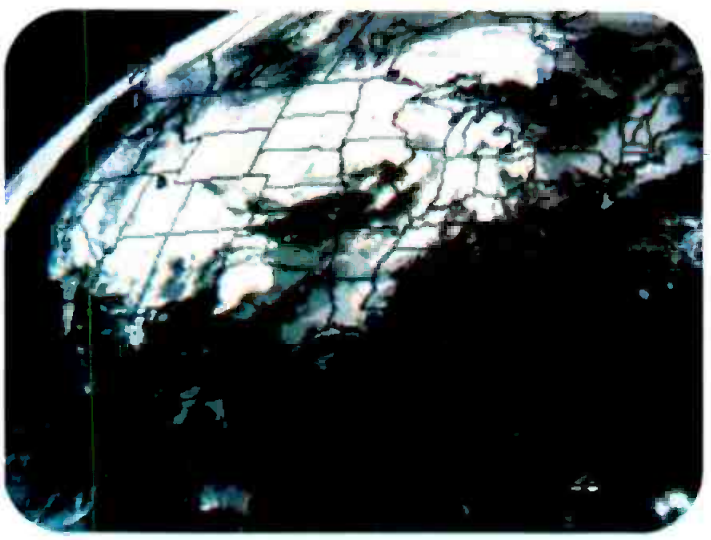


Our Live Color Radar System accesses free government transmitters nationwide, with a simple phone modem.



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

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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 . . .

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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.

The price? We invite you to compare ours with other systems. And you can lease directly from Alden, with no third-party expense.

Who is Alden? We're the most respected name in weather forecasting equipment. Just ask your meteorologist.

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play priority, first air date/remove date, and comments.

In other ways, the system is the equivalent of a dubbing room with the capability of editing spots from one deck to another, making dubs for protection copies, and so forth. Plus you get all the attendant advantages—and disadvantages—of the M-format cassette. On the plus side, of course, is the excellent image quality, ease of handling, ready availability of cassettes, and so forth. In the negative column is the maximum 30 minutes play time with the new T-180 cassettes—an acceptable length given that 30 minutes of uninterrupted air time is very rare these days, even on late-night movies, but still not up to the program length of ¾-inch cassettes.

Brand-new systems

A proof of how important an area of development MERPS decks are will be furnished at this year's NAB when no less than two major manufacturers will bring completely new systems, designed around the multitransport rather than the multicassette approach.

Details are still somewhat sketchy until show time, but the Asaca ACL-3000 now appears to meet almost all of the subcommittee's needs. It has room for a full 300 cassettes—either Beta or VHS, M-format or Betacam—arranged in a gigantic rotating drum, each section of which holds 50 cassettes. When a cassette is needed, the drum spins and stops in front of a "grabber arm," which removes the cassette from the slot and transports it to the machine's playback section, then inserts it into one of the vacant VCRs—basically off-the-shelf half-inch player/recorders. The minimum system configuration is with four such VCRs, in which case the maximum loading time is 30 seconds. But it can also be set up with either six or eight VCRs to improve the maximum loading time; and with a two-elevator system planned for some seven months from now, loading time can be cut to 20 seconds (still, it might be noted, too slow for the 10-second maximum of the MERPS subcommittee report).

Electronic specifications of the system are, of course, those of the half-inch decks themselves. But the event programmer is highly sophisticated, and definitely in line with the subcommittee's thinking. Each cassette is provided with a bar code that identifies it to the machine. The code not only prevents misloading into the bins (if the machine can't read the bar code, the cassette is in the wrong way), but also allows the system to determine where the tapes that it needs to execute a program log are located. Thus operator interface is restricted to simply putting the cassettes into the bins, while the machine takes over the task of identifying where the different program segments are located. This is seen as a distinct advantage to stations which sell up to air time since the commercial can simply be run over from the agency's office and slapped into the system without having to prepare a master spot reel. The system will be priced at $200,000 fully configured with four VCRs.

Not to be outdone, Sony also plans a major product introduction—a multicassette player for the Betacam format. Priced in the $180,000 range (approximately half the cost of the TCR-100), with 22-minute cassettes costing about $10 each, it holds 40 cassettes in a storage bin. When needed, the appropriate cassette is transported by an elevator to one of four BVW-40/10 decks and inserted. In one configuration, a record/playback deck is added to three play-only decks so that commercials can also be recorded and dubbed, using the automatic control features if desired.

Foolproof deck installation is achieved by aligning a sensor in the deck with a sensor in the transport; the transport memorizes the exact location of the four players. As with other approaches, the cassette then identifies itself to the Z80-based microprocessor that controls the system, via a 16-character bar code prepared when the cassette is recorded, indicating its location and status. Three types of control are available. The simplest is the front-panel on the system itself, offering local control. Level two is entry of program control data into the system's microprocessor, coupled to a video display indicating which cassette is currently playing, which are loaded, and so forth. The most sophisticated level is full program automation, with an interface between a host computer system loaded with program logs, play times, cassette identification data, etc. and the Sony player's internal microprocessor. In the last case, program legs can also be loaded from a floppy disk, offering the latest in computer automation control.

To be unveiled at NAB, Asaca's brand-new MERPS deck handles up to 300 half-inch cassettes.

Perhaps the best feature of the Sony Multicassette Player is its improved operating characteristics. Its start time is only 0.3 seconds, and there is no cycle time effect. Further, using the deck's built-in basic functions, there is a freeze-frame mode, especially useful for doing news. Other features of the system include built-in diagnostics, the ability to enter the cassette ID code directly from the computer if there is no time to prepare the bar code ID (as in fast-breaking news coverage or sports event), built-in 24-hour memory back-up, and so forth.

And, as if all these new MERPS developments still weren't enough, there is a possibility for the future which even the MERPS subcommittee members stand in awe of: a fully automated cassette recording system operated by satellite signals—similar to those now used in automated radio stations. Gone forever will be the days of overnight mail delivery of commercials to local stations. Instead, each day's quota of commercials will be transmitted via satellite from a central location, at night when rates are low and most stations are off the air. A message encoded in the satellite signal will activate the MERPS deck and instruct it to cue up an empty cassette, then record the incoming signal. In the morning, the operator will be ready with all the commercials pretaped, at least one generation in quality better than mailed dubs, and with an automatically prepared log which can be given to the scheduling department.

It is more than a dream, of course, since the satellite part of the operation is already underway in 27 key cities through the efforts of Charles Ahto's Tape/Film Industries. Now it is simply a question of interfacing a MERPS deck to make the ultimate dream of TV station automation a reality. **BM/E**

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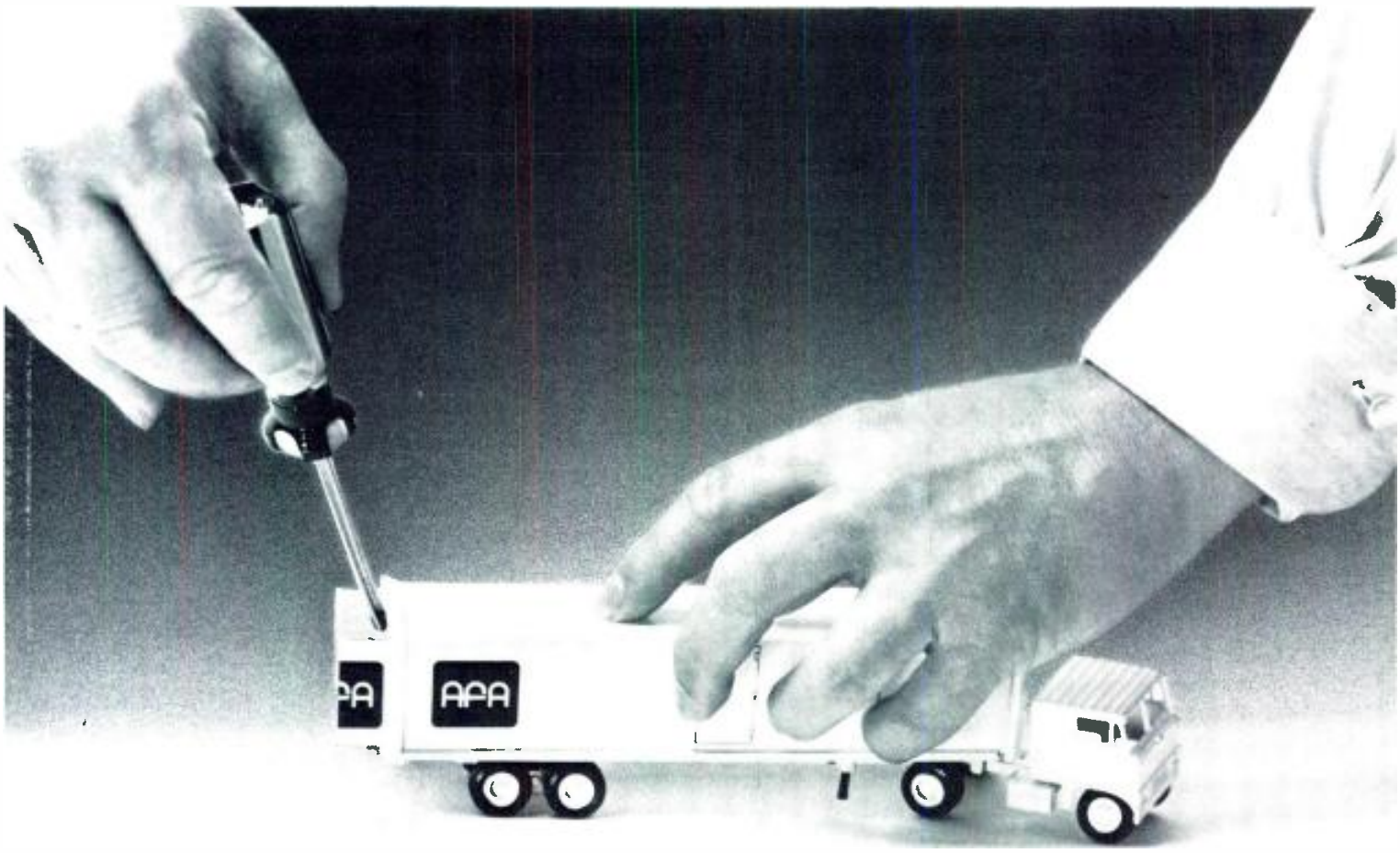

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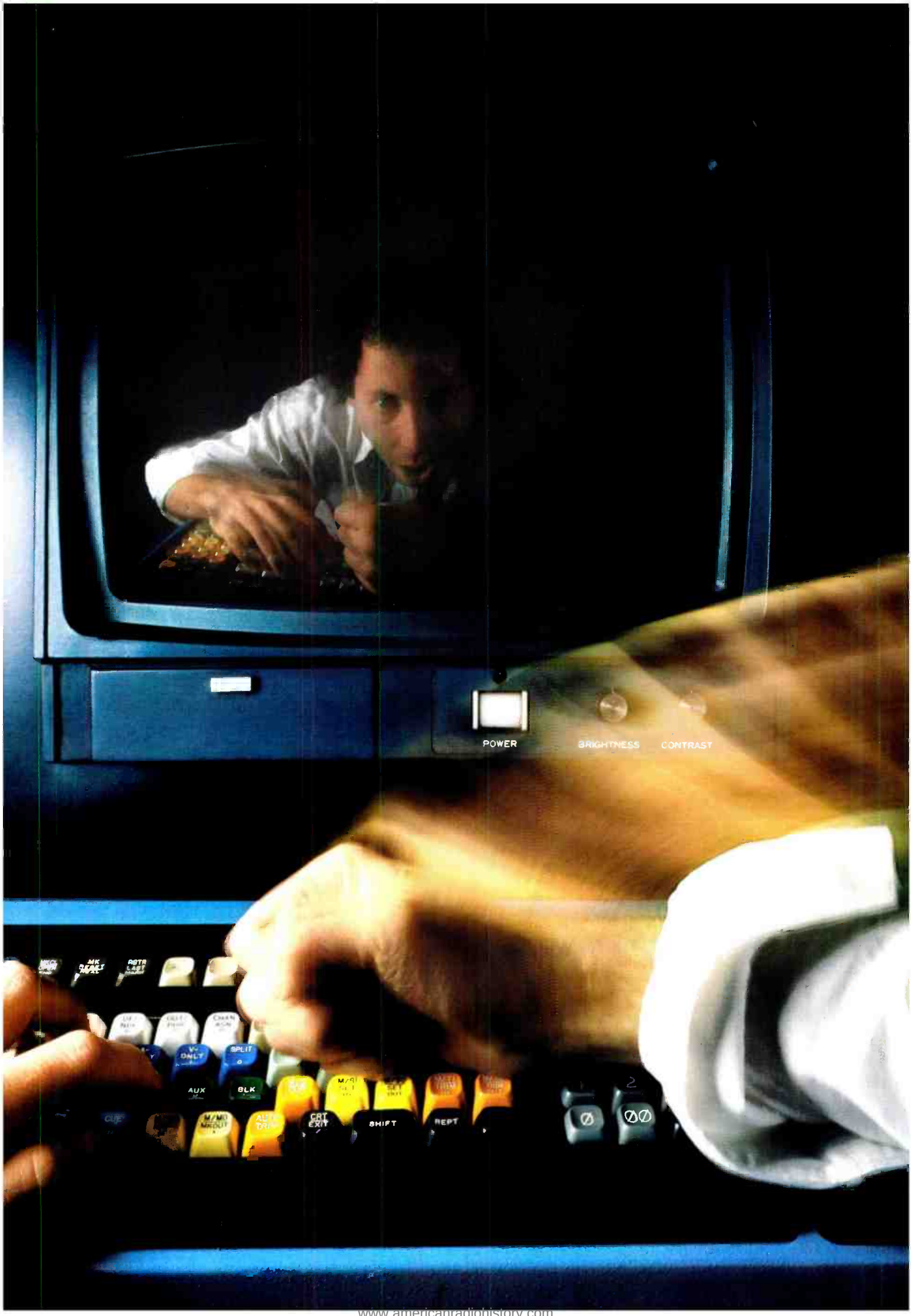

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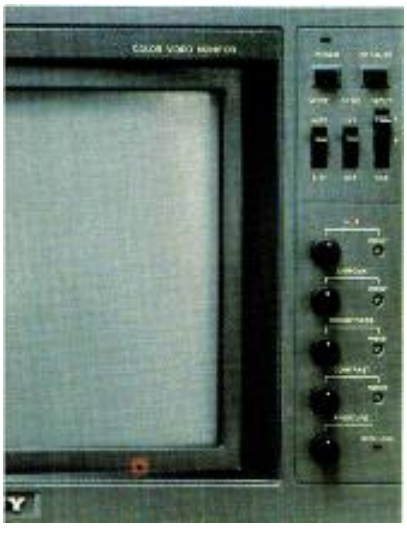
I DEVELOPED BY ONE MANUFACTURER.



BVM-1201
BROADCAST
MONITOR

BVH-2000
1" RECORDER

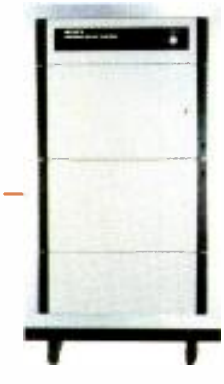
BVT-2000
1" TBC

GVG 300 SERIES
PRODUCTION
SWITCHER

CPD-5001
DISPLAY
TERMINAL

RS-422

BVE-5000
COMPUTERIZED
EDITOR



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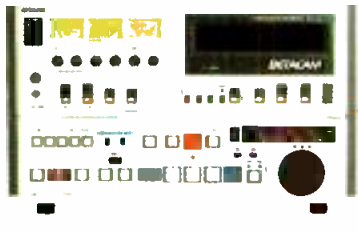
BVT-2000
1" TBC

SONY/MCI
JH-600 SERIES
AUDIO CONSOLE

BVU-820
3/4" RECORDER

BVT-800
3/4" DIGITAL TBC



BVW-40
1/2" RECORDER

RS-422

SONY/MCI JH-24
24-TRACK
AUDIO RECORDER

BVE-5000
CONTROL PANEL

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- Plug-in Timebase Corrector (optional)
- 2 hours record/play time

BKH-2015 OPTIONAL PLUG-IN TIMECODE FOR BVH-2000

- Generator/Reader with VITC/LTC capability
- Character Generator
- User Bit Display

BVH-2500 RECORDER

All features of BVH-2000 plus:

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BVT-2000 TBC

- 9-bit, 4 Fsc sampling
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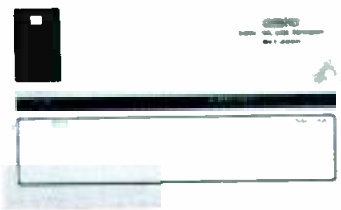
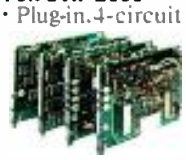
- Built-in Velocity Compensation, Sync Pulse Generator, Video Processor and automatic Advanced Sync Generator
- Full remote-control function
- DT playback with BVH-1100/1100A/1180/2000 and BVU-820 VTRs



BKH-2100 OPTIONAL PLUG-IN TBC FOR BVH-2000

- Plug-in, 4-circuit board Digital TBC
- 8-bit 4x Fsc samplings
- Remote-control capability



3/4" EDITING

BVU-820 RECORDER

- Built-in, full-scale editing functions
- Dynamic Tracking
- Playback from —1 to +3 × standard speed
- Simultaneous video playback in record mode (Video Confidence)

BVT-800 DIGITAL TBC

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1/2" EDITING

BVW-40 BETACAM™ RECORDER

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At Sony, we do more than guarantee the best total system. We guarantee the best individual components.

The machines you see on these pages, which comprise the three established formats of the broadcast industry, represent only a small sampling of the Sony universe of post-production products.

Each component, while different in price and scope of features, shares five things in common. Unsurpassed quality, reliability, durability, ease of maintenance, and excellence of value that Sony is famous for.

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SONY
Broadcast

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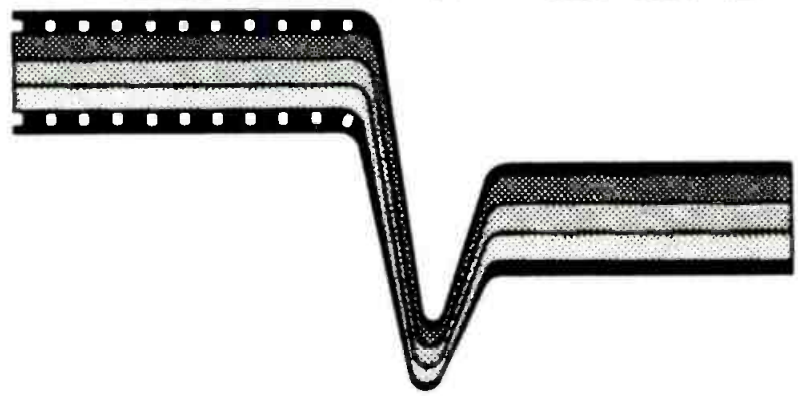
production facility report

VIDEO POST &TRANSFER



By evolving to serve the mix of clients peculiar to the Dallas market, Video Post and Transfer has found a stable niche.

By Eva J. Blinder
Senior Associate Editor

While the people at Video Post and Transfer may not have set out to prove the theory of evolution, the facility provides an excellent example of how an organism responds and adapts to its environment. Unlike New York and Los Angeles, where the major networks and feature film producers provide much of the sustenance for large post-production facilities,

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the busy Dallas area is heavily weighted with smaller independent producers as well as corporate and industrial video users. By positioning itself to supply these users with a top-quality one-inch post-production facility, Video Post and Transfer has placed itself at the hub of this busy market—literally as well as figuratively.

The company makes its home in the busy Love Field air terminal, which serves the entire Southwest and has remained active despite the opening of the Dallas-Fort Worth Airport. According to Video Post and Transfer president Neil Feldman, the facility serves the same territory as Love Field-based Southwestern Airlines—all of Texas, plus Louisiana, Oklahoma, and New Mexico, with some work from Colorado and Kansas City.

"A client can actually fly in, spend a couple of hours doing a transfer or editing job, and fly right back out," says Feldman. Video Post and Transfer occupies office space in what used to be the Braniff terminal at Love Field—an easy walk from the Southwestern Airlines terminal, and served by the air express companies.

Serious engineering

The facility serves its clientele with more than easy access, however. Engineering is serious business at Video Post and Transfer, as both Feldman and chief engineer Dan Sokol agree. Both men are dedicated engineers with many years' experience: Feldman once designed ICs for Motorola, and Sokol, whose background also includes IC work, wrote the program for the ESP still store during a year spent at ADDA Corp. just before joining Video Post almost three years ago. Their shared expertise has led to the development of some unique equipment for film-to-tape transfers, a large part of the company's business.

Although the facility was the first in its market to offer the Rank transfer system, state of the art equipment alone is not enough to insure success, according to Feldman. As he puts it, "For us to stay ahead of the game, we have to develop devices that nobody else has. We are doing things that neither coast is doing yet." Sokol has built a color-correcting computer for the Rank which he and Feldman agree goes beyond the capabilities of other computer-controlled color correction and telecine control systems.

The ambitious project was conceived jointly by Sokol and Feldman and built entirely by Sokol over "eight months worth of weekends." As Sokol describes it, "A software project never ends. The Rank is so busy that I had to schedule time on weekends to debug and work on the program, and restore the machine to its original working condition before I finished."

The finished equipment, in full operation for about three months at press time, expands the capabilities of the Rank scanner in several ways. For example, it has the ability to do moves on slides or on still frame; on the Amigo system, a pan or move has to take place over moving video. "Essentially, there's no time limit on moves with our system," Feldman boasts. Other "little goodies" include the choice of relative or absolute color corrections (the relative mode allows more "fine tuning") and a bubble memory, which Sokol says is faster and quieter than the Rank's disk.

In addition, the Video Post unit is capable of continuous multiple dynamics (slow transitions from one set of correction parameters to another), with transitions as long as two or three minutes, if desired. Besides, Feldman adds, "We can add any little trick we want because we built it ourselves." Sokol notes that he has written special software routines for the system to meet particular client needs or problems.

Home brew

Another useful home-brew item—also a collaboration between Feldman and Sokol—is a device that burns in laboratory film frame edge numbers during film-to-tape transfer on the telecine. "I thought the people in Los Angeles had something like this, and I was really surprised when I went out there last summer and they didn't," Feldman relates. "We couldn't find it anyplace."

In essence, the device takes the opposite tack to the time-code-on-film solution to the film-tape dilemma, allowing the editor to read film frame

Post Suite 2, showing Neotek audio board in foreground. Unique layout of post rooms lets clients concentrate on esthetics, not engineering.

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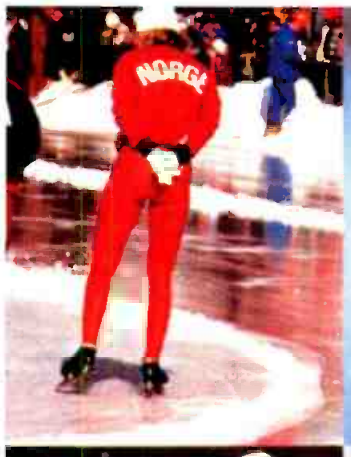

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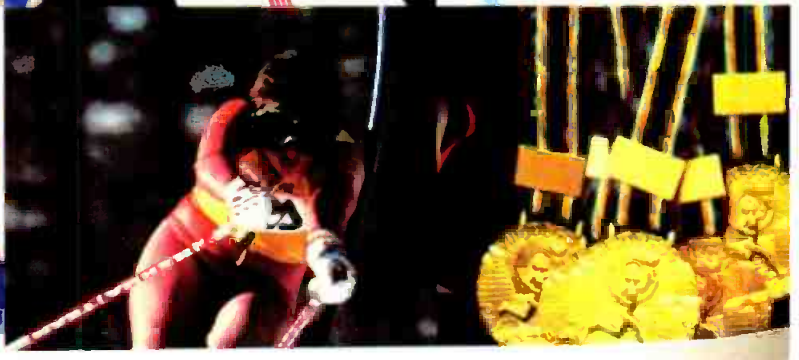

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numbers directly off the videotape for final conforming in film. Originally suggested by a client, the device is based on an Apple computer modified with a Video Associates Laboratories board that converts the computer's video to NTSC, essentially turning it into a computerized keyer, according to Sokol. Sokol wrote a program for the computer that counts the film frames as they go by on the Rank in either direction for complete frame accuracy, and burns them in on the videotape. The service is offered at no extra charge to transfer clients.

Sokol is presently at work on several other R&D projects, most of which are in too early a stage to be discussed. One project he is willing to mention is a character generator that will let clients put 64 to 70 readable characters within the safe title area on videodisc. "Many of our videodisc clients want to pack a lot of text on a page, more than you can read on NTSC," Sokol explains. "This project [which he won't describe in detail] helps solve that problem."

Doing their own engineering work hasn't precluded a close relationship with manufacturers, according to Feldman and Sokol. "We work closely with a number of manufacturers, both because of our technical expertise and because we know the people," Sokol notes. "That way, we get the opportunity to evaluate and know about products before they're released—and also get high up on the delivery list." Arrangements such as this have made Video Post and Transfer among the first to receive CMX's new 3400 editing system and NEC's Optiflex digital effects package.

The facility has gone into the animation business with its Dubner CBG-2 graphics system.

Editing systems

As one of CMX's four Beta test sites, Video Post and Transfer has two 3400 systems, each installed in one of the company's two identically equipped post rooms. The editing systems are "about three-quarters of the way to a full 3400," according to Feldman. Like many others, Feldman is still somewhat skeptical about the 3400+, however. "The Plus has interesting ideas, but I think they'll be refined considerably before we see the final product," he suggests. "I'm not impressed by the keyboard because I think it adds confusion. With the CMX keyboard, you have to get to a place where you don't even look at it. Most impressive is the extensive control over digital video effects and other equipment." Still, he says, "We're certainly slated to get

Post Suite 1. The identical post rooms each have a CMX 3400 editing system.

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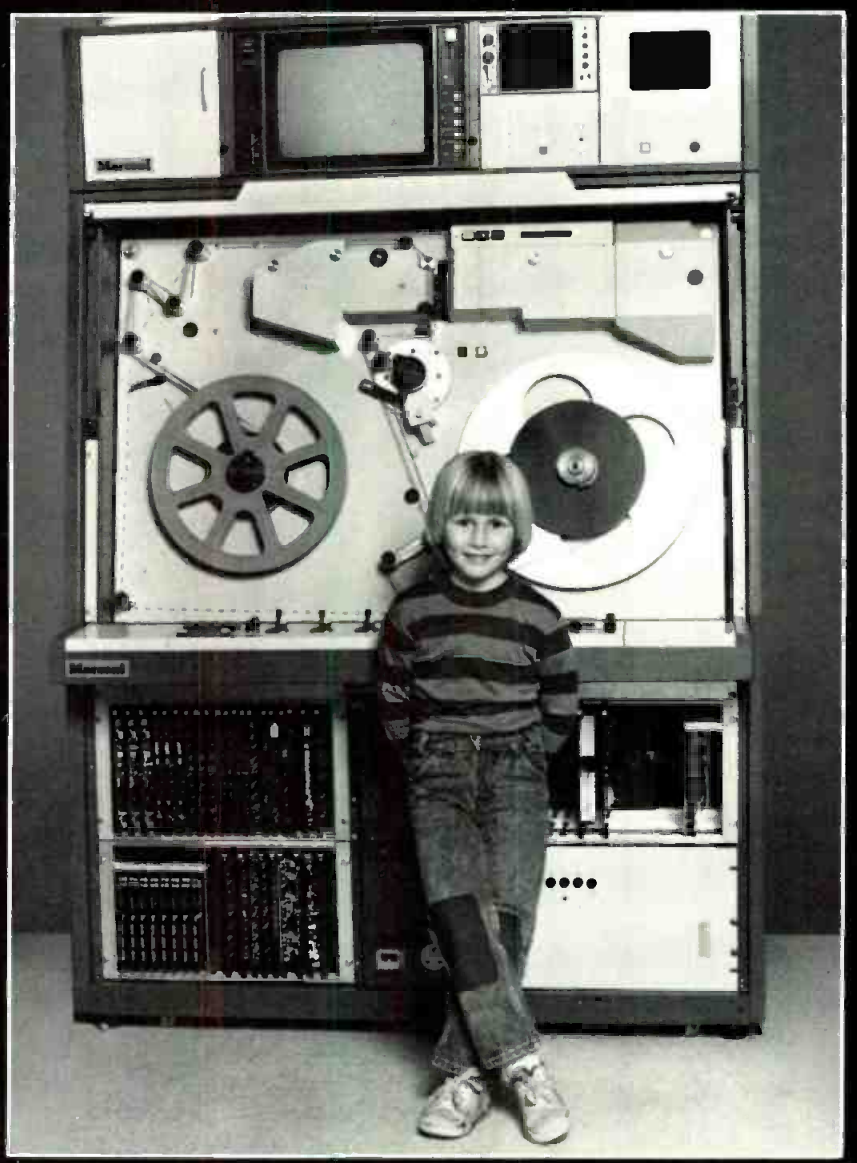

He's 5½ going on 6 and he isn't a genius. But the Marconi Line Array Telecine B3410 doesn't need a genius.

Unlike other telecines, the Marconi B3410 is fully digital. That means, among other things, it can deliver full performance within two minutes from the time you switch on. It does not require tweaking or day-to-day adjustments, and there is no registration drift or tubes to replace. The stability of its electronics is simply superb!

Once it's started, you'll appreciate the Marconi B3410 for its fully digital processing and CCD image sensors that provide an extraordinarily true video picture. Moreover, the Marconi B3410 has a light bias facility that resolves dark areas of the film. It converts into all international standards and interfaces with all available color correctors.

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Central equipment room houses the RCA and Sony one-inch VTRs.

at least one of them."

Other equipment in the post rooms includes GVG 1600-75 switchers, which Feldman chose over the larger 300 as more cost-effective. "In our market, we need a very efficient, quick system," he says. "With the addition of the NEC Optiflex keyer/combiner, we have tremendous capability for all the work we need to do." In addition, each room has a Chyron RGU-2, a 12-input Neotek audio console, and a Thomson-CSF color corrector.

A total of nine one-inch VTRs serve the two rooms: five RCA TH-200As, three TH-200s, and a Sony BVH-2000, which will be replaced this month as soon as the new BVH-2500 becomes available. According to Feldman, the 2500 can perform single-frame edits with no preroll—very useful for animation work—and is the only machine now on the market that can play in real time in reverse. In addition, the facility has an RCA 600-A quad machine and several Sony and Panasonic ¾-inch players, used only to dub tapes up to one-inch. (Post-production is strictly one-inch at Video Post, and the company encourages even industrial clients to produce on one-inch.)

Unique layout

What makes the post rooms unique, however, is their layout. "We got lots of input from engineers and clients when we were building them," Feldman explains. "Many layouts have evolved from broadcast television, but in post-production, where there's less time pressure, it's less important to see exactly what the switcher is doing at any particular moment. If something goes wrong, you can always stop the tape.

"Most facilities have the client sit behind the equipment, with the monitors on the wall," Feldman continues. "Our clients sit next to the editor at a table. The editor sits behind the CMX editor, with the switcher at an angle to his left so that he doesn't see it when he looks at the monitor. He needs access to the electronics, but neither he nor the client needs to be distracted by it." In addition to the editor, an audio operator (whose responsibilities extend to operating the RGU-2 and changing tapes) attends each editing session. "Most of the space consists of flat tabletops," Feldman adds. "The client looks at the monitors and listens to stereo audio from the speakers."

Economical graphics

While Feldman is not averse to saving money on equipment—and passing the savings along to his clients—he refuses to skimp on capabilities. This is illustrated by his choice of the NEC Optiflex digital video effects system, an add-on package for NEC's E-FLEX that increases the system's flexibility with three-dimensional perspective, rotation, and other sophisticated effects and operates on digital information received directly from the E-FLEX, with no A/D conversion necessary. One Optiflex feature Feldman particularly appreciates is a keyer/combiner that combines two channels of video into a single channel, saving an M/E on the switcher. According to Feldman, this allows the user to do a chromakey on any color for either channel, even after they have been combined.

The Optiflex system is additionally attractive to Feldman because of the close engineering relationship Video Post and Transfer enjoys with NEC. "They listen to our criticisms," he says. "With the Optiflex, we made a number of suggestions about what we would like to see that NEC has adopted, even though it delayed the introduction of the device." In fact, for the past two years NEC has employed editors from Video Post to operate Optiflex at its NAB booth. In the future, Feldman sees Optiflex becoming "more powerful than ADO—maybe like Mirage. It's expandable, and that's what we're so excited about."

Software demands

The new kinds of problems associated with software-based equipment are a matter of concern to Feldman, as they are to many engineers. "When we purchase equipment we are adamant about obtaining the source code list-

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KDAY Los Angeles, CA	**WLS** Chicago, IL	**KYW** Philadelphia, PA	**KNBR** San Francisco, CA	**WWDC** Washington, D.C.
KABC Los Angeles, CA	**WNOE** New Orleans, LA	**WFIL** Philadelphia, PA	**WPTF** Raleigh, NC	**KUGN** Eugene, OR
KEEN San Jose, CA	**WCAO** Baltimore, MD	**KENR** Houston, TX	**WCOS** Columbus, SC	**KODE** Joplin, MO
KIBE San Francisco, CA	**WQXR** New York, NY	**KKBQ** Houston, TX	**WWL** New Orleans, LA	**WESC** Greenville, SC
KNEW Oakland, CA	**WPTF** Raleigh, NC	**KTIA** Ft. Worth, TX	**KRDS** Phoenix, AZ	**KAAM** Dallas, TX
WMAQ Chicago, IL	**WGAR** Cleveland, OH	**KTSA** San Antonio, TX	**WISN** Minneapolis, MN	**WKIX** Raleigh, NC
WPLO Atlanta, GA	**WSPD** Toledo, OH	**WISM** Madison, WI	**KRE** Berkeley, CA	**WAKY** Louisville, KY
WQXI Atlanta, GA	**KGW** Portland, OR	**KYA** San Francisco, CA	**WKAT** Miami Beach, FL	**KUBA** Yuba City, CA

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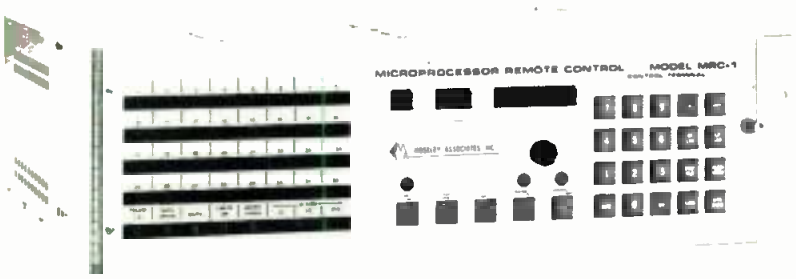

MRC-1

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- MULTIPLE REMOTE SITE CAPABILITY
- AUTOMATIC TELEMETRY MUTING
- USER DEFINED SYSTEM SETUP

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ings," Feldman insists, adding that he has persuaded CMX to part with the source code for its new 3400 editing system, which Video Post and Transfer is installing.

"I would have left CMX if they didn't deal with us on software," he adds. While he is aware that many manufacturers are reluctant to part with source code, he feels that engineers can exert pressure on them by acting in concert.

"I want to see engineers in facilities come together and demand access to software," he states. "If editors got together and screamed collectively, we could solve this problem in two seconds. I will sign any kind of legal document the manufacturers insist on," he continues. "After all, we're users, not manufacturers. Most of the maintenance problems we encounter are software-related. The hardware is relatively reliable." It is Feldman's feeling that CMX is becoming more willing to bend on the software issue as it is putting more emphasis on building editing systems and less on building interfaces "for every little switcher."

In addition to the post rooms, a newly built telecine room houses the Rank Cintel flying spot scanner, the color correction and film edge numbering systems, a Chyron RGU-2, digital noise reduction, and a Grass Valley Group 1600-1L switcher.

A separate area is reserved for animation, a field Video Post and Transfer "had no intention of getting into until we saw the price of the Dubner CBG-2 and what it could do," according to Feldman. "The thing that especially intrigues me about the CBG-2 is the continual upgrade of software," he remarks. "It's a very creative device." With its acquisition of the CBG-2 about two years ago, Video Post and Transfer became the first facility in the area to offer animation services. "Now, a couple of other companies are trying it," Feldman says.

Serving independents

Feldman's dedication to independent producers is expressed in the basic structure of Video Post. "We are strictly a post-production facility," he insists. "To offer production services would make us competitive with our clients, the independent producers. In the early days in this market, independent producers had to go to facilities that were also involved in production. We gave them another alternative."

Feldman became involved with the company about three years ago, when it was in the process of being transformed

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from its original incarnation as Video Post, Inc. In its initial setup, the company was the first independent one-inch facility in the Dallas area, according to Feldman; the other independent post-production facilities used quad, with one-inch available only through the local TV stations.

"When I became involved, we created a new company, moved to a larger space, rebuilt, and began to offer film-to-tape transfers with the first Rank Cintel flying spot scanner in the area," Feldman recalls.

To be accessible to independents, however, Video Post's alternative had to be cost-effective. "We are solidly committed to the idea that the future of growth in the Southwest is with the independent producer—and the independent producer must save money in order to be competitive," explains Feldman. "We cut costs not to attract people from Los Angeles and New York, but to make people here competitive with those markets."

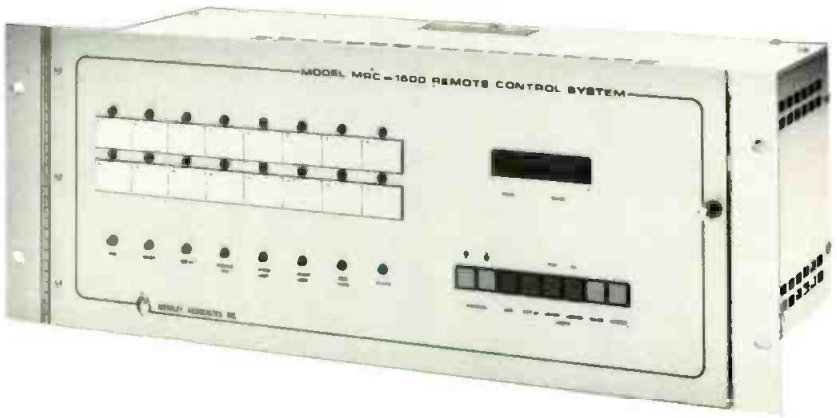
Feldman adds, "People in Dallas have often tried to judge themselves in terms of what happens in Los Angeles and New York. I threw that concept out from the beginning." About 45 to 50 percent of Video Post and Transfer's business is commercial production, with the rest divided among television series work for clients such as PBS, corporate video productions for in-house use, interactive videodisc work, and other areas. "The wide range of clients is healthy for us," Feldman says. "When one segment is slow we don't get scared."

A major difference between Dallas and the two coasts is clients' more restricted budgets. "We don't have the high rollers as part of our business," Feldman admits, and this limitation has reinforced his determination to be cost-effective. An excellent example of how Video Post and Transfer endeavors to save clients' money is the way it handles audio sweetening. Located adjacent to the video house is Omega Audio and Productions, a 48-track studio facility specializing in audio sweetening for video. Although the two companies have no financial connection or arrangement, they have a symbiotic relationship in which each benefits the other.

Symbiotic sweetening

Rather than maintain its own audio sweetening room—and bill clients at its own rates—Video Post and Transfer sends clients with sweetening work next door with a ¼-inch workprint with

ECONOMY AND RELIABILITY



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- CRT AND LOGGER OPTIONS

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Status inputs may be set to alarm on rising, falling, rising and falling waveforms, or muted completely. Each telemetry channel can be calibrated in one of four modes: power, indirect power, linear, or millivolt. Upper and lower telemetry limits may be set or disabled independently. In operation, telemetry data is checked against these limits. Exceeding these limits enables visible and audible alarms. Data needed to bring telemetry back within limits is automatically displayed when an operator acknowledges an alarm.

An optional CRT displays all status and telemetry data and gives the operator full control from the keyboard. A Logger may be added to the CRT to record transmitter operation. The MRC-1600 has full control fail-safe features and maintains special channels to monitor data link conditions and A/D ratios. A maintenance override mode continues to update status and telemetry data while locking out command signals from the Control Terminal.

- ADAPTS TO ANY INTERCONNECTION NETWORK
- ALL TELEMETRY LIMITS MAY BE SET OR DISABLED INDEPENDENTLY

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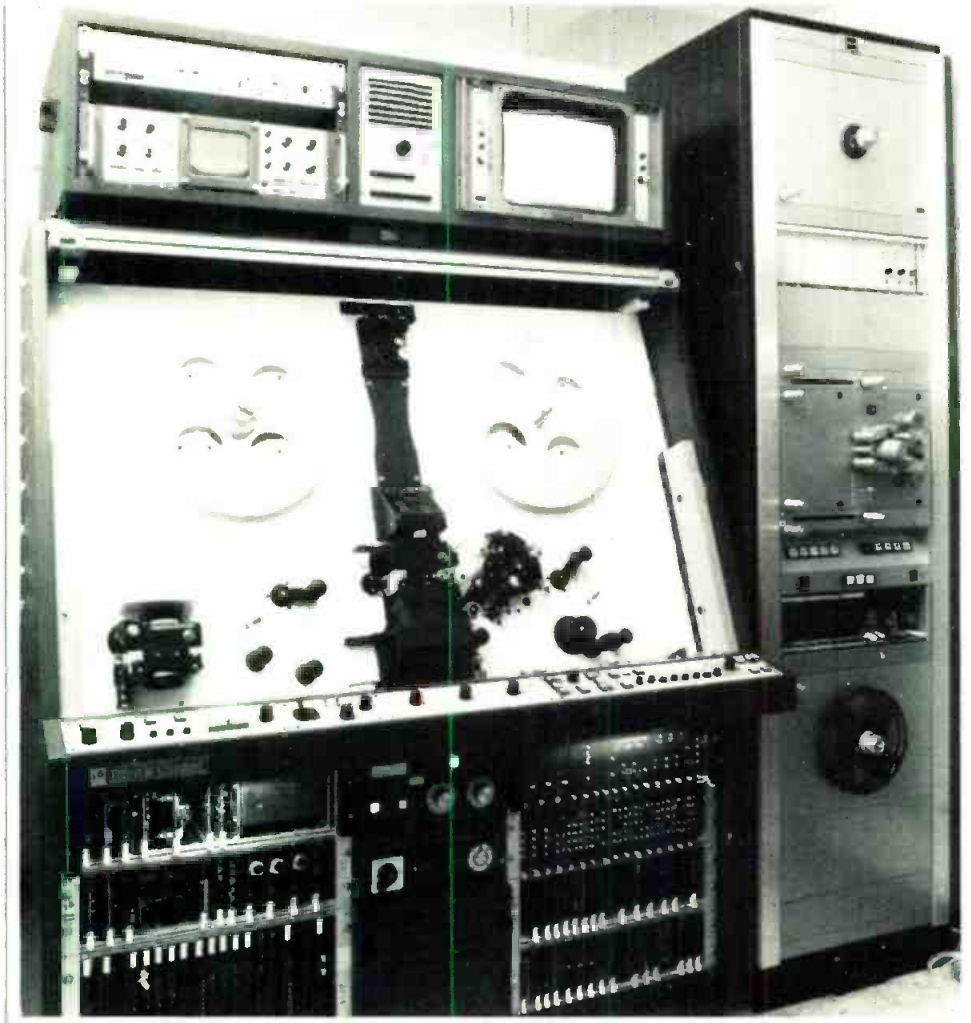

VPT engineers built their own computer controller for the house's Rank Cintel Mark IIIC flying spot scanner. Also in the telecine room is the VPT-built film edge numbering device, which burns in film frame numbers on videotapes used for off-line editing of material produced on film, simplifying final conforming. Feldman believes such in-house inventions keep the facility competitive.

burned-in SMPTE time code. Omega locks the print to its 24-track recorders with a BTX Shadow synchronizer and performs all the necessary audio work, with the aid of a British-built, computer-controlled 48-track Amek console—all for about half the cost of doing it at Video Post. When that is finished, the client goes back to Video Post and Transfer, which then mixes the 24-track masters down to stereo on its computer-controlled audio board and redubs the finished show on one-inch, with Dolby A encoding if the client wishes.

Audio facilities at Video Post and Transfer, then, can remain much simpler. Any impression that the facility

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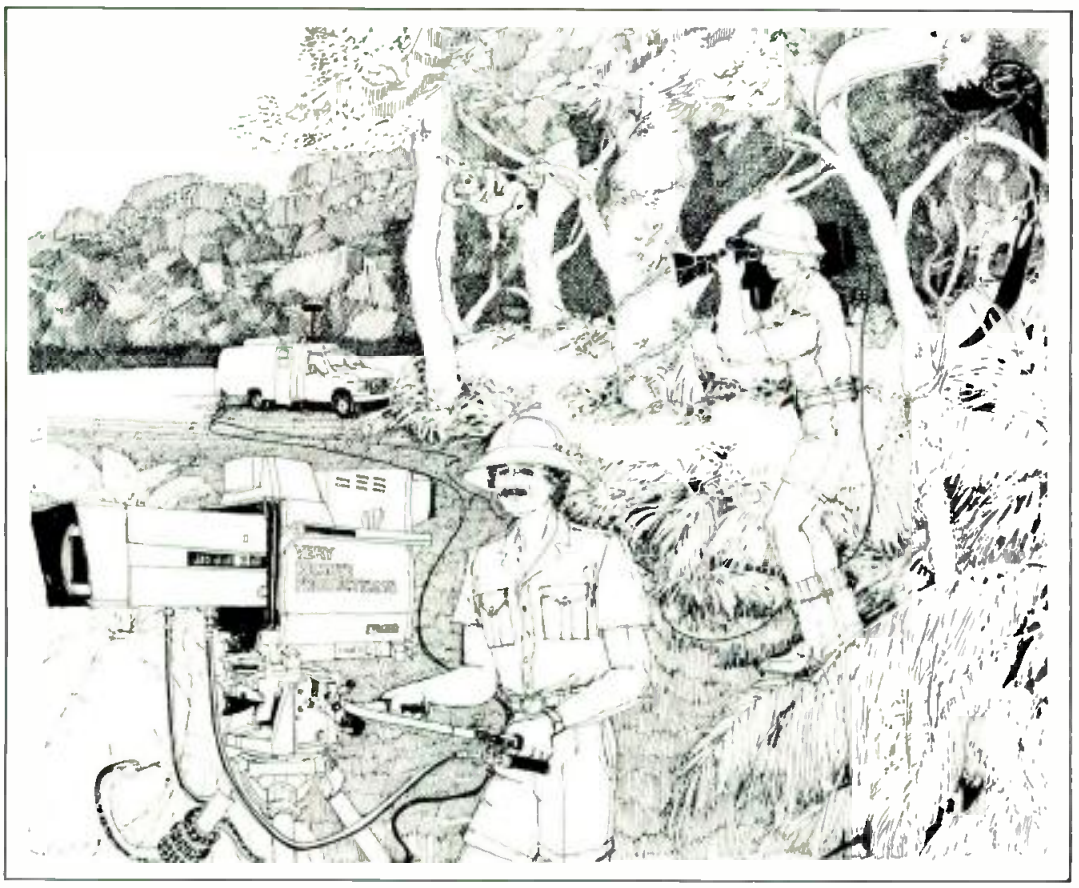

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neglects audio is quite mistaken, however. Among the many engineering projects underway is development of what Feldman calls "a single-entry keyboard type of device" to control an audio console, tape recorders, effects, and other audio devices in a manner similar to CMX or Datatron video editors. "We're trying to design equipment especially to deal with the problems of audio sweetening in the video environment," Feldman explains. Still, he has no intention of competing with Omega in the audio area. "My view is to look for ways to save our clients money," he insists. "I don't want them paying for equipment they have no use for."

Future visions

Future plans at Video Post and Transfer, like present realities, start with Feldman's vision of the market. "I'm not sold on the idea of having a facility with five CMXs and seven Ranks," he explains. "We want to address the direct needs of this market. Beyond a certain size, we may become unwieldy." Still, the company will probably expand in the next few years, spurred on by competition from an increasing number of competitors.

"At the present time, at least four new companies are opening up, offering what we offer," Feldman says. "We know there's not enough work for all of us. If these companies succeed in developing the market, however, there'll be no problem. We'd like to see everyone committed to developing the marketplace."

Feldman looks forward to the advent of HDTV, although he's not sure exactly how it will fit in with the market or with his facility. "We are absolutely committed to the new technologies, including HDTV, if there's a market for it," he says. "Personally, I'd like to see a noncompatible HDTV system solely concerned with generating a higher quality signal." In the long run, he feels, incompatibility with NTSC will not be a hindrance, although mass-market appeal would take some time: "I think that the initial impact will be to people who really understand what they're buying."

Incompatibility is more troublesome to Feldman when it comes to small-format video recorders, however. "To offer small-format video services, I'd have to invest in Beta, M-format, and Quartercam," he complains. "I resent that." Of most concern, however, is the 20-minute recording time limit of most of the small-format equipment, which Feldman feels is inadequate for post-production. "The intriguing thing about the small formats is the quality of the component video, which is certainly better than ¾-inch," he concedes. "But they're for production, not post-production."

Whatever direction future expansion takes, Feldman is sanguine about his company's prospects—and those of the Dallas market. "The future of post-production is highly related to the new nonbroadcast technologies," he suggests. "In the next few years, the importance and size of this market is going to dwarf the traditional kinds of production. Dallas has been addressing this area successfully for many years."

In fact, Feldman predicts that the Dallas market, with its wealth of independent producers and high-end corporate users, "could grow to be larger than New York or Los Angeles. It's certainly a vision, but it's not far-fetched.

"New York and Los Angeles will have to be far more flexible to deal with the upstarts like us," he laughs. "We can do anything they can do—cheaper!" **BM/E**

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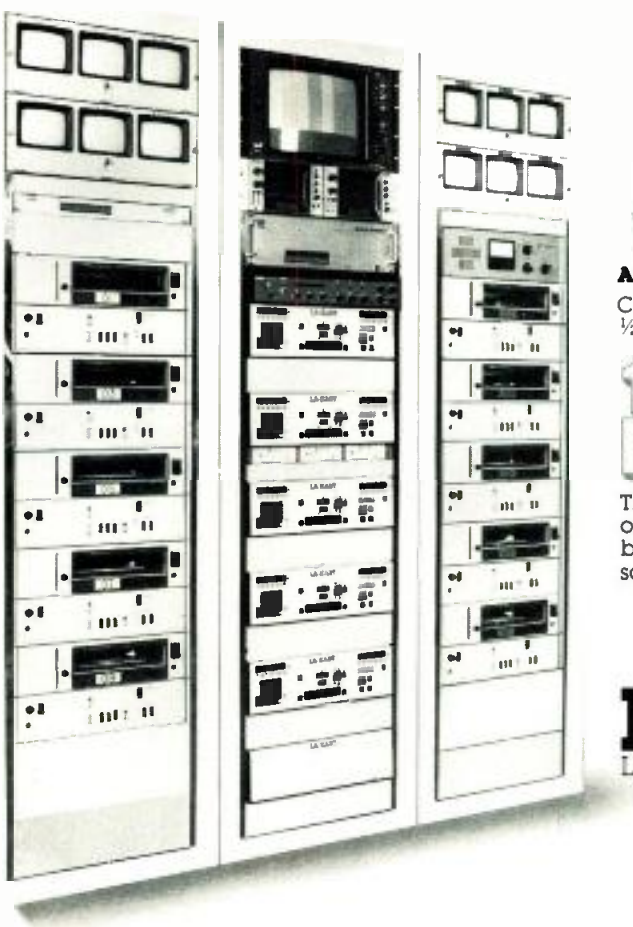

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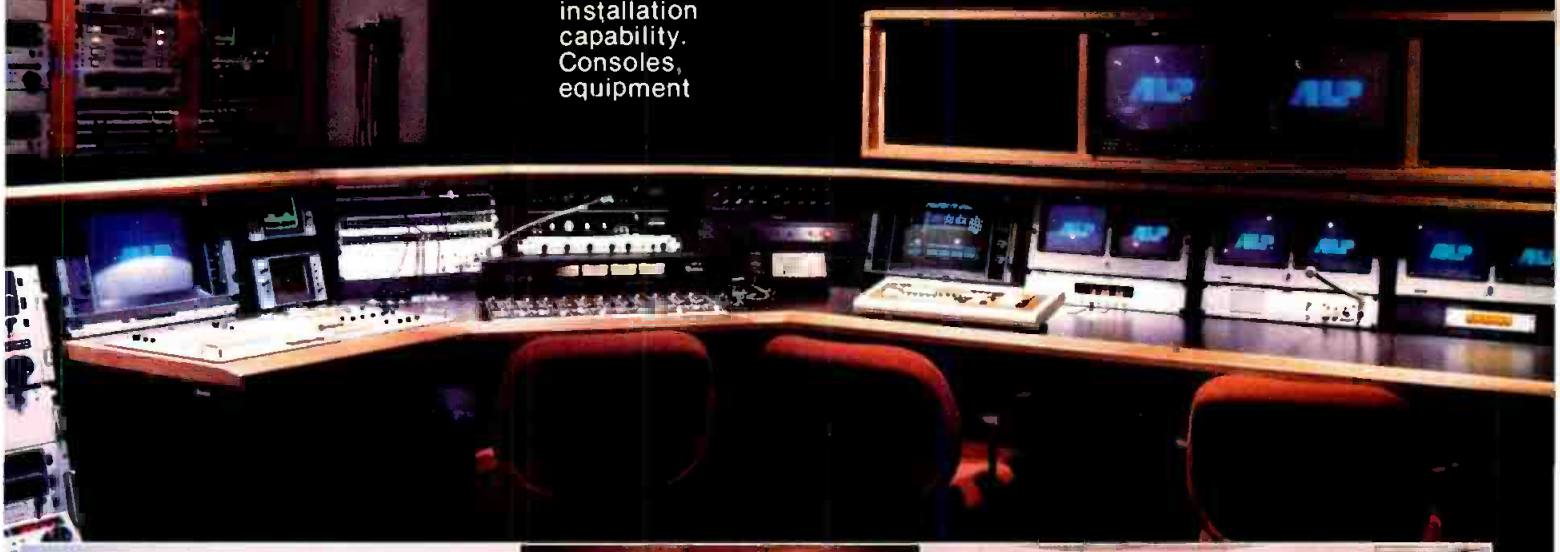

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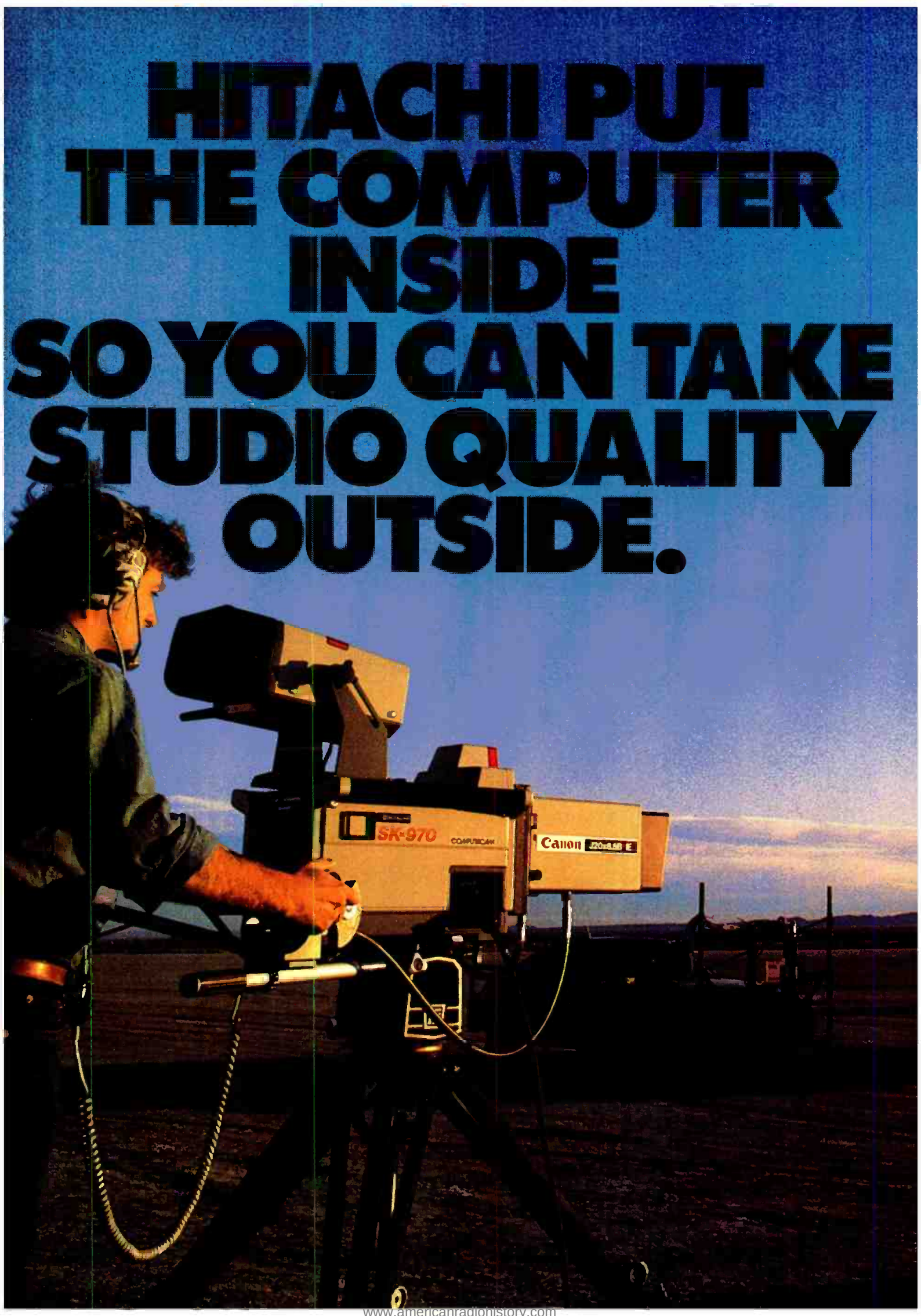

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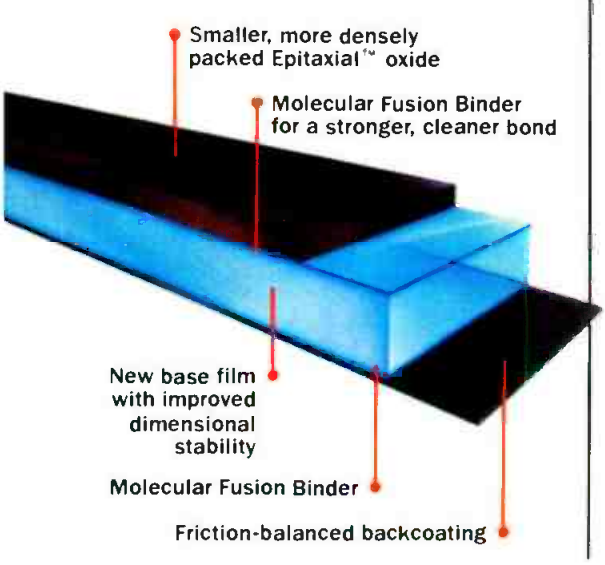

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ABC Computerizes Olympic Control Room

Coordinating a television event as complex as the Olympics takes almost superhuman ability—or a computer program like BIONICAD.

By Stanley Spiro

When viewers tune in ABC's summer Olympic coverage, one program they'll never get to see will be running on an IBM Personal Computer just 10 feet away from the executive producer. This computer program will be helping to guide the decision makers through the countless options available for formatting the daily coverage.

The program's development dates back to 1976, when the author served as timing associate director in ABC's main control room at the Montreal Summer Olympics. The timing AD's task was to keep track of all potential

Stanley Spiro, *a freelance director and associate director, regularly works on ABC's* 20/20 *news magazine. He designed the BIONICAD computer program.*

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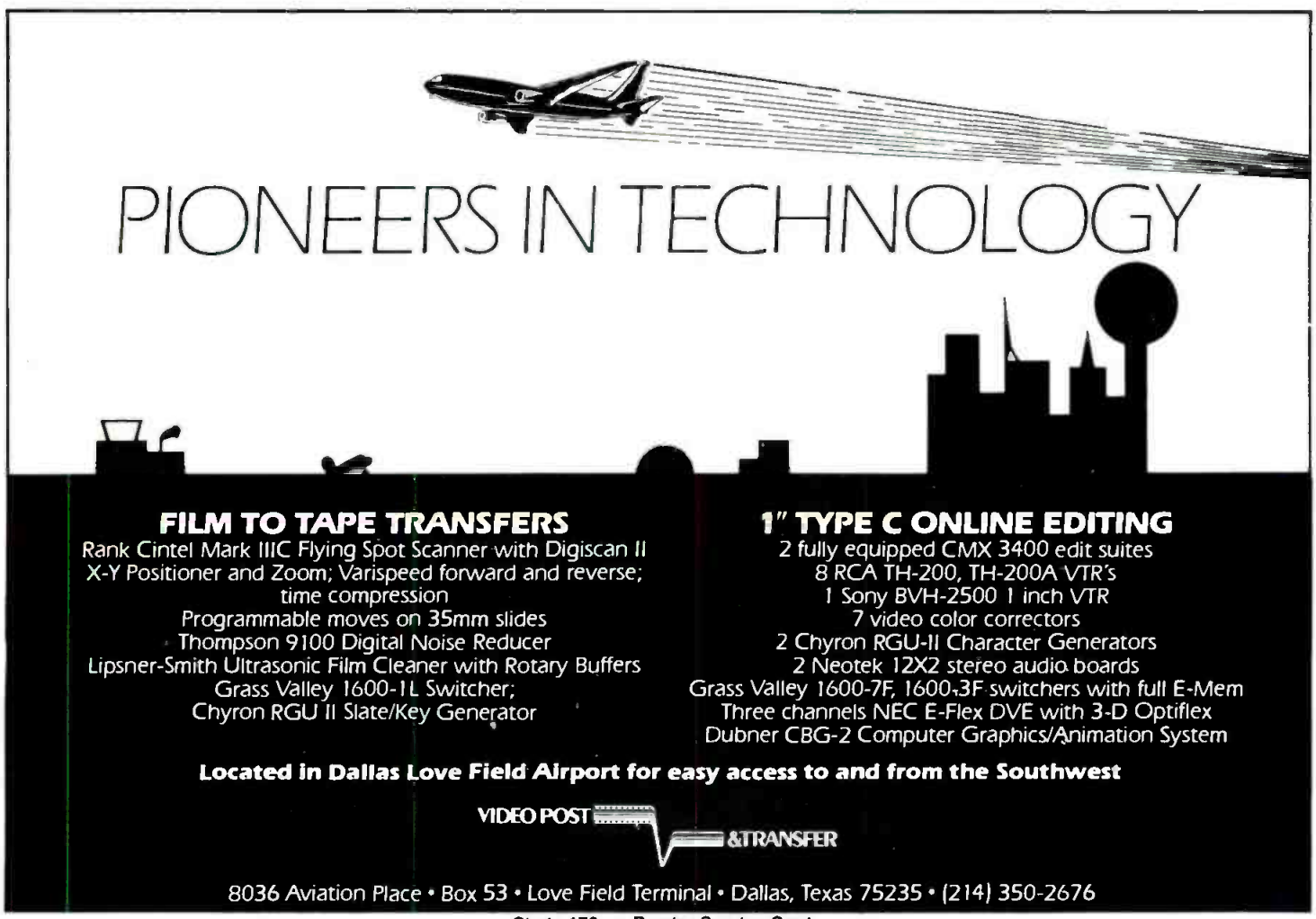
In ABC's Sarajevo control room, author Len Feldman sits at the IBM PC dedicated to BIONICAD.

elements of the television program and their expected running times. It was his job to calculate how, from a timing standpoint, the various programming options facing the executive producer would affect other elements within the show and the broadcast as a whole.

This is a formidable enough assignment when working on a half-hour news show or a one-hour variety show. Olympic coverage, however, involves hundreds of potential program elements occurring over many hours of continuous coverage. There are, of course, the numerous sporting events that occur live during the broadcast, many of them taking place at the same time. Then there are the highlight packages, *Up Close* and *Personals*, background material, intros and lead outs, commercials, interviews, teases, station breaks, feature stores, and so on.

The challenge facing the executive producer is to air the most appropriate coverage at any given time. While this seems logical enough, accomplishing it is no easy task. Control room strategy takes on the elements of a giant chess game. Programming options are evaluated as far in advance as possible. The merits of various choics are discussed and weighed. One decision affects all other coverage down the line. If one event is aired live, will there be time to air a tape of a simultaneous event? Which event most requires the immediacy of live coverage? Will the airing of the taped segment allow time for the following live event? How late can the live coverage start? Will there be time to fit in all the commercials? Will the show get off the air on time? The possible format permutations are endless. And the pressures to make the right de-



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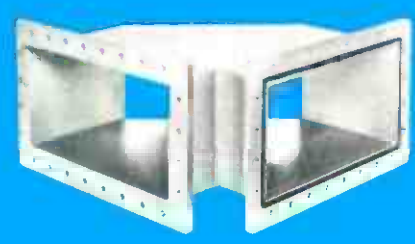

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cisions are enormous.

The 1976 solution was in keeping with the then-current state of low priced-computer technology. On a large art card (36x48 inches), the timing AD drew a grid of 240 equal-sized boxes, each representing one minute of program coverage for a total of four hours. Once the laughter subsided, the system worked fairly well. When information for an element of the television program became available, its name was written on a strip consisting of boxes corresponding to those on the art card. This was physically cut to a size representing its running length and pinned to the appropriate place on the card. Thus, each element was assigned to its place within the program format.

Stepping up

This simple approach became the foundation for a computer program written for the Radio Shack Model I home computer in 1979. Though light years ahead of the art card on the control room wall, the computer left much to be desired, by today's standards. With the cost of disk drives and memory placing them out of line for an untested concept, the original program ran on 16K of memory and took two minutes to load from audio cassette (then another two minutes when the computer bombed).

Finally, the program was ready to be tested for on-line, in ABC'S TV-1 control room for *20/20*. Its value became apparent immediately, and with the encouragement and suggestions of many members of the production team, both software development and hardware additions continued. Recognizing its value to the upcoming Olympic coverage from Lake Placid, ABC contracted the author to complete the writing and directly control the operation of the computer during the Winter Games.

The new computer-based system went the art card one better, with story data loaded into elements of a data array. The Model I further calculated and displayed cumulative times to each show element stored in its memory. Disk storage facilitated rapid saving and recall of various format options, and the internal computer clock permitted automatic updating of time calculations based on real time. Data handling commands permitted the reformatting and updating of show elements with enormous accuracy. The speed and flexibility of the computer was unprecedented.

It was no surprise, then, when in late 1982 ABC called for a bigger and better computer program to run during the 1984 Olympics. While in the intervening time many electronic newsroom programs had come on the scene, all missed the mark in terms of the specific functions needed to keep pace with a fluid, fast-moving program of the magnitude of the Olympics. The only ground rule was that the IBM PC be the chosen computer. ABC Sports was wisely keeping all its specialized computer programs dedicated to one kind of computer for hardware interchangeability.

Seven months later, the Basic listing made its final pass through the machine language compiler. Out emerged a fast and flexible computer program so superior to any mortal AD that it deserved the title BIONICAD.

System structure

BIONICAD is actually comprised of two programs, the master and the slave. Both programs run simultaneously, on separate, though interconnected, computers. The master program runs on the computer directly under the operator's control. Through that computer, the operator enters, revises, and deletes

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ABC Television

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Atlantic Image (New York animation house)

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data relating to the broadcast, with overall storage capacity for 500 television program elements. These individual elements are then stacked into an ordered format representing the broadcast.

Specialized commands accommodate the kinds of changes producers are likely to make to television programs. In addition to changes within an individual element, complete swapping of acts or commercial breaks is also easily accomplished. The overall format is kept in sync with the real-time show by means of the computer's internal clock.

Hit times to each element of the stack are constantly calculated and displayed. Commercial breaks are printed in reverse video so that individual acts stand out as entitites. Segments containing videotape are displayed in high intensity for the benefit of the tape room schedulers. Program rundowns are quickly printed in hardcopy. RAM disc storage provides near instant recall of format options. Intricate error checking routines provide assurance that illogical or incorrect commands or data are kept out of the system.

While the master program actually provides all needed information, the slave version was written to provide clean screen displays throughout the teleproduction facility. It receives raw data via an RS-232 interface, processes it, and continually displays the upcoming 24 elements of the show. This computer is configured with the IBM color adapter, which facilitates composite video distribution. Thus, the operator is free to scroll his or her personal screen or to display alternate format options without affecting the other monitors.

Monitor display

All information is clearly formatted on the computer monitor. The first 24 lines of the screen display, from top to bottom, the next 24 elements of the televison program. As each element airs, it is removed from the top line, all following lines scroll up one position, and a new line appears at the bottom. The computer simultaneously calculates "hit times" for each of the upcoming show elements by means of the internal clock.

A clearer idea of the amount of information displayed comes from taking a close look at the display line. The information within each line is broken down into fields. Starting from the left, the first field indicates the extent to which the hit time of an item is over or under a specified ideal time. Next, the line number is displayed. This is followed by the cumulative time field, which generally contains the computer-calculated start time for the segment. Next appears the estimated duration of the segment.

Any desired item or act number is next on the line, followed by an indication of the source for the segment. A space for a brief description of the segment is last. (The "type code" field on the far right is for the computer's use only.)

One added extra on the slave display is the twenty-fifth line. It contains a forward-counting clock for time duration into segment, a backward-counting clock for segment time remaining, and a 15-second warning blinker.

BIONICAD is now a tested and proven production tool. Other than the typewriter and stopwatch, little had previously been available to assist production personnel in their work. BIONICAD not only helped fill that void, but may also serve as a model for other programmers with their own unique expertise. **BM/E**

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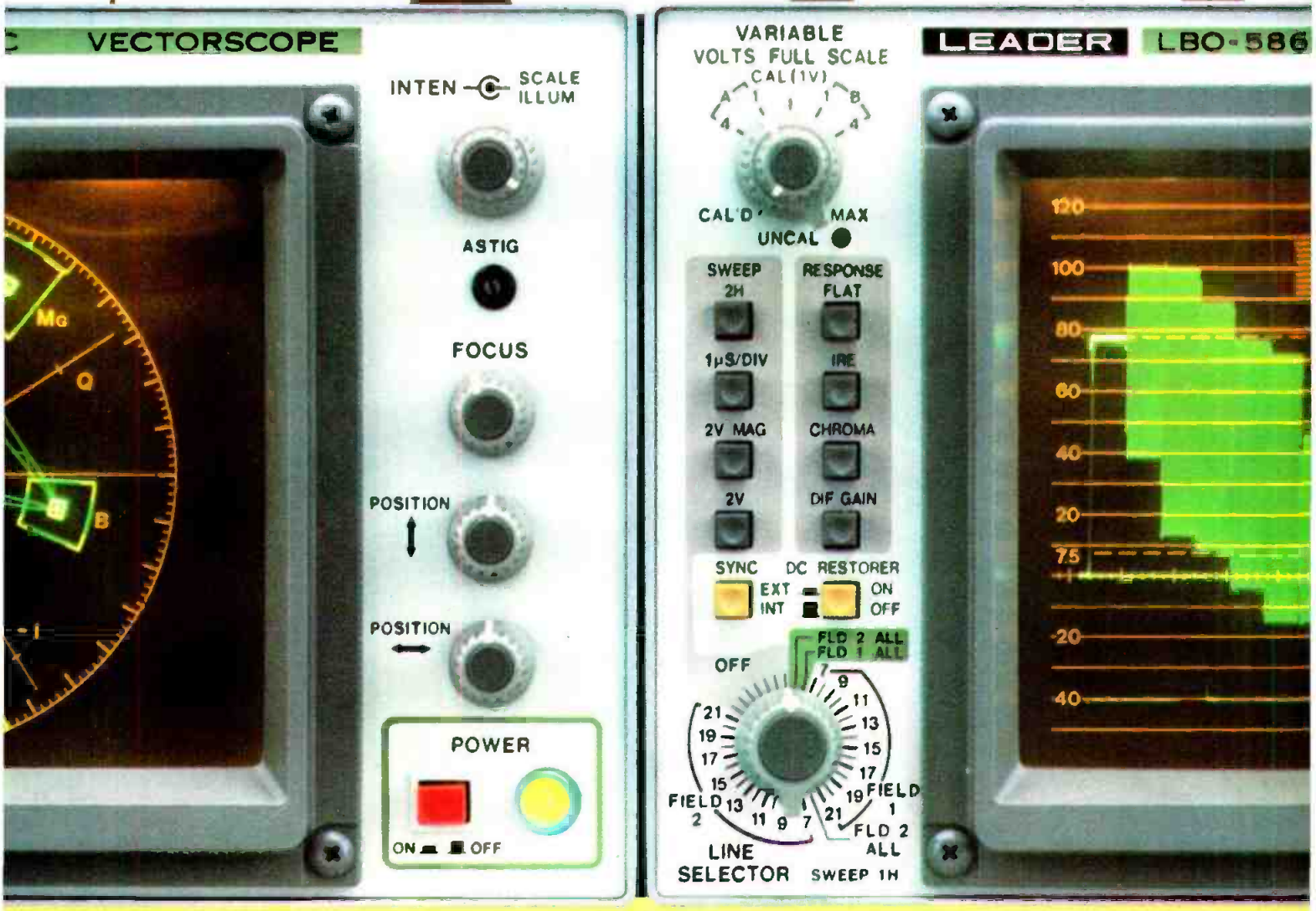

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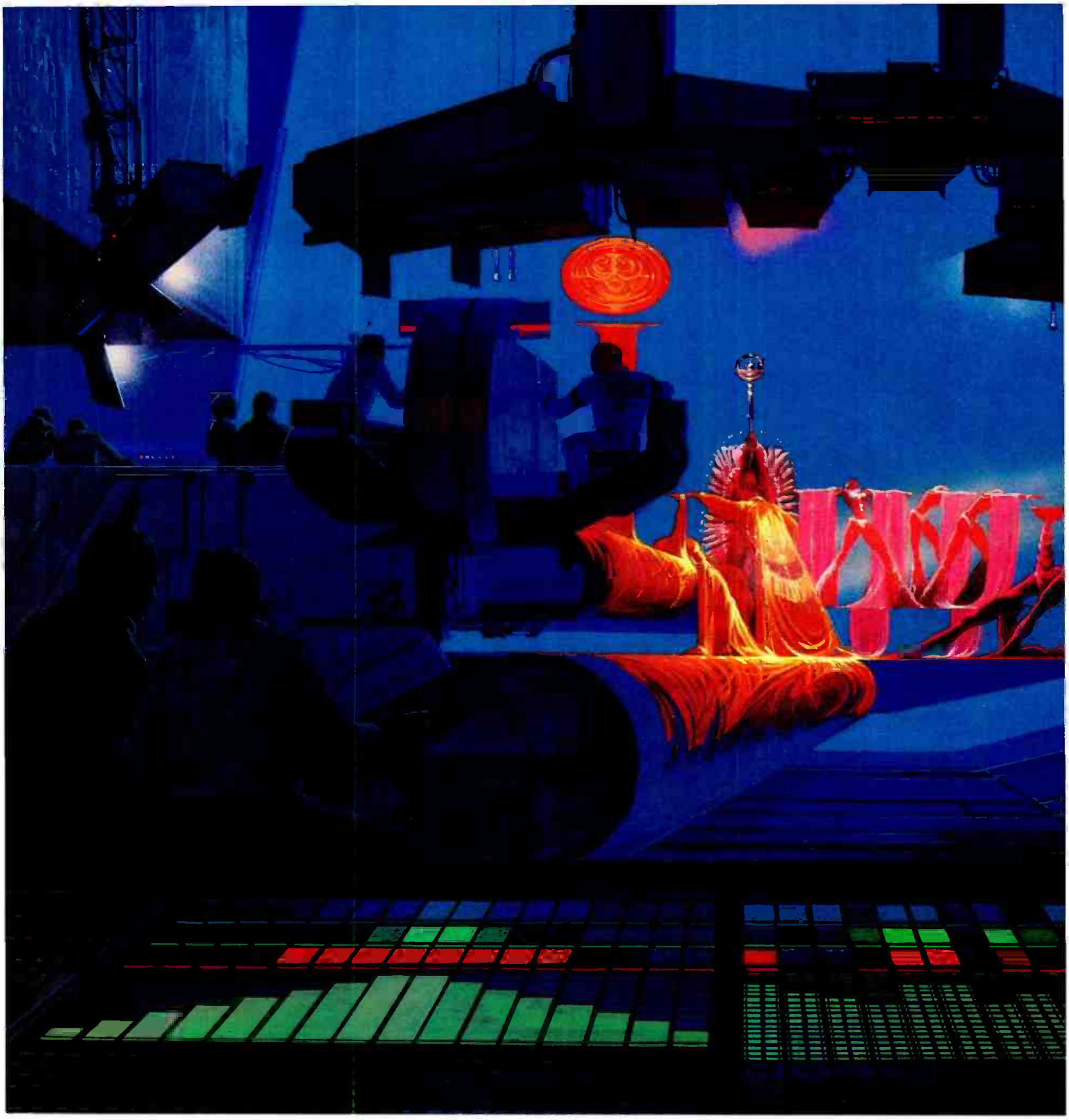

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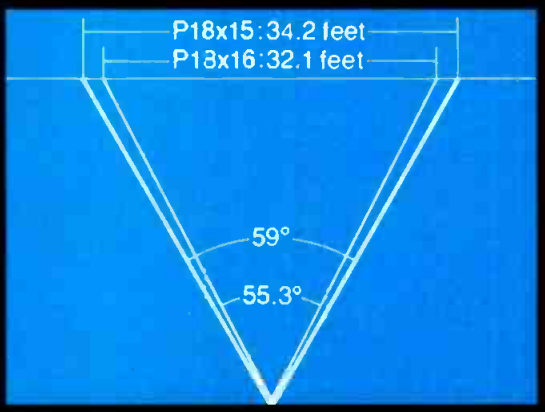

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REPORT FROM SARAJEVO

First Photos from ABC's Olympic Center

Even though the American athletes did not fare too well, ABC put on a gold medel performance in broadcasting the XIV Winter Olympic Games just concluded at Sarajevo, Yugoslavia. With over 40 hours of prime time coverage, the ABC staff pulled out all the stops in getting the "thrill of victory and the agony of defeat" to the U.S. audience.

Here are the first pictures of the Sarajevo facilities in full operation. These shots were flown to BM/E on the day America's Alpine skier Bill Johnson and figure skater Scott Hamilton won their gold medals. Shown as it looked at the Olympics are the master control room, control room A, the graphics equipment, editing system, and sound room.

This same equipment is on its way back to the U.S. now to be used for the presidential conventions and, of course, the Summer Olympic Games at Los Angeles.

▲ **Control Room A.** *The main control room of ABC's broadcast center in Sarajevo, Yugoslavia. At left (lower level) is executive producer Roone Arledge's desk. Production switcher has 22 inputs. To right on lower level is main on-air audio mixing area. On second level, to right, is Julie Barnathan's command desk.*

Edit Suite. *The upper floors of the broadcast center were devoted to post-production, with some 26 VTRs (primarily Ampex VPR-3s, six in PAL). Here one of six three-machine suites is shown in action, with ISC editor, GVG 1600 1L switcher, and Graham-Patten afv audio switcher.* ▶

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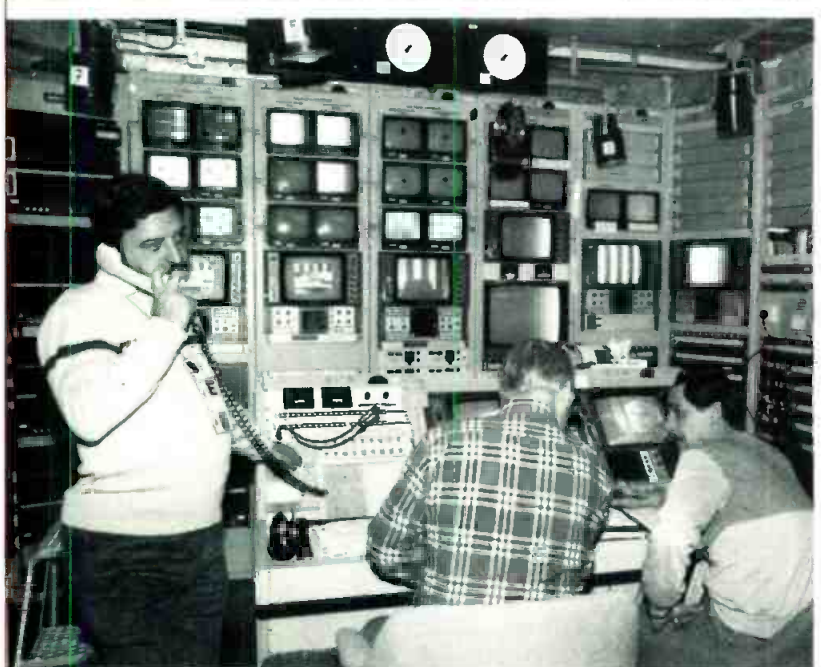
◀ **On-air Graphics.** *Graphics capability included the four-channel version of Ampex's ADO, with the newly developed four-channel combiner. Graphics, under the direction of coordinating director Roger Goodman, were created in a separate area, then fed to tthe PreSet control rom for integration with other program elements, and finally fed to the main control room through one of PreSet's three dedicated inputs to the main switcher.*

Radio Production. *ABC radio production room at the broadcast center. Heart of the operation was the Yamaha mixing console, fed by mics in announce studio or through elaborate Ward-Beck intercom/IFB system to pull in reporters from the field. Notice routing/distribution system monitor above rack.* ▼



▲ **Master Control.** *Master control operators kept watchful eye on two clocks, one for Sarajevo, the other for network operations back in New York City. Master control MC had primary responsibility for handling elaborate satellite transmission back to the U.S.*

Paint Box. *Artist puts finishing touches on map created by electronic tracing with MCI/Quantel paint box in the graphics area. In addition to standard painting programs, Paint Box was also outfitted with animation software.* ▶

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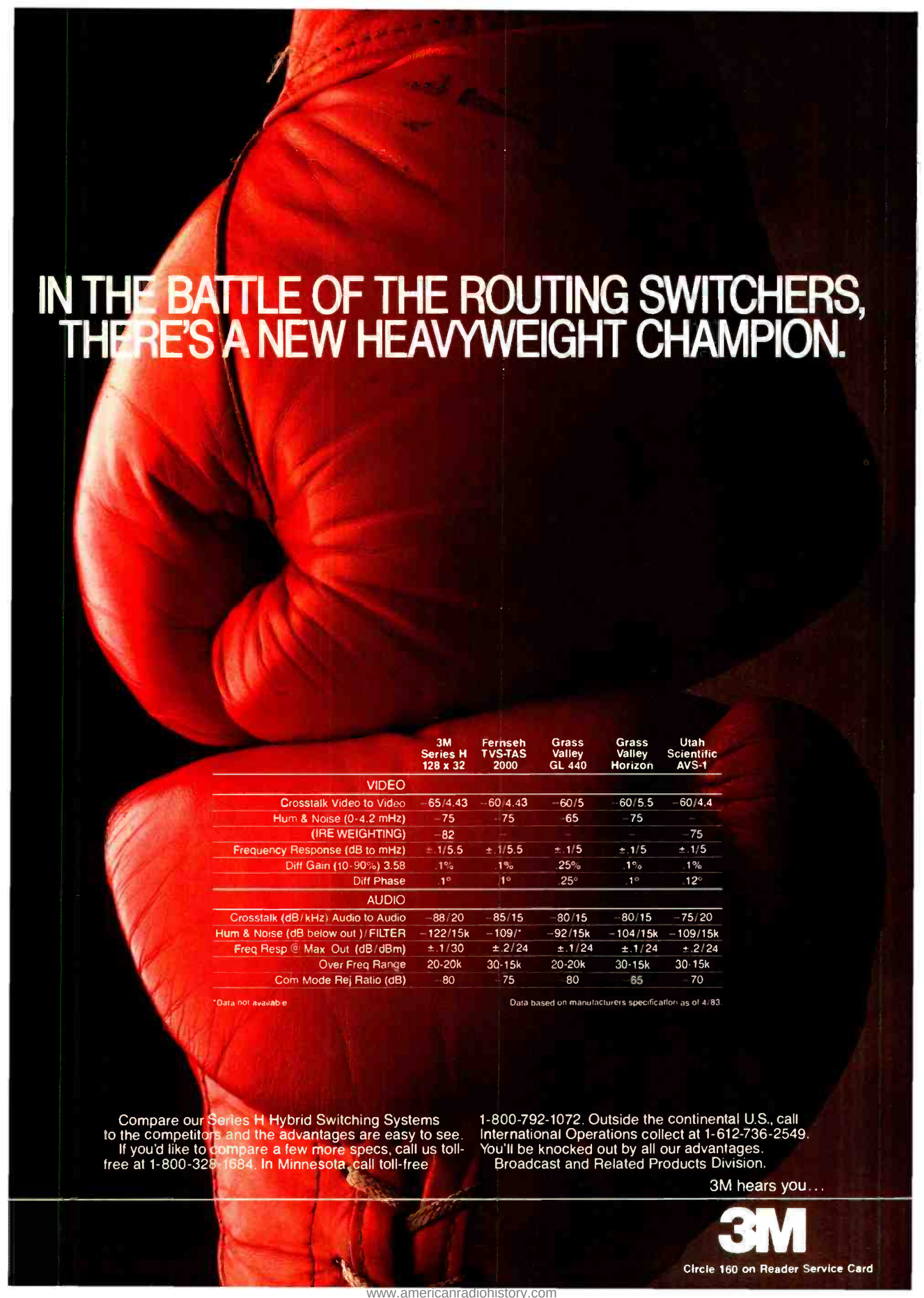

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Freq Resp @ Max Out (dB/dBm)	±.1/30	±.2/24	±.1/24	±.1/24	±.2/24
Over Freq Range	20-20k	30-15k	20-20k	30-15k	30-15k
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New Portable Scopes for the Video Environment

Portable scopes have had problems measuring the video waveform. But now thanks to a new design, measuring waveforms is more accurate, simpler, and faster than ever before.

By Bill Law

When it comes to using portable oscilloscopes for testing video signals, engineers have faced a traditional dilemma. On the one hand, the portable scope offers several advantages: it can be moved almost anywhere, no special test environments are

Bill Law is project leader of the Tektronix 2400 Series engineering team.

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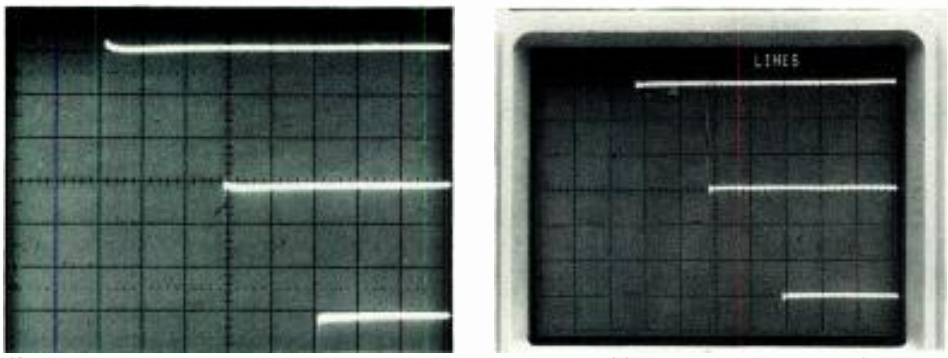

If waveform shape changes at different vertical positions on screen, this is position effect. This can lead to inaccurate mesurements. A 1-volt composite video signal of 100 IRE units displayed at 50 mv/div often highlights position effect. Display (at left) is an example of position effect. Display (to right) shows the display quality of the 2445 and its lack of position effect.

necessary to use it, and it is almost as simple to set up as today's portable broadcast equipment. In the studio, the portable scope is also movable from place to place, eliminating the need to have a fixed scope in every location where tests have to be performed, or, worse, having to remove equipment from the rack in order to bring it into the shop to be tested.

On the other hand, portable scopes have traditionally posed several problems when analyzing the video signal, which is far trickier to test than other electronic signals more easily handled by portable scopes. The problems have included waveform fidelity, waveform tilt and APL, and problems inherent in TV triggering.

It was with these potential problems in mind that Tektronix set out to design a series of custom-tailored options for its 2400 Series microprocessor-based portable oscilloscopes, first introduced last February, that would make measurement of the TV waveform on the portable scope more accurate, simpler, and faster than ever before.

More than triggering

Achieving the necessary level of video signal measurement performance is not simply a matter of including television trigger capabilities in an existing portable oscilloscope. The resulting instrument may still suffer from poor overdrive recovery, a short ac coupled input time constant, and TV triggering that is difficult to use. Such an approach does not provide a truly synergistic system—that is, one that integrates the advantages of an oscilloscope with the performance needs of video users. The design team working on the new scope therefore employed recent advances in circuit design, custom ICs, hybrids, and microprocessor control to achieve the necessary improvements in scope performance.

By integrating TV Option requirements with the high-performance feature set being planned for the new-generation 300 MHz and 150 MHz bandwidth scopes, excellent video waveform fidelity and ease of use were incorporated into one instrument. For example, because the needed signal pickoffs and video signal handling capabilities were planned from the beginning of product design, video performance was not compromised. Likewise, it became possible to include important waveform monitor features without sacrificing scope performance.

In many cases a.c. coupling is desired, but the resulting waveform tilt makes measurements difficult. Noticeable waveform tilt is present on the three fields of live video displayed on the lower trace. On the upper trace, the TV (backporch) clamp removes this tilt from the waveform.

Waveform fidelity

Perhaps the most significant deficiency of an oscilloscope, when used for video waveform monitoring, has been waveform fidelity. Traditionally, scopes traded linearity and dynamic range for high bandwidth, high sensitivity, and low power. Compromises like these often resulted in subtle changes to the displayed waveform caused by position effects, poor overdrive recovery, and less than ideal attenuator response. These subtleties often masked changes in the video signal itself, which alone would cause noticeable degradation in television picture quality.

To achieve waveform monitor-quality vertical amplifier performance, a new circuit configuration known as cascomp (compensated push-pull cascode amplifier) was incorporated (see Figure 1). In the vertical amplifiers, combining the superior performance of cascomp with custom integrated circuits and hybrids reduces parasitics and improves thermal balance. This provides the necessary low distortion signal amplification over a large dynamic range with excellent overdrive recovery. Then, the use of preamplifier gain switching eliminates the need for a passive input attenuator through 50 mV per division. This considerably simplifies the attenuator design and ultimately allows improved attenuator performance characteristics.

Attenuator implementation itself is also innovative. In the 2465 and 2445 oscilloscopes, an actively trimmed thick-film ceramic substrate is utilized. This "novar" (no variable) attenuator has no manual adjustments. A laser trimming process yields optimum response through all attentuator ranges. Cascomp circuits, along with custom ICs and hybrids, are also used in both the vertical channel switch and the vertical output amplifier to maintain signal fidelity. This attention to detail results in a vertical amplifier system having excellent overall response and providing a display quality comparable to a TV waveform monitor. Figure 2 shows how position effects and poor overdrive recovery can affect a waveform and the performance improvements achieved in the 2400 Series.

Waveform tilt and APL

Another traditional problem is that an oscilloscope makes allowances for input voltages up to 400 V and therefore requires a mechanically small input attentuator to insure superior high-frequency response characteristics. The small size, high voltage input coupling capacitor required has limited capacitance, resulting in a very short time constant. When video signals are ac coupled, this short time constant causes excessive waveform tilt and changes in signal position from APL (average picture level) changes. Predictably, then, accurate measurements of ac-coupled video signals

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using conventional oscilloscopes are often extremely difficult to make.

The Tektronix design team addressed this problem by including provisions for a dc restorer circuit in the vertical preamp, a common feature in waveform monitors. The TV option adds a fast back-porch (blanking-level) clamp in the Channel 2 vertical input circuitry. When ac coupled, the use of the clamp effectively eliminates waveform tilt, reduces display of low-frequency hum present on the video input signal, and stabilizes the position of the display in the presence of changing APL. Figure 3 shows the effect of waveform tilt on live video and how the clamp circuit eliminates this tilt.

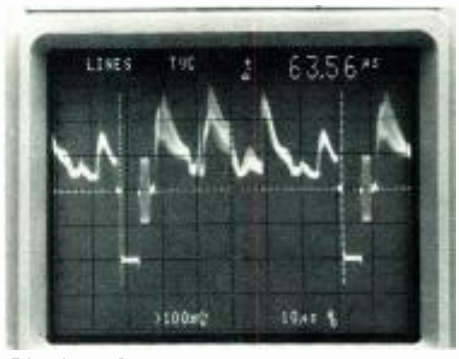
The Δ_v and Δ_t cursors of the 2400 Series scopes with TV Option provide a convenient, accurate means of verifying waveform timing and amplitude parameters.

additional conrols to the 2400 Series front panel.

Other video signal measurements

Since an oscilloscope is a general-purpose instrument, additional features deemed essential for video signal test and measurement equipment were included. Increased use of closed-circuit television and high-resolution raster-scan terminals, as well as investigation of HDTV for commercial use, are resulting in a proliferation of horizontal line rates coupled with noninterlaced scan systems to provide increased resolution.

Display of horizontal blanking time.



Display of horizontal scan period.

Display of sync amplitude.

Yet another problem is that the TV trigger function on previous generations of oscilloscopes has not been easy to use. Constraints placed on cost, power, internal space, and front-panel space have inhibited the development of enhanced triggering features.

Previously two trigger modes were available—Line (horizontal sync) or Field (vertical sync), both usually sensitive to trigger level. Field triggering is especially difficult to use when trying to view a particular line within a field. Generally, the operator has to trigger the main sweep (the A sweep) on vertical sync and use the delayed sweep (the B sweep) to view individual lines. If an operator wants to examine a specific line, he or she has to count lines manually until the desired line is reached. This is, of course, both time-consuming and prone to error.

To improve video signal triggering capabilities, the 2400 Series microprocessor, a 6802, was utilized. Several noteworthy improvements stem from this decision. First, triggering is simplified in the TV-trigger modes. When proper slope is selected, the scope will always trigger at the 50 percent point on the leading edge of sync, regardless of whether sync is positive-going or negative-going. The operator, therefore, is not required to adjust the trigger level control manually to obtain a stable trigger, which is often the case with other scopes.

Second, video trigger modes have been expanded to include not only Line (Horizontal sync) but also the ability to trigger the main (A) sweep on any selected line in Field 1, Field 2, or Field 1 alternating with Field 2. In a Field mode, both the triggering field and line are displayed in the CRT readout. This expansion of triggering modes, together with CRT readout, makes it simple to trigger on any given line within a specific field. After selecting the correct triggering slope and the desired field, the operator simply turns the Δ control (also used for ΔV and Δt cursors) until the desired line number appears on screen. The processor then properly accounts for the equalizing and serrated pulses (if present) and triggers the sweep on the desired line. The line number shown in the readout is the first line displayed. Trigger setup takes mere seconds, and the potential for error is minimized. While simultaneously simplifying triggering, the microprocessor allows a degree of video-signal triggering previously not available on other oscilloscopes. All this was accomplished without adding

Fortunately, the 2400 Series microprocessor allows the TV trigger cicruit to automatically accommodate these systems. The TV trigger automatically adapts to both interlaced and noninterlaced scan systems having horizontal rates from 12 kHz to more than 76 kHz (525/50 interlaced scan to 1280/60 noninterlaced scan). In addition, stable triggering is assured on systems with block sync—that is, those systems where the horizontal edges are lost during the vertical interval.

The processor not only keeps track of the number of lines in each field, but also allows the operator to choose several line-counting schemes. By using front-panel controls to select software routines, line numbering systems commonly used in television protocols throughout the world can be facilitated. The operator can define the beginning of the field either as the start of the equalizing pulses (as in NTSC) or as the start of the vertical sync (as in PAL and SECAM). Moreover, line numbers can be referenced to either the beginning of each field (NTSC) or the beginning of the frame (PAL and SECAM). Multiple-system users will especially appreciate this feature.

To accommodate the new, faster systems, the 2400 Series frequency response was made extremely flat—± 1

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percent for signals up to 5 MHz and +2 percent/−3 percent for signals from more than 5 MHz to 30 MHz. This is very important to those users employing high-resolution, high line rate systems.

Improvements in basic oscilloscope performance plus the added triggering capabilities provide noteworthy performance enhancements for practically all video applications. It is the specialized TV Option features, when combined with the standard features of the basic 2400 Series scopes, that provide the synergism to make these instruments so versatile for video waveform measurements.

Cursors and CRT readouts exemplify this synergism. The V cursors can be used to make accurate (less than two percent) voltage measurements, as well as ratio and percentage. In a typical amplitude measurement, after adjusting the display to show the signal of interest, the operator simply selects the V mode and sets the cursors at appropriate points on the waveform. The CRT readout will then display the voltage difference. In the Ratio mode, using the V cursors facilitates measurements such as step linearity or measurements

Display of peak video amplitude in FRE units (59.9 IRE).

in IRE units (where 100 percent is set to 100 IRE). Typical measurements might include sync pulse, color burst, and video signal amplitudes.

Likewise, highly accurate timing measurements can be made with the Δt cursors. Typically, one percent accuracy is attained with Δt cursors, while delay-time measurements yield 0.5 percent accuracy. Measurements made with the Δt cursors classically include sync pulse width, picture blanking interval, and back porch width (see Figure 4 for typical amplitude and time measurements).

In addition, the new 2400 Series instruments are extremely powerful oscilloscopes for all types of general design, manufacturing, and service uses. Four channels are available for signal acquisition, and internal 50 termination insures low VSWR (voltage signal wave ratio) in 50 environments. A novel Auto Trigger level mode allows "hands off" triggering with either the 300 MHz 2465 or the 150 MHz 2445. The TV option is just one of several available with the 2400 Series. The GPIB option allows the scope to be controlled over the IEEE-488 bus. All front panel controls (except CRT controls) can be programmed via the GPIB, and front-panel setups can be sent over the GPIB. The GPIB can operate as a talker or listener and waveform measurements can be transmitted over the bus. The 2400 Series does not digitize waveforms, and waveforms cannot be transmitted over the GPIB. With the GPIB option the upper line of readout can be used to display messages. A scroll feature allows long messages to be scrolled across the screen. The 2400 Series with GPIB is ideal for use in semiautomated test systems, or applications where a series of repetitive measurements must be made. **BM/E**

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Mutual Engineering Harnesses Microcomputer

For a modest investment, MBS engineers have a dedicated machine that can handle antenna coverage, sun outage predictions for the satellite, word processing and even departmental budgets.

By Edgar F. Coudal

On a single computer costing less than $13,000, as many as seven users in the Engineering Department of Mutual Broadcasting System are running sophisticated antenna coverage programs, doing routine correspondence and memos, developing programs to predict exactly when the sun will blank out its satellite feeds, and working out departmental budget projections with "what if" scenarios. All simultaneously.

Edgar F. Coudal *is head of Coudal & Associates, Ltd., Park Ridge, IL, a communications consulting firm working for CompuPro.*

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Lynn Ashley, manager of design engineering at the Mutual Crystal City, VA headquarters just outside Washington, DC, who is charged with overseeing the computer system comments, "The microcomputer we chose (CompuPro System 816/C) is used exclusively in the Engineering Department and provides us with a powerful tool independent of the many computers in use in other parts of the MBS operations."

There are seven user terminals connected to the computer's 1 million bytes of main memory and 20 million bytes of on-line rotating storage. Originally intended simply as a high speed calculator, the computer has now been put to work on a number of varied tasks. These tasks are possible because the machine's memory is partitioned to each active user so that any one of the users can run a program without hindering the others. However, there is some loss of speed when there are simultaneous demands on the Input/Output segments of the system—such as disk storage access or printer use—which is typical of microcomputers of this type. Here is a brief description of what the engineers get out of the dedicated, multi-station system.

How It's Used

One station is Operations Support, Multicomm. The program developed for this task incorporates the powerful dBASE II data base management system. Dave Wilcox is involved with the network's new MultiComm system, a one-way FM subcarrier delivery service for voice and data which is designed for relatively large organizations with a need to communicate one-way to a large field force.

An example of such a customer would be a large consumer products company whose wares are sold by distributors or dealers. MultiComm could be used to transmit price changes, promotional information, new product news and the like from headquarters to the sales force. MBS is planning to lease the rights to FM subcarriers from about 200 radio stations.

Wilcox uses the computer to sort out the information concerning the SCAs needed for the MultiComm network. This research involves searching the FCC data base of FM stations and listing those stations that have the coverage required by MultiComm. Further research will be conducted via engineering questionnaires concerning the detailed coverage of each station in order to compile a final list of SCAs needed for the network.

Wilcox wrote the program for searching the FCC files and Ashley prepared the program for the coverage analysis. The programs evaluate 11,000 records on the FCC list covering about 4000 stations for information such as call letters, frequency, transmitter location, effective radiated power, and antenna height above average terrain. In approximately 20 minutes the CompuPro microcomputer can produce a rough outline of the coverage that might be expected from each station in a particular market.

When combined eventually with information contained in a terrain data base, the end result will be a coverage pattern that pinpoints specific stations which will give MultiComm full coverage in the most economical way. This final use in developing the selection process will include output from a hard copy plotter as well as a visual display. In addition, Wilcox will have a "what-if" program to try out various combinations of transmitters in each market in order to plot the optimum coverage. (A special report on new and uniquue applications of SCAs will appear in the May issue of *BM/E*.)

The System in a Nutshell

The basic CompuPro 816 C system at the Mutual Engineering Lab has 1 megabyte main memory plus CompuPro's proprietary "M Drive," which is a random access memory that performs like a peripheral drive. The operating system is MP/M 8-16, an advanced multi-user operating system based on the popular CP/M. The large library of CP/M-based programs available today will run on this system.

Output from the main frame computer, in addition to its terminals and rotating storage devices such as hard disk and floppy disk drives, is to letter quality printer for external documents, two high speed dot matrix printers for internal documents and memos, a hard-copy plotter, and a graphics device. The printers are the DEC LS 120, TI 810 and Diablo 630. The plotter is the HP7470A linked by IEEE 488 interface.

The mainframe contains one hard disk drive and dual eight inch floppy disk drives. The interfaces to a dedicated telco line and a switch slaved telco line are two Hayes smart modems.

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Following the Sun

A second station is assigned to Peter Nielsen, manager, Satellite Uplink Facility. He has a program that will predict sun outages which affect transmissions from the broadcasting satellite serving MBS. A sun outage occurs for a period of from three to 15 minutes twice a year when the sun is directly behind the satellite. At these times the sun's noise blocks all transmission from the satellite requiring an alternate route. Last fall, for example, a sun outage threatened to block broadcast of a National Football League game.

By predicting the exact time and location of the swath the outage will take across the MBS broadcast area, provisions were made to deliver the signal via land lines to the affected areas during the blocked period. The program Nielsen is developing predicts where and when the outage will occur, identifies the network affiliates that will be affected, and pinpoints the exact time and duration of the outage. The program then generates a warning letter to the affiliate giving the precise time when signal degradation will begin and offering alternative steps to avoid the problem. This program had previously been run on a larger time-sharing minicomputer. When converted to the microcomputer, the same accuracy and speed will be obtained with greater direct control and time saving, according to Nielson. He also uses the computer program SuperCalc for budgeting the satellite uplink operations.

Lynn Ashley, manager of design engineering (left) and Andrew Coile, senior programmer, check memory boards from the mainframe. System is designed around the S-100 (IEEE 696) standard architecture.

A third terminal is used by Gib White and others in design engineering to develop computer aided design programs. Few software tools have been developed that meet MBS' special needs, so the group is writing its own programs. Ashley has decided that the department will be better off with do-it-yourself software rather than trying to incorpo-

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rate modifications in existing software.

Andrew Coile, senior programmer who did much of the work on Mutual's satellite-related software, is also using the computer to write programs in conjunction with the MultiComm project. Part of this task is developing a program that will integrate the terrain data base information into a MultiComm game plan.

Both director of engineering Bob Cleve and Ashley have terminals that they use for word processing and administrative tasks. In addition, the system works for top management. Senior vice president for Broadcast and Communications Service Gene Swanzey uses his computer terminal primarily for generating reports, including SuperCalc to work out overall financial plans for the department.

Says Ashley, "Some of what Gene does is highly confidential. The security of having documents under his control on a departmental computer, protected by a password, and not floating around in the typing pool, is very appealing to him. Like most of us, he can compose as quickly at the keyboard as he can in longhand, which speeds up the paperwork."

Internal Communications

While engineering departments generally use computers for so-called number crunching, the MBS engineering department has benefited from the WordStar word processing program. According to Ashley, virtually all interanal correspondence is composed at the terminals and printed out on the spot, bypassing the typing pool. In addition, all the CRTs are linked together so that users can exchange messages or leave messages on other CRTs in the network through use of Mail and Write programs furnished by Gifford Computer Systems, the original supplier of the system.

Another administrative task done on the computer is tracking of purchase orders. "We are developing a purchase order system within engineering to simplify keeping tabs on the large quantities of hardware that are regularly purchased by our network. We need a day-by-day break out of what we are spending and on what project, information the accounting department does not provide daily." The dBase II data base manager was used to form a structure for the program, report forms were generated, and tracking of POs now is being handled within the engineering department and coordinated with the accounting department.

Another purchasing service provided by the computer is direct interface to the MBS telex system for outgoing messages. Connected to the telex terminal by modem, the microcomputer can, for example, send parts lists to a series of vendors to request competitive bids. This procedure saves time as well.

Ashley spent three months shopping for the computer system that would fit the department's budget. At first he considered buying separate 8-bit personal computers for each user, "However, we felt that there were great benefits to be gained, now and in the future, from selecting a machine with 8- and 16-bit central processing units, which could serve multiple users simultaneously."

Ashley explains, "We were not in the minicomputer ballpark in terms of funds. In fact, with a budget maximum of $25,000 for everything including printers, terminals and modems, we were far from it. Yet minicomputer performance was what we had in mind, and these days you can get it." **BM/E**

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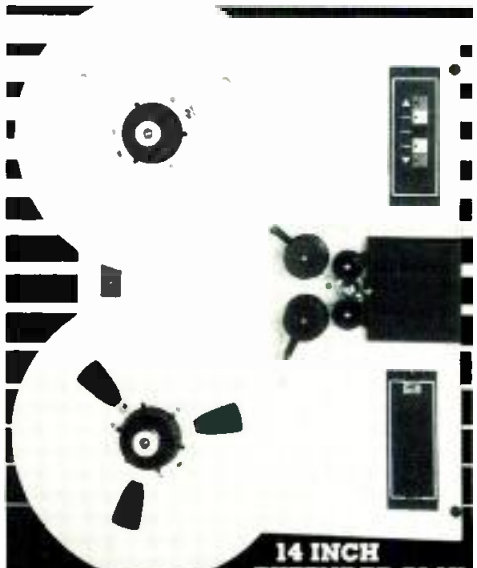

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inside TV stereo

A system closeup

With industry consensus reached on transmission and companding systems, FCC approval is all that is necessary for TV stereo broadcasting to begin. MTS committee member Len Feldman gives an insider's perspective on the vote and the systems.

By Leonard Feldman

The electronics industry, in its recent vote choosing transmission and companding systems for television stereo, may have put all its chips on the table—but whatever the outcome, the industry will come out the winner. Faced with the very real possibility that the FCC would repeat its action on AM stereo and throw the technical decision to the marketplace, the television industry knew the stakes were too high to gamble with multichannel TV sound.

Len Feldman, with over 30 years' experience as an electronic engineer in the high fidelity and audio fields, was a member of the Multichannel Television Sound Committee of the EIA and NAB.

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The final consensus that led to the unanimous acceptance last December 22 of the Zenith stereo transmission system with dbx companding was not acheived easily, however. The Multichannel Television Sound (MTS) Committee, an independent group cosponsored by the Electronic Industries Association and the National Association of Broadcasters, brought together representatives of various segments of the industry: manufacturers of both transmitting and receiving equipment; the networks, including PBS; IC manufacturers; and NAB, NCTA, and the Association of Maximum Service Telecasters. Competing for the favor of these diverse elements were three noncompatible transmission systems, those proposed by the Electronic Industries Association of Japan (EIAJ), Telesonics Corp., and Zenith Corp.

The EIAJ system proposal was similar, but not identical, to the stereo TV sound system in use for the past five years in Japan. For stereo TV sound, it employed an FM-modulated subcarrier whose center frequency is twice the TV horizontal line rate, or 31,468 Hz. The two remaining transmission systems each employed AM-modulated, suppressed-carrier subcarriers. The Telesonics system proposed a subcarrier frequency of 2.5 times the horizontal line rate (39,335 Hz), while the Zenith system positioned the AM-modulated suppressed subcarrier at twice the horizontal line rate.

Additional subcarriers for other uses (such as broadcasting a second language or even a totally different audio program) were also included in system proposals, but as tests went forward, all three trasmission system proponents agreed on a single standard for these additional subcarriers.

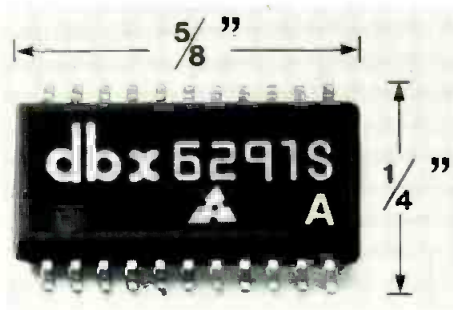
S/N difficulties

Tests of all three transmission systems revealed severe signal-to-noise degradation in the stereo mode. The situation was similar to that encountered by FM listeners in weak signal areas, who experience signal-to-noise degradation of as much as 23 dB when they switch from mono FM to stereo FM. After numerous adjustments and modifications of system parameters, the S/N loss caused by all three TV stereo systems hovered around 15 dB.

While that may seem to be a smaller penalty than that suffered by FM radio, it is important to note that TV sound starts off with a 10 dB penalty compared to FM, even in mono. That's because maximum modulation in standard FM broadcasting is ±75 kHz, whereas maximum FM deviation for television audio is ±25 kHz.

Therefore, one major result of the initial series of tests was the obvious need for noise reduction, or companding. Experiments with compatible companding revealed that some companding could be tolerated by people owning older TV sets not equipped with the necessary expander circuits, but that it would be difficult to devise an effective companding system without altering sound balance for those owning older, monaural sets. After a great deal of deliberation, the committee decided that companding should be applied only to the stereo difference channels and not to the mono or (L + R) sum channel, which the mono listener would continue to receive as before.

While as many as five different proponents offered companding systems, by the time the tests reached their conclusions only three proponents remained in the running. These were CBS, which proposed a variation of its CX system (first proposed for use in phonograph records and now found as a noise reduction system in many videodisc players); dbx, Inc. (which proposed a system found in many cassette tape recorders and used in pressing "audiophile" disc recordings); and Dolby, perhaps the best known of the three.



Noise-reduction IC chip for dbx TV stereo sound system.

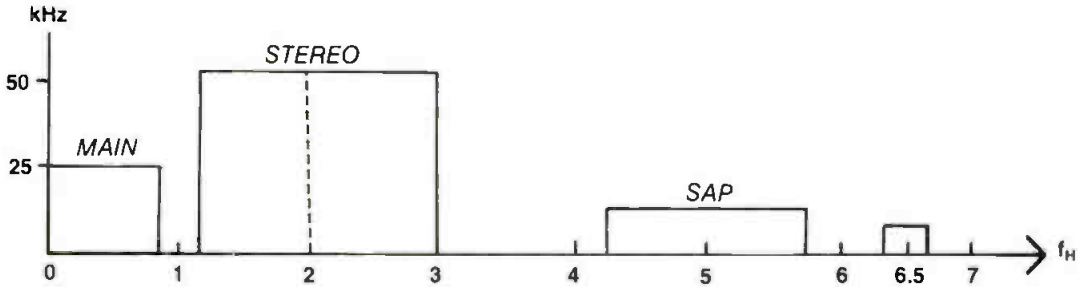
Comparing companding

A separate committee task force evaluated these companding systems while the rest of the committee continued its work on the transmission systems. The task force conducted extensive subjective listening tests, using experienced listeners ranging from recording and broadcast engineers to musicians, audio critics, and journalists. The participants were asked to make a large number of "forced choices" in blind A-B comparison tests between pairs of companding systems.

The tests were conducted using noise and interference levels simulating those that would occur with each of the three transmission systems in strong and weaker signal locations. Since it was agreed that noise reduction would be even more important in the case of the second audio program (SAP) channel, which is normally noisier than the stereo channel, the auditors judged the action of the three companding systems for the SAP channel as well. In addition to these subjective tests, the performance of each companding system was evaluated by extensive laboratory measurements.

The votes that chose Zenith for transmission and dbx for companding, therefore, capped several years of intensive work, punctuated now and then

Fig. 1. Spectral distribution of main and subcarriers in the Zenith multichannel sound system for TV.



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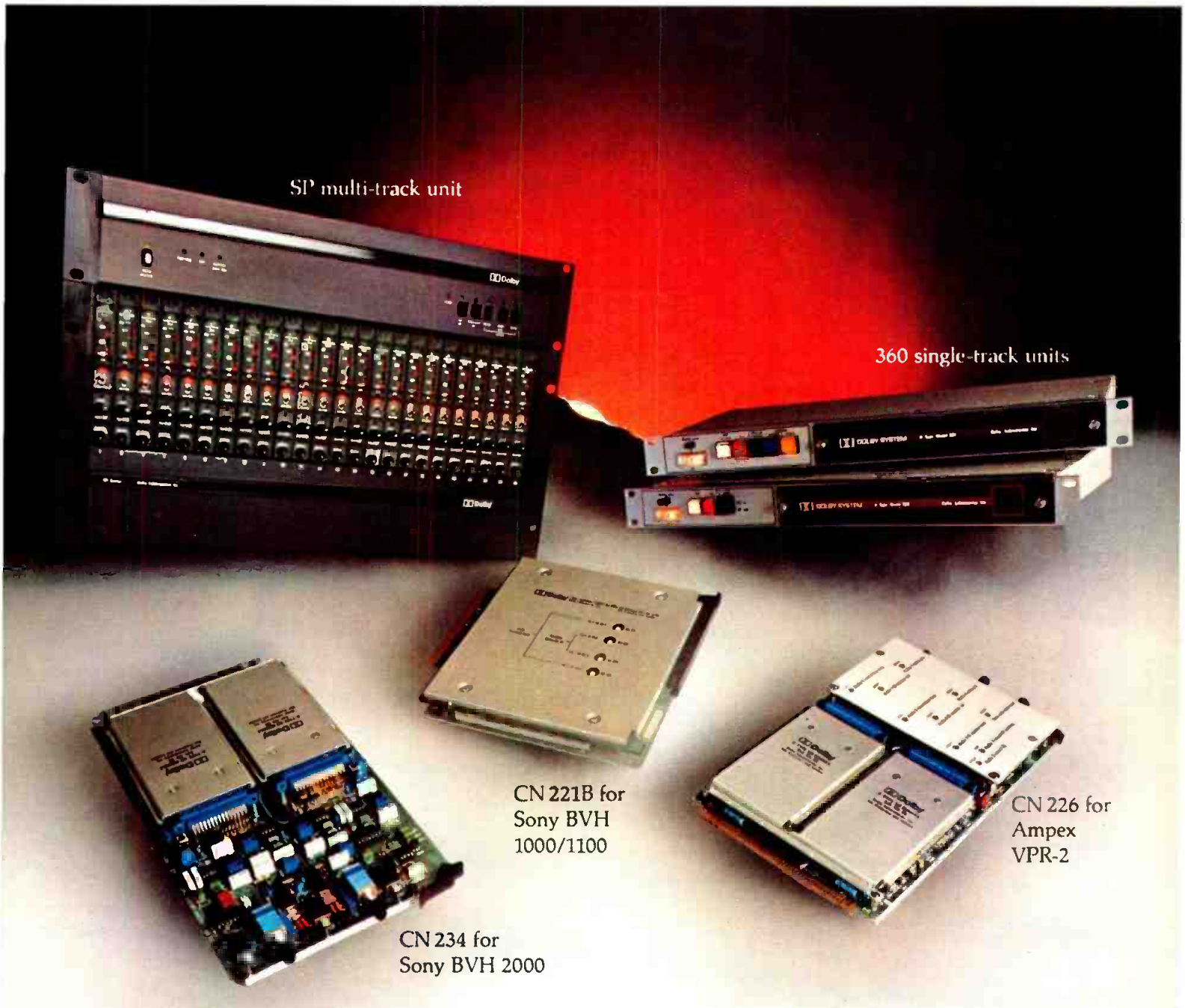

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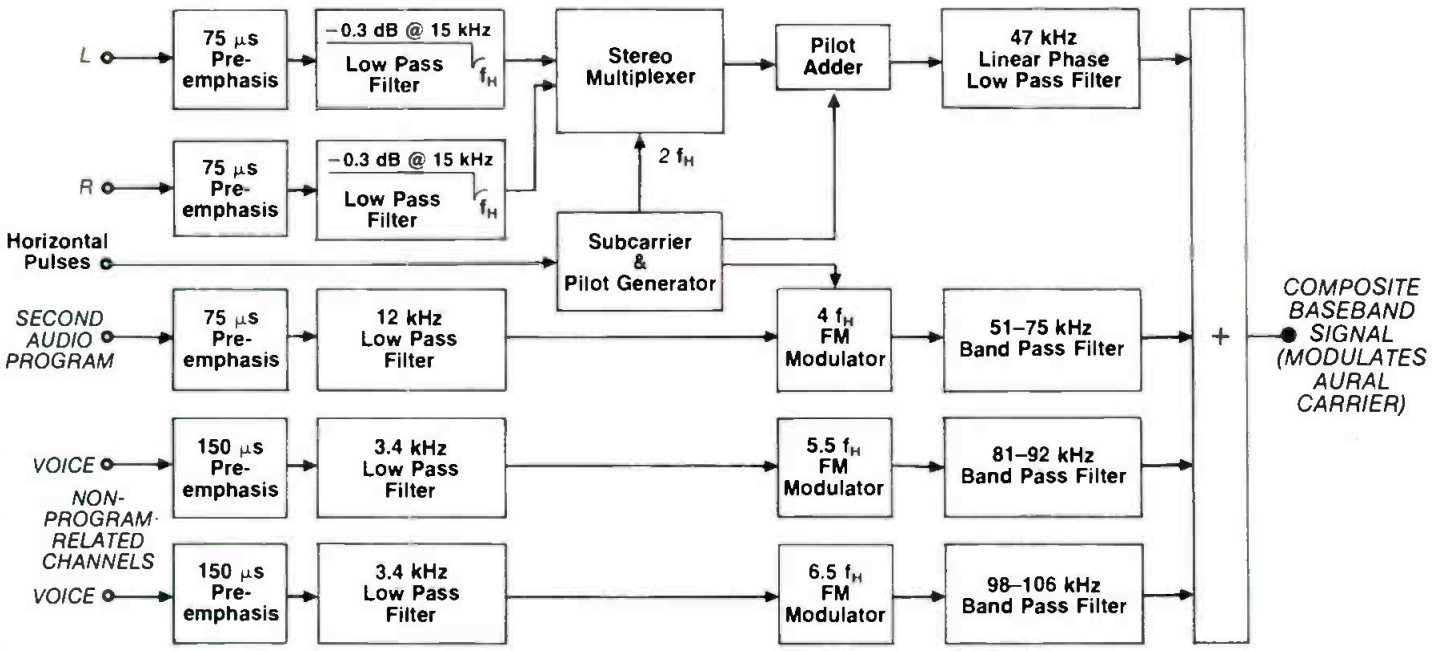

Fig. 2. Zenith multichannel TV sound encoder.

by intra-industry wrangling. Exactly what kind of multichannel TV sound system has the MTS committee specified? First, let us take a closer look at the technical details of the Zenith transmission system.

Zenith transmission

Figure 1 shows the spectrum occupancy and modulation standards of the Zenith transmission system. Main channel modulation consists of an L + R audio signal. An L − R stereo difference audio signal causes double-sideband, suppressed carrier amplitude modulation of a subcarrier at twice the horizontal line rate frequency. Audio bandwidth of each signal extends to 15 kHz and the main channel preemphasis remains as it has been in the past, 75μs. Preemphasis of the stereo subchannel is a part of the companding system, described below.

The combined peak deviation of the main channel and stereophonic subchannel is 50 kHz, due to the interleaving property that occurs when L and R are statistically independent. Under this condition the peak deviation due to the stereophonic subchannel is also 50 kHz. When L and R signals are not statistically independent, or when L + R and L − R do not have matched preemphasis characteristics, the combined deviation of main channel and stereophonic subchannel is constrained to 50 kHz and the separate components assume their respective natural levels dictated by the acoustic scene.

A CW (continuous wave) pilot signal having a frequency of the horizontal line rate is transmitted with a main carrier deviation of 5 kHz. The subcarrier for the SAP channel is five times the horizontal line rate (or 78.67 kHz) and is frequency locked to that frequency in the absence of modulation. The SAP channel is FM modulated to a peak deviation of 10 kHz by a signal that is band-limited to 10 kHz and its preemphasis is, again, part of the chosen companding system. Main carrier deviation by this subcarrier is 15 kHz.

A third subcarrier, known as the professional subchannel and intended for voice or data transmission, is located at approximately 6.5 times the horizontal line rate frequency. This last subcarrier causes 3 kHz deviation of the main carrier. A complete summary of the various elements of the multichannel composite signal of the Zenith system will be found in Table 1. Figure 2 is a simplified block diagram of the encoder that would be required at a transmitter to broadcast the new system, while Figure 3 shows a basic block diagram of the decoder circuit that must be incorporated in multichannel sound

TABLE I ZENITH SYSTEM SIGNAL SPECIFICATION

SERVICE OR SIGNAL	MODULATING SIGNAL	MAX. MOD FREQ. kHz	PRE-EMPHASIS μSEC	SUBCARRIER FREQ. kHz	TYPE OF MODULATION OF SUBCARRIER	SUBCARRIER DEVIATION kHz	MAIN CARRIER DEVIATION kHz
MONO.	(L+R)	15	75				25.0
PILOT				f_H			5.0
STEREO	(L−R)	15		$2f_H$	AM-DSB-SC		50.0
2ND PROG.		10		$5f_H$	FM	10	15.0
PROF. CH.	Voice	3.4	150	Approx $6.5f_H$	FM	3	3.0
	Data	1.5	0	" "	FSK	3	3.0
						TOTAL PEAK DEVIATION	**73.0**

NOTE: $f_H = 15.734$ kHz

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▶ Read Up

Study the competitive literature. Not only do we welcome comparison with the BE FX-30 and the Continental 802A—we *encourage* it. For more information, contact Harris Corporation, Broadcast Transmission Division, P.O. Box 4290, Quincy, Illinois 62305-4290. (217) 222-8200.

See the MX-15 at NAB '84

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3. EOM Stop Delay–Adjustable from 0 to 24 seconds. Front panel indicator illuminates when 25 Hz signal present.

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9. Studer Revox Quality–A fully professional machine in every respect, the PR99 Replay Only features die-cast aluminum alloy chassis and head-block, servo-controlled capstan motor, contactless full logic switching, and a Studer-made play head. Careful German craftsmanship shows in meticulous attention to every detail.

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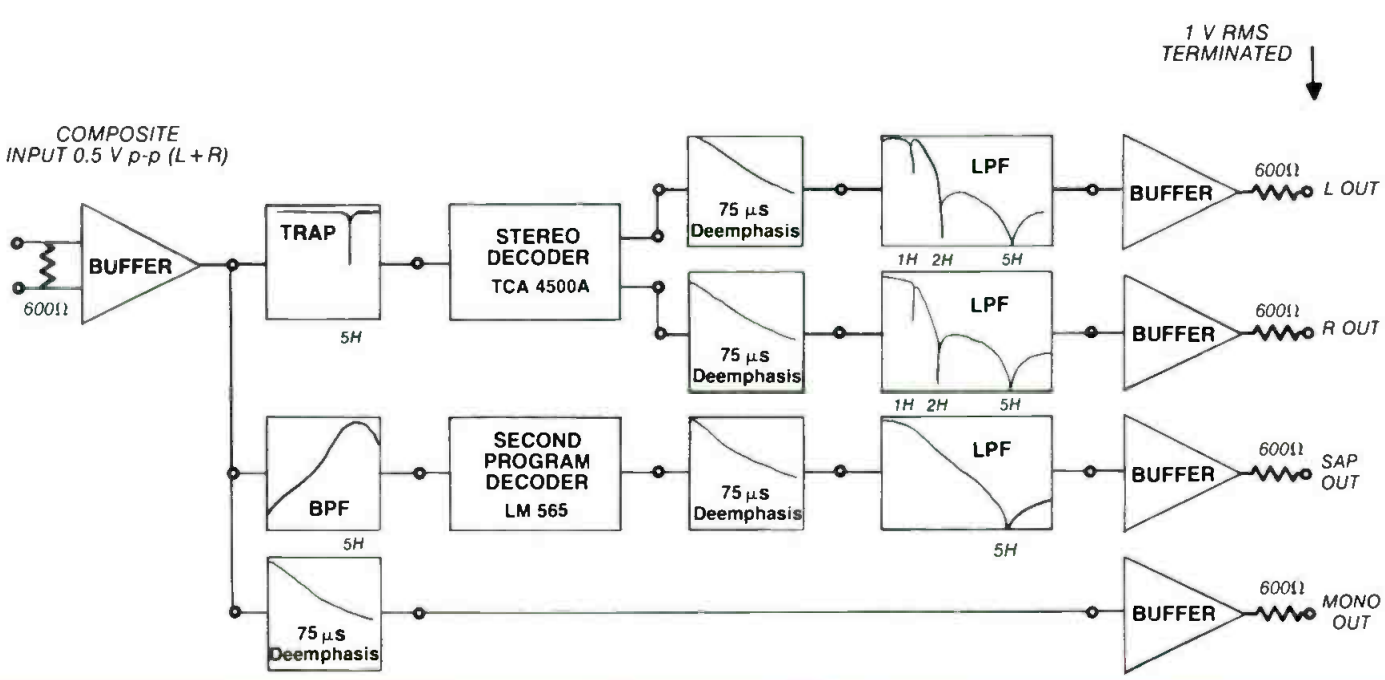

Fig. 2. Zenith multichannel TV sound encoder.

TV receivers or tuners. Not shown is the companding circuit, which would have to be inserted ahead of the stereo decoder and second program decoder blocks in the diagram. Both the basic decoder and the compander probably will be implemented by means of appropriate ICs.

dbx companding

Although the companding system chosen by the industry for noise reduction was proposed by dbx, Inc., its operation is more sophisticated than that of the familiar dbx noise reduction system found in consumer tape recorders. The compander works in two stages. First, it provides wide-band amplitude compansion to reduce dynamic range in the transmission channel at all audio frequencies. This section utilizes a 1:2:1 linear dB compander, similar to dbx's approach to noise reduction for tape recording. In addition, the

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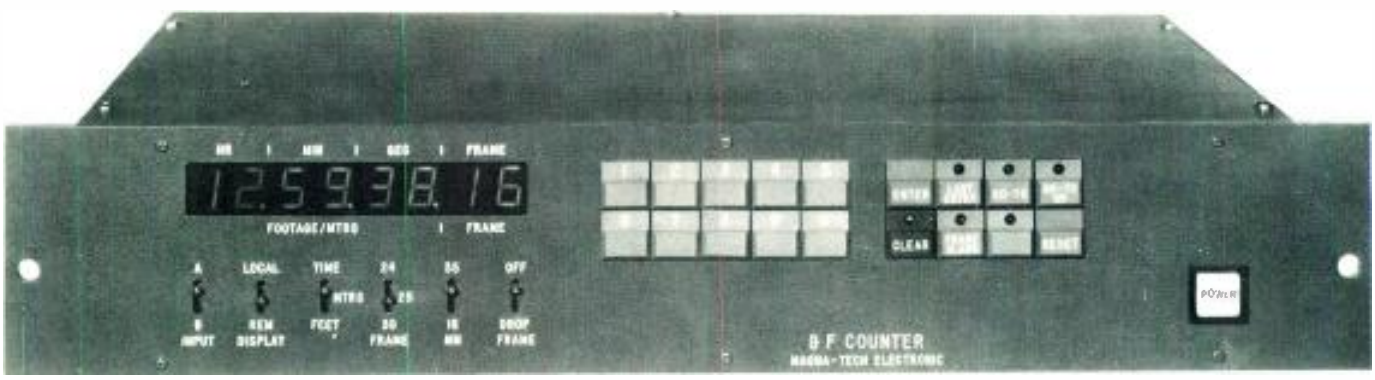

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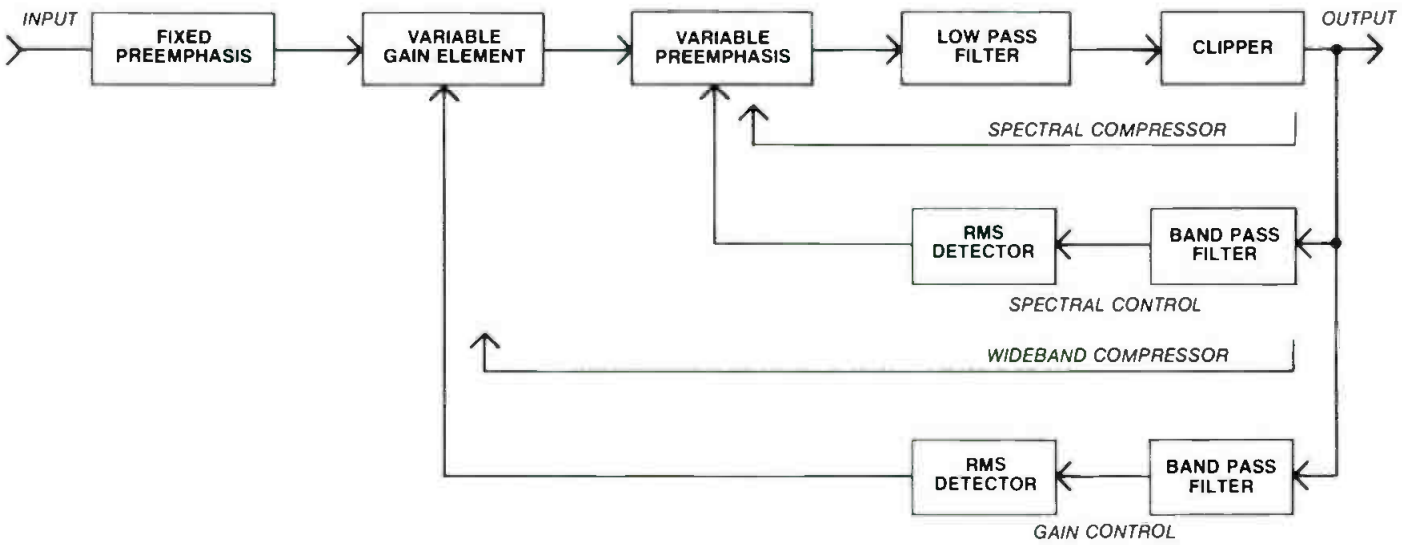


Fig. 4. Block diagram of dbx compressor (encoder).

compander provides variable preemphasis/deemphasis that adapts itself to the spectral distribution of the program material, to take full advantage of the limited channel headroom available. The spectral compressor is able to boost *or* reduce high frequency levels, depending upon the input signal spectrum.

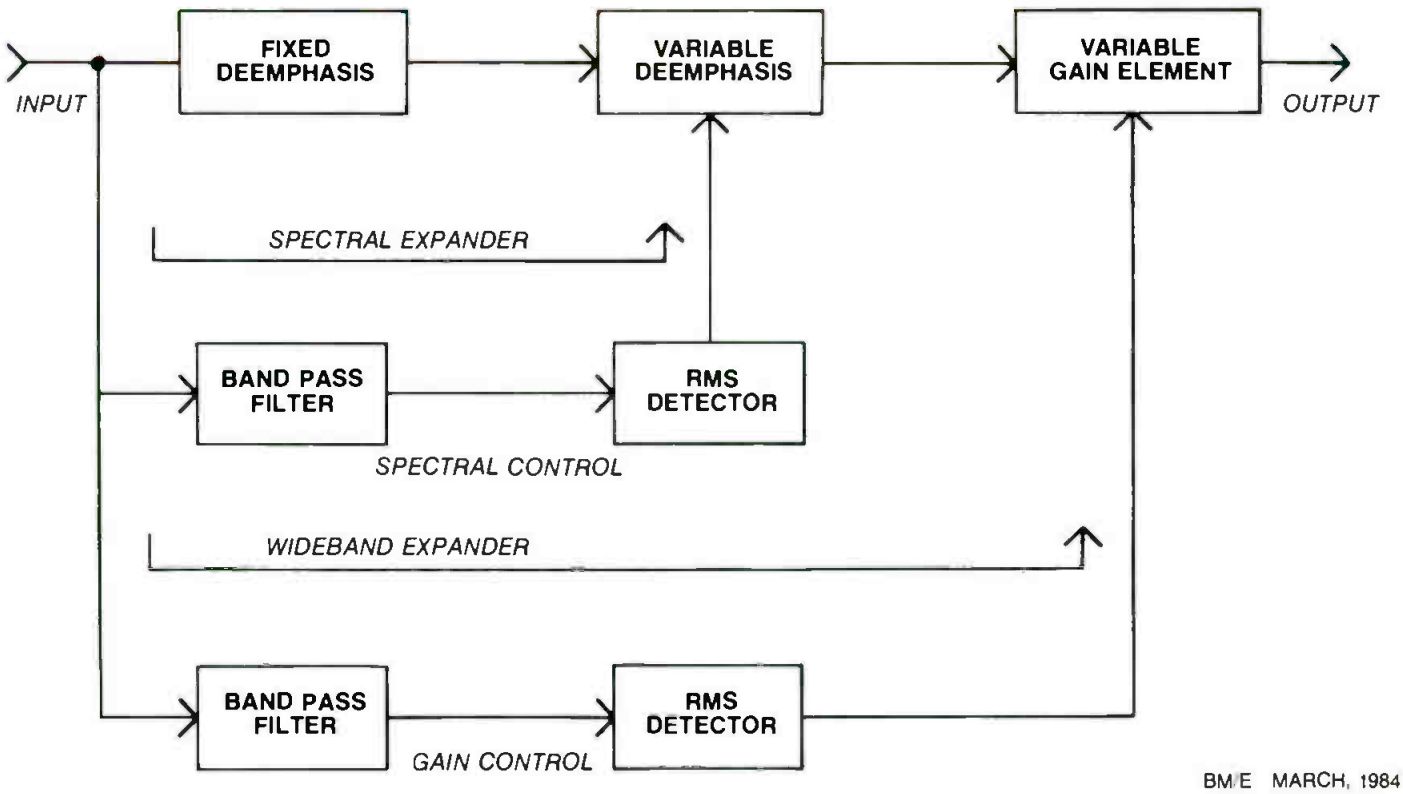
Rms detectors control both the amplitude and spectral companders, providing minimum sensitivity to impulse noise while maintaining appropriate reaction times for music signals. A clipper within the compressor control loop prevents channel overload without inducing compressor/expander tracking errors. Band-limiting filter are also included in the compressor design. Compensation for the phase errors caused by band-limiting throughout the system is provided in the form of a complementary sum (L+R) channel filter. The compressor design is shown in block diagram form in Figure 4, while the expander block diagram is shown in Figure 5.

System S/N

Now that one transmission system and one companding system have been selected, it is possible to disclose the signal-to-noise levels that may be expected in the stereo mode and on the SAP channel with various types of TV receivers under various signal conditions. The following data was extracted from the many, many pages of data that formed part of the report EIA submitted to the FCC to support the industry recommendation. In "city grade" reception tests with a split-sound type of receiver, the chosen systems yielded S/N ratios of between 65 and 68 dB for stereo reception, with SAP channel S/N ratios of between 78 and 79 dB.

The real advantage of companding showed up more definitively when tests

Fig. 5. Block diagram of dbx expander (decoder).



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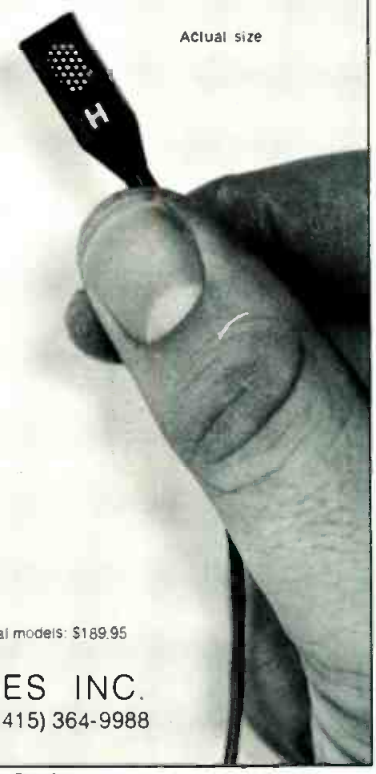

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were conducted for Grade B signal reception conditions. Such conditions are represented by a video carrier-to-noise ratio of only 30 dB, and might be expected in outlying areas served by a TV station. Again, using a split-sound receiver, stereo signal-to-noise ratio of the Zenith system *without* companding was just over 50 dB. With dbx companding, the signal-to-noise ratio under these conditions increased to between 63 and 64 dB. The improvement was even more dramatic in the case of the normally noisier SAP channel. With no companding, S/N measured a very noisy 43 dB. When dbx companding was added S/N improved to a remarkable 77 or 78 dB! With intercarrier types of receivers (those that do not have separate video and audio IF circuits), SAP signal-to-noise without companding in a Grade B signal environment was even poorer; between 36 and 42 dB. With the companding, S/N improved to between 62 and 63 dB, still an acceptably low level of background noise.

What happens now?

As of this writing, we are still waiting for the final outcome of the MTS Committee's labors. Comments and reply comments were due at the FCC by the end of last month, and the ball is now in the Commission's court. All indications are that the FCC will move quickly on this issue, since pressure for multichannel TV sound has been building for a long, long time.

The best estimates, at this time, are that by this summer we may see—or rather, hear—the first FCC-approved stereo TV broadcasts and bilingual audio for TV, probably for the Olympics. That should generate a host of new products, such as stereo TV receivers, add-on adaptors for monaural sets, TV tuners, and other video/audio components. The addition of the broadcast service should also help in the integration of audio and video in consumers' homes—a marriage that has been widely discussed but only narrowly consummated to date.

And if the FCC rejects the suggestions of the MTS Committee and the desires of the industry, and throws TV stereo to the marketplace? Even if the FCC insists upon issuing another "marketplace" decision, the industry has already agreed on a standard. Broadcasters will still be able to adopt multichannel TV sound in an orderly, uniform manner, avoiding the anxiety and incompatibility that has plagued AM stereo. **BM/E**

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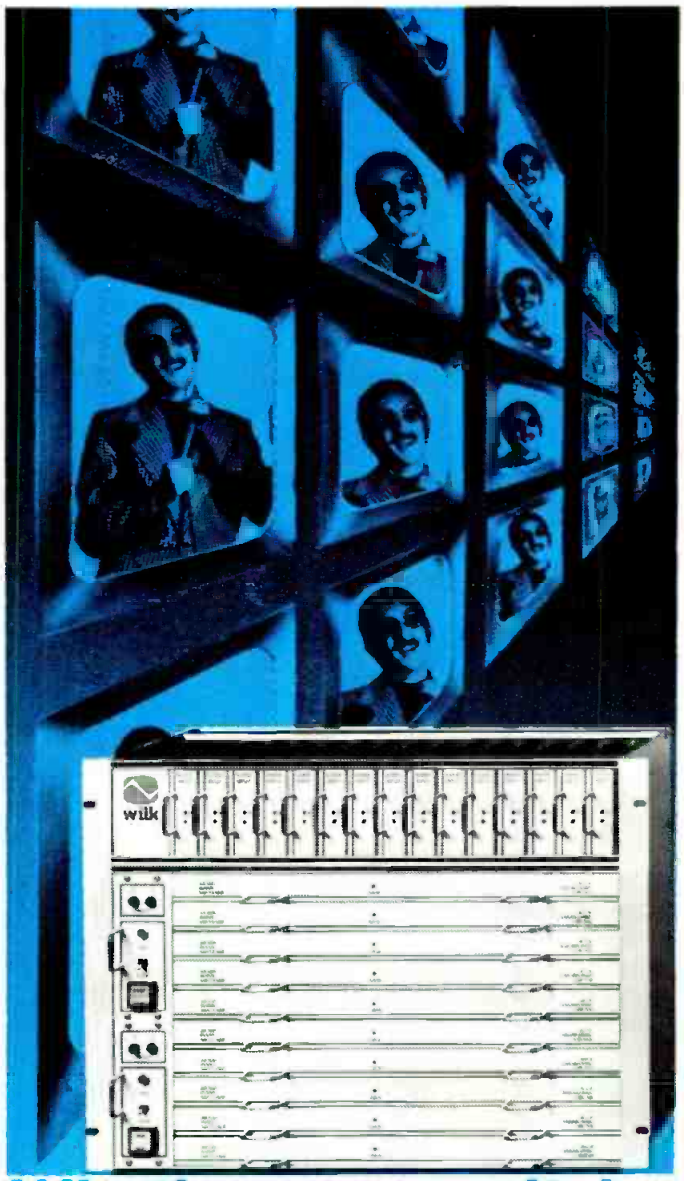

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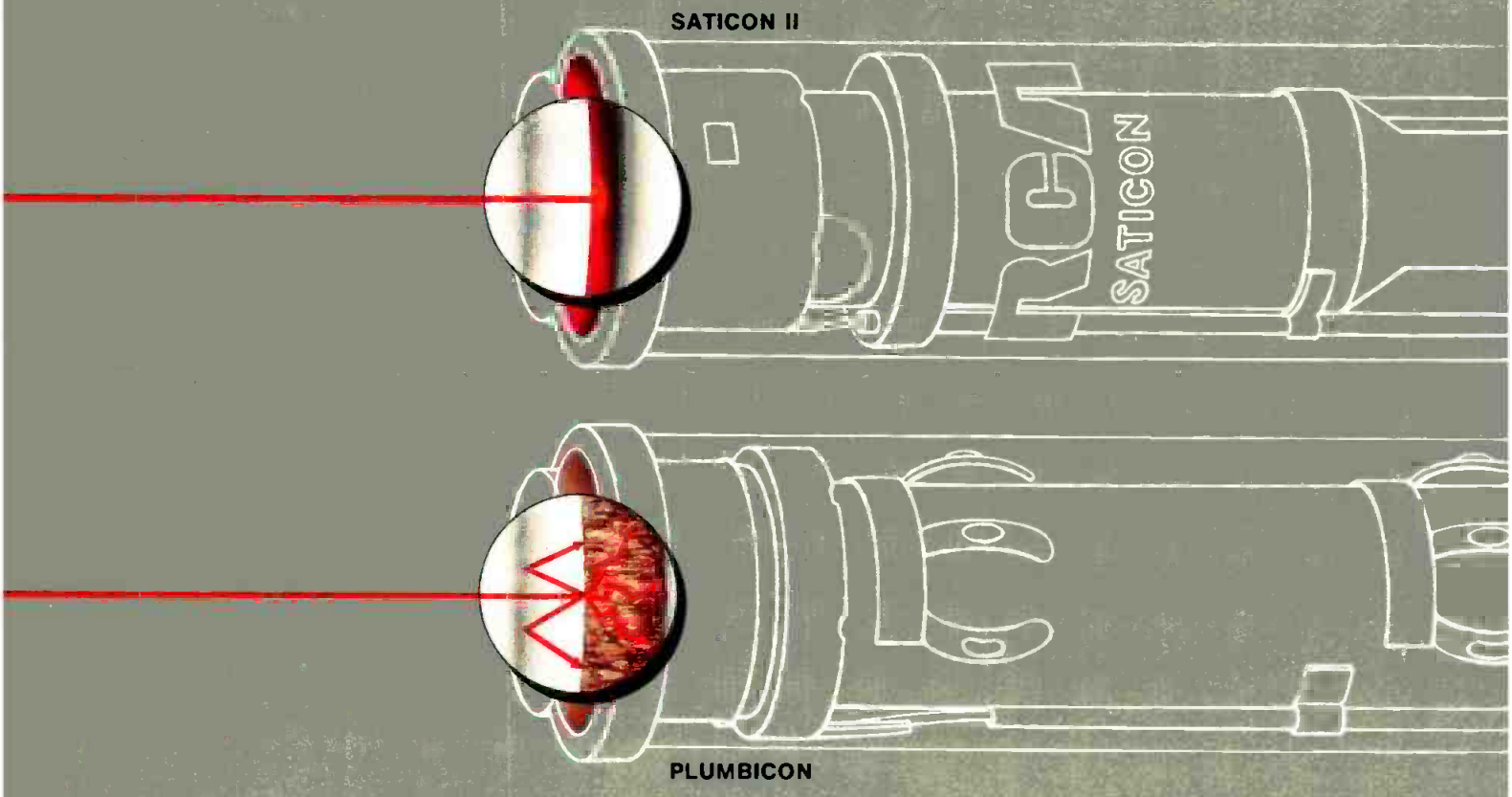

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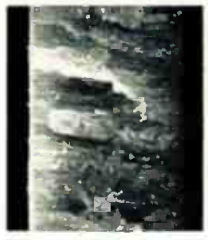

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The Simplest Way to a Hands-Free Talk Show

By John Gaboury, CE
KVOY, Yuma, AZ

For talk shows, it is highly desirable that the operator at the console should never have to touch the telephone.

The operator should be able to talk to the caller through the console microphone and listen to the conversation over the console headset. This simplifies things for the operator—hands-free operation, freedom to concentrate on the program, and a lessening of the distortion inherent in the carbon telephone transmitter.

Typically, this operation is achieved with either a passive or electronic hybrid circuit. Most hybrids give marginal performance and even when they do work well, can be both elaborate and expensive.

With just two components I solved the problem here at KVOY. No hybrids—no amplification.

We use a Sparta A-20 console and a beeper unit. The beeper output feeds into pot 7—a typical setup.

Since only the operator's microphone output need be fed into the telephone line to achieve the desired result, I fed the microphone preamp output into the telephone through the talkback output of the console using an isolating network. This worked immediately and well, with no changes of any kind made inside or out of the console.

To initiate a talk program, the operator turns up the beeper pot, puts the talkback switch in position A, takes the receiver off the cradle, lays it aside, and begins to take calls. He or she talks to the caller over the console microphone, and listens to the conversation over the console headphones, touching the telephone only to punch up the next call.

The microphone preamp feeds into the telephone through terminals B and R on the 425 E networks inside the telephone. These are the telephone transmitter (carbon mic) terminals. In our case, the microphone preamp output level just matches the normal output of the carbon mic, −20 to −10 dB. No feedback is possible in operation, because only the beeper output is fed into the console.

Because (in our case) the microphone preamp output is connected directly to the microphone pot, the setting of the mic pot will affect the level sent to the telephone. A simple dB measurement at terminals B and R will show you the best setting of the mic pot. In our case, no changing of the "normal" setting was necessary.

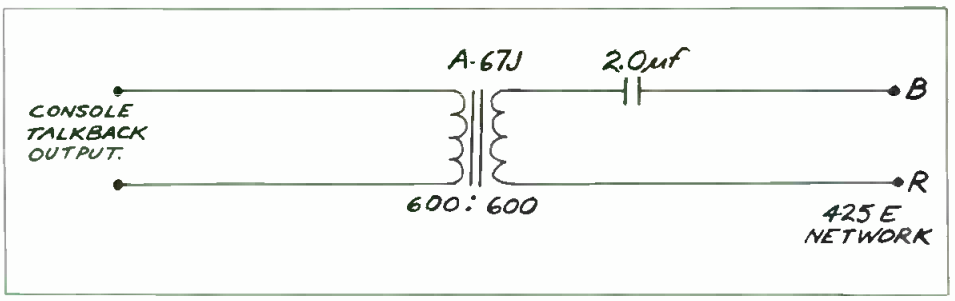
Since dc voltage is present at the telephone terminals, a dc blocking capacitor is necessary. If the capacitor is removed, the resistance of the transformer secondary will "hold" the line, making it impossible to hang up. The capacitor also governs the frequency response of the line. A higher capacitance will not improve the response. A lower capacitance will begin to cut the low end frequency of the mic preamp output. This may be advantageous, for excess low frequencies may "muddy" the quality of the telephone transmission.

Do *not* use an electrolytic or two electrolytics back to back. Use only a solid capacitor of 100 V or more rating.

I used the TRIAD A-67J transformer because it is my standard choice for all interfacing and because its excellent shielding allows its use in heavy RF fields. Because the telephone must be kept isolated and balanced, a transformer *must* be used.

I have described a system used with a Sparta A-20B console and a WE 500 keyset. The transformer I used does not excessively load either the telephone or the mic preamp. For other consoles and telephones, the principles and schematics would be basically the same. In the case of a mic preamp that does not have an emitter follower or low impedance output, it may be necessary to use a transformer that would bridge or match the preamp output. This would require a primary of 5K–20K impedance. Use whatever works.

Since the unit is connected to the mic preamp only when in use, it cannot in any case interfere with normal operation. **BM/E**



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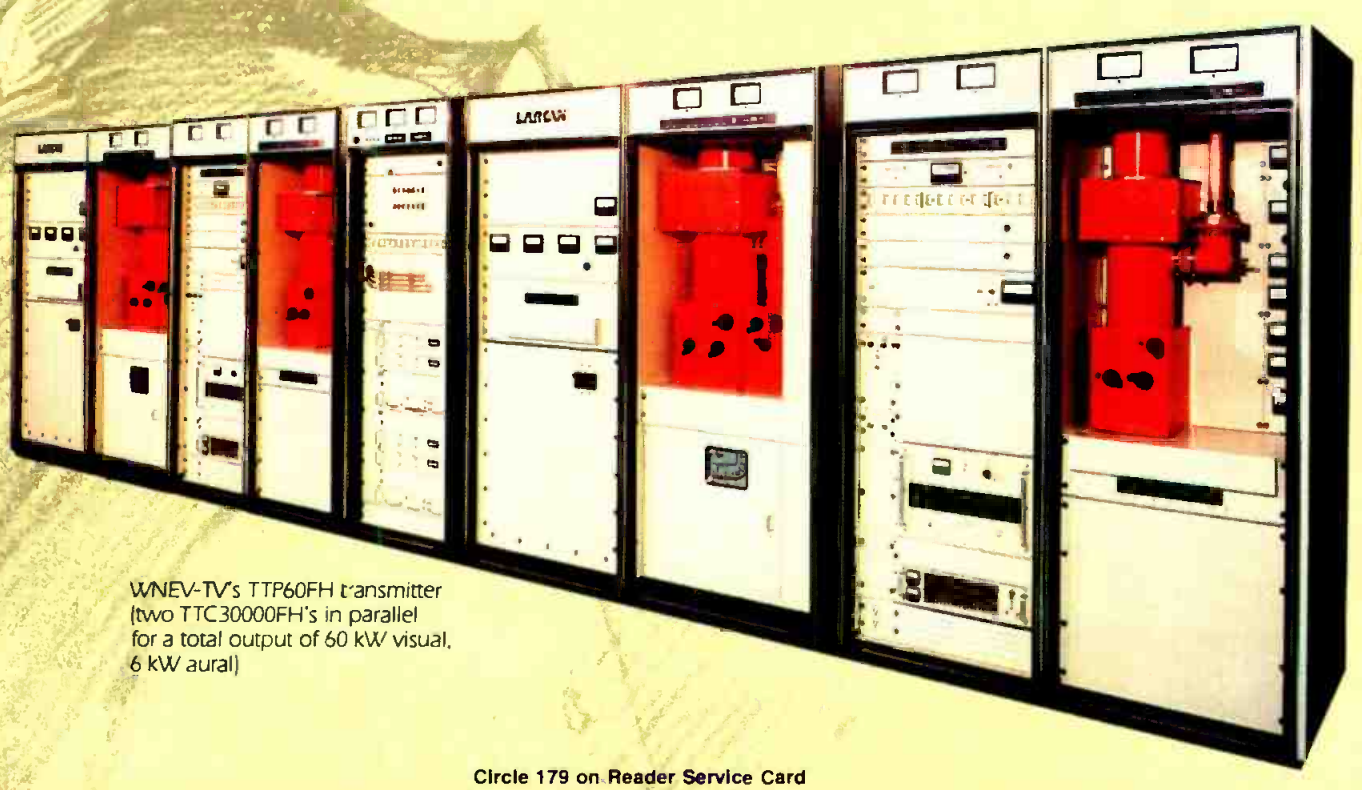

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The Marketplace and Stereo TV

By Harry Cole, FCC Counsel

The frequently invoked reminder that those who cannot remember the past are condemned to repeat it is certainly applicable to the Commission's proceeding concerning expanded use of the aural baseband of television stations. The FCC is confronted with a situation remarkably similar to the AM stereo marketplace decision. The result has been drawn out competition among the proponents of the various AM stereo systems for acceptance by manufacturers, broadcasters and the listening (and radio-purchasing) public.

Unfortunately, the TV baseband proceeding presents the same type of problems as did AM stereo. Because of the FCC's lackluster performance in AM stereo, those in the television industry interested in getting the multichannel TV sound business going may be justifiably concerned that a similar "let the marketplace decide" result in the television aural baseband proceeding could slow things up there in the same way. With that in mind, it may be useful to take another look at the proceeding.

In question is the aural baseband of the television broadcast signal. It is similar to the baseband of FM broadcast transmission, except that in FM the baseband is broader than necessary for the transmission of the main channel signal. The Commission has for years authorized the use of portions of the excess FM baseband for subsidiary purposes. These subsidiary communications authorizations (SCA's) have traditionally been used for stereophonic service on the main channel, data transmission, background music, or other specialized, nonbroadcast services. The television baseband is similarly broad, and thus can be utilized for similar types of services. However, the Commission has never established standards governing the use of the extra TV baseband capacity. In 1977, though, it decided to consider the subject and, accordingly, it began a rule making proceeding intended to lead to the adoption of rules and standards.

The Commission's rule making looks to the ultimate uses to which the excess baseband could be put. High on the FCC's list of such uses is the creation of a stereo television service. In other words, television licensees would be able to broadcast programming with two channels of audio material, thus permitting soundtracks to be prepared and transmitted in stereo. This could obviously enhance consumer enjoyment of the programming in much the same way that the availability of stereo FM service has enhanced enjoyment (and general acceptance levels) of FM radio. Additionally, the Commission has indicated that the aural baseband could be used for the provision of a second audio program (SAP), which could enable television stations to provide, for example, foreign-language soundtracks for English-language programming. The viewer interested in receiving the foreign-language service would obtain (doubtless for a fee) a decoder which, when activated, would substitute the foreign language for the English version. Other possible uses include data transmission and paging. Actually, the whole proceeding was initiated in 1977 at the suggestion of one party who asked the Commission to authorize use of the aural baseband for cueing and coordinating station personnel, particularly electronic news gathering teams.

Compatibility a Must

In addition to the uses to which the excess baseband might be put, the Commission must also look at the technical standards which would apply to such uses. This is a particularly delicate matter since the Commission must be mindful of the fact that any new services must be compatible with existing receiving equipment. That is, the FCC could not adopt standards which, if implemented by broadcasters, would render obsolete all (or most) of the television sets currently used in American homes. And, to assure the highest quality of service from the excess baseband, the Commission initially decided that it would consider not only a transmission system, but also a noise reduction system intended to provide the best possible service.

With these various factors on the table, the Commission set about gathering comments from the public and the industry. What became apparent was that there were three major proponents of transmission systems and three major proponents of noise reduction, or companding, systems. Each of these six different systems had its own particular qualities, and the various combinations of the three transmission systems and the three companding systems also

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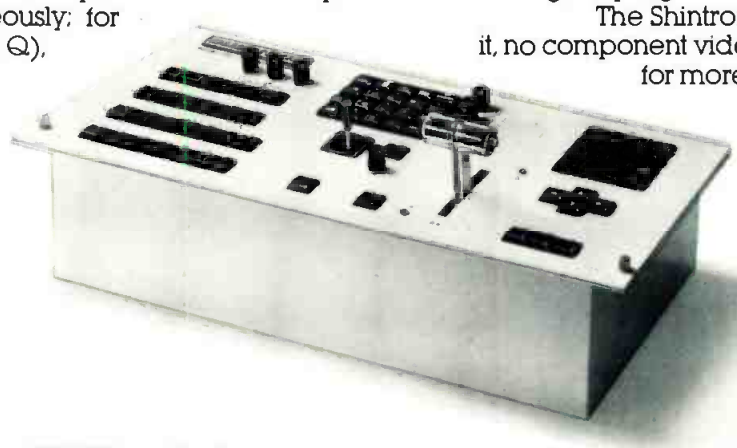

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featured certain qualities. However, the various systems were not necessarily compatible; in other words, if a station were broadcasting with one system, a television receiver equipped with another system would not necessarily be able to pick up the enhanced service. This, of course, is where the AM stereo analogy applies. In AM stereo, five different systems were available, all of them capatible with existing monaural receivers, but not necessarily with one another. The Commission, after initially selecting one of those five as the preferred system, changed its mind and decided not to select any of them; instead, it adopted general technical standards which each of the systems had to meet and left it to the industry and the public to figure out which, if any, of the systems would become the dominant AM stereo system.

In the multi-channel TV sound proceeding, the same thing could happen. This is particularly true in view of the fact that, as recently as August, 1983, the Commission was still articulating an interest in using a "free market approach" under which the FCC would set only minimal technical rules with the dual aims of ensuring "the integrity of primary visual and aural service" and precluding interference to other licensees.

The Slow Lane?

In principle, there is nothing wrong with this point. In fact, there are arguments that the public is much better off without the Commission, or some other governmental agency, interfering unnecessarily in details of the broadcast industry best left to the industry itself. The problem, however, is that the marketplace mechanism is not the fastest way of introducing a new service. Indeed, it tends to put a damper on things at least as effectively as restrictive FCC rules and regulations might. Witness, for example, AM stereo. Although the Commission reached its final decision on the "standards" governing that service some two years ago, that service still has a long way to go to gain any kind of widespread acceptance among broadcasters and the public. While the causes of this delay are obviously complex, it stands to reason that one factor is almost surely the lack of certainty in the minds of broadcasters and listeners as to which system will ultimately dominate.

The AM stereo experience has not been a particularly happy one, and virtually all segments of the television industry have a clear interest in avoiding a repetition of that experience when it comes to expanded use of the aural baseband. Television licensees, for instance, would like to be able to offer their audiences an enhanced service which, ideally, could attract more viewers and boost ratings. Television receiver manufacturers would certainly like it if rapid acceptance of the new service(s) led to increases in consumer demand for new upgraded television sets. Indeed, the potential market for such recievers would be substantially larger than the existing market for conventional receivers, since the enhanced sets would represent more than replacements. Television program suppliers would have an interest in being able to upgrade the quality of their productions (by adding stereo sound) and/or the potential audience for their programs (by adding foreign language soundtracks). And, of course, viewers would be interested in having a higher quality program service. Thus, it would appear that most interested parties would like to move forward with the proceeding

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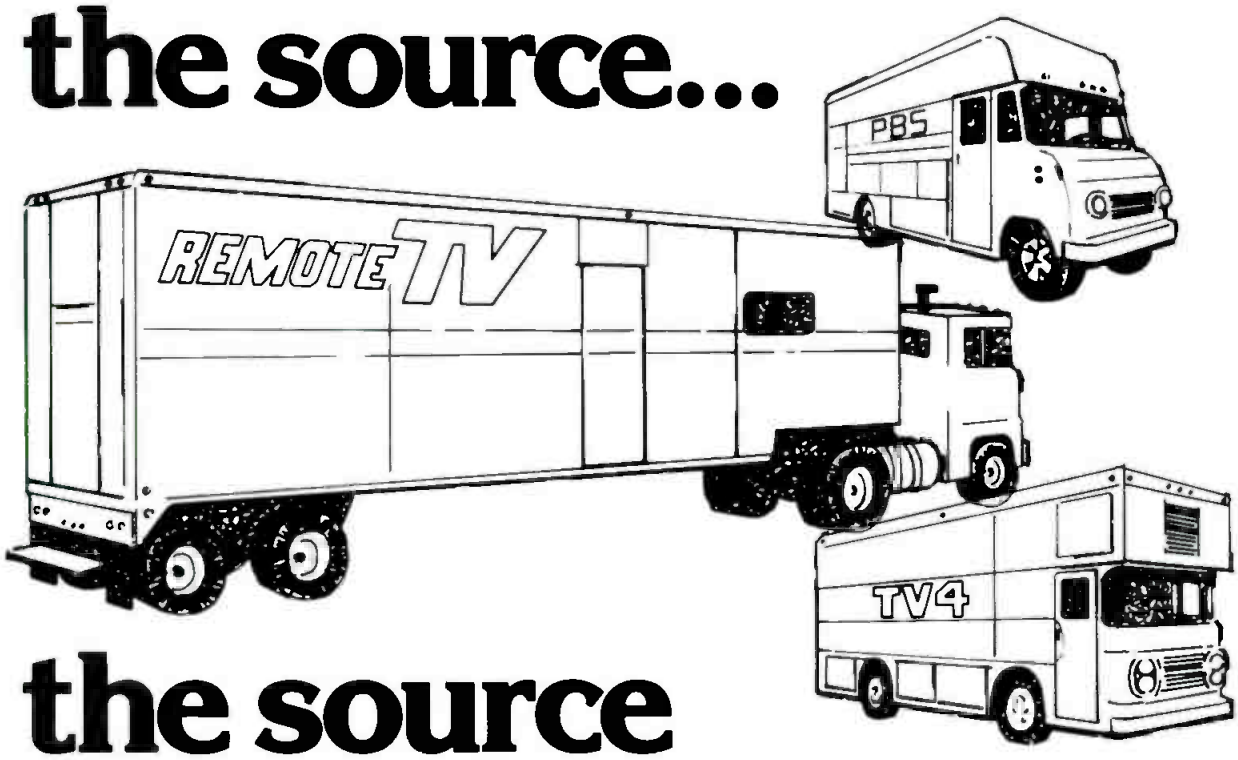

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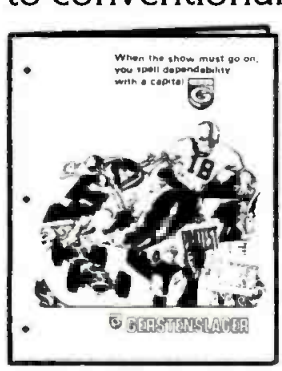

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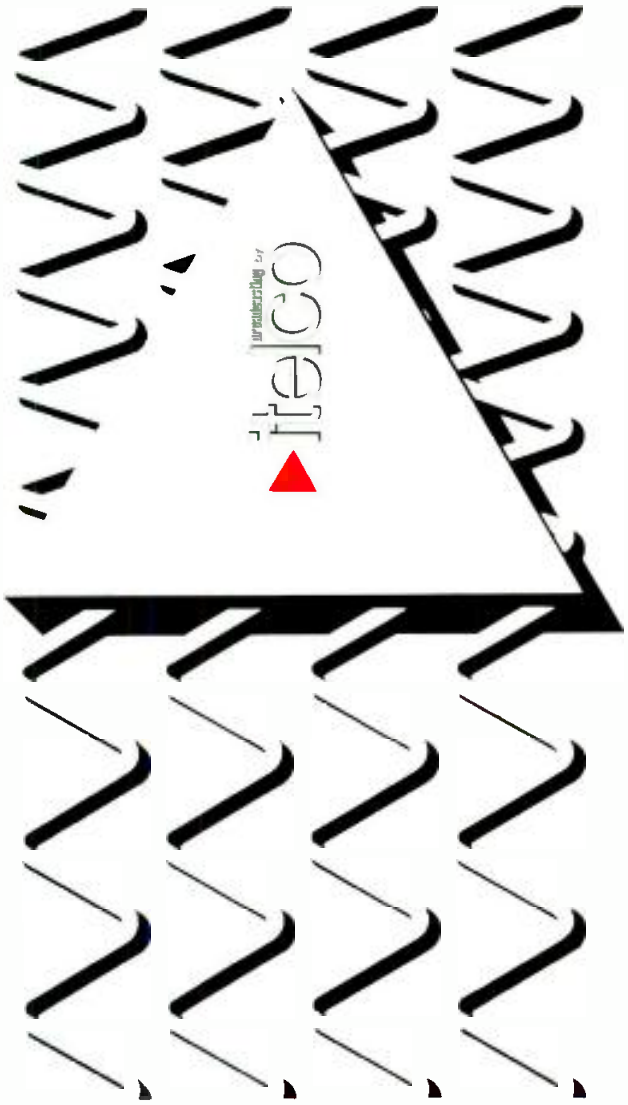
EIA Tests

With an eye toward just that, the Electronic Industries Association (EIA) undertook a series of tests of the various available systems to determine which, if any, had superior characteristics. An EIA committee including representatives from virtually all segments of the television industry performed an extensive review of the systems and concluded that one transmission system and one companding system did seem to be more desirable than the others. The EIA filed its test results with the Commission, with the further recommendation that the FCC adopt certain technical rules which, while not specifying any particular system, would be compatible only with the Zenith transmission system and the dbx, Inc. companding system. The obvious hope is that the Commission will be willing to temper its marketplace philosophy enough to adopt the standard proposed by EIA. The EIA's proposed standards, some think, are phrased broadly enough to satisfy the FCC's desire not to take sides, but narrowly enough to dispel any concern about the industry's ability to provide a single system as soon as possible. (See article on EIA proposals, p. 119.)

It is now up to the Commission to decide what to do. The comment period in this rule making proceeding closed late in January, which means that a decision could be reached as early as this spring. That is significant, since this is an election year. In view of the television industry's substantial interest in being able to utilize the aural baseband more effectively, it is conceivable that the Commission might be willing to expedite its consideration of the matter in order to avoid any potential negative fall-out from that influential segment of society. And, while the Commission ostensibly remains committed to its marketplace philosophy, it would seem that support from the TV industry for the adoption of standards along the line suggested by EIA might prove palatable to the FCC.

In any event, the Commission must now decide whether its faith in the "let the market decide" approach to regulation should govern its decision with respect to the TV aural baseband. The aftermath of the AM stereo decision would normally provide ample impetus for questioning the wisdom of that approach. Further, the television industry, apparently mindful of the dedication the current FCC has displayed toward regulation, has taken reasonable steps to review the technical data and lay it all out for the Commission's reference. This may not, however, be enough to override the FCC's deep commitment to marketplace decision-making. In confronting this question, the Commission may wish to take into account the fact that frequently, the marketplace does not act on the basis of technical superiority or with an eye toward such things as present or future frequency allocation and utilization. Rather, marketplace decisions are often based on such non-technical matters as promotion, packaging and merchandising. In light of this, the FCC may well ask itself whether the advantages of letting the marketplace decide outweigh the likely disadvantages, which may include substantial delays in getting the new service to the public. And, in order to answer that question, the Commission may wish to take a second look at the history and progress (or lack of it) of AM stereo. **BM/E**



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New Boundary for Crown PZM

A new line of three boundaries has been introduced by Crown to make the PZM microphone more directional in its pick-up pattern. The boundaries are intended to help reduce noise and feedback as well as minimize muddy room acoustics.

The A240 is a transparent plexiglass panel two feet square by a quarter-inch thick to which the PZM mic can be mounted. The boundary extends the low frequency response, increases gain before feedback, and reduces pick-up of leakage and other undesirable noises. The boundary also rejects sounds from behind it, thus making the PZM, in effect, a directional microphone.

The two remaining new boundaries are designated Isoflector 1560 and 1590. The Isoflector is an L-shaped plexiglass boundary to which small PZMs can be attached and made directional. The boundary can be mounted on the edge of tables or lecterns for use in interviews, talkshows, or speaking engagements. The 1560 has a 60 degree angle between the two boundaries and is more directional than the 1590 with its 90 degree angle.

For More Information
Circle 252 on Reader Service Card

ATS Develops New Cases

ATS Cases has introduced its new cases with easy access panels for electronic equipment. The new cases feature removable front and back panels for access to both front and rear of equipment, allowing easy hook-up and front panel equipment adjustment without removing the equipment from the case.

The cases come designed to accept all types of equipment including monitors, amplifiers, and test equipment. All cases are constructed with half- or quarter-inch plywood laminated with high-impact ABS plastic, zinc plated steel reinforced corner hardware, front mounted 11 gauge 10-32 tapped steel mounting angles, and recessed spring-loaded catches and handles.

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Options include twist lock catches, rear mounting angle, vibration isolators, ac power strip, blank mounting panels, casters, and fans. The cases may be ordered in standard sizes from 3.5 to 78-inches with custom cases also available.

For More Information
Circle 254 on Reader Service Card

Microdyne Goes For Ku-Band Receivers

Microdyne recently introduced its new Ku-Band video receiving system. The system is comprised of two units, the 1100 BDC-12 block downconverter and the 1100 DCR-12, a 72-channel video receiver. The downconverter mounts to the antenna and reduces the incoming 12 GHz satellite signal to the 270-770 MHz range helping reduce installation costs.

The receiver features a PROM-controlled, frequency synthesized tuner that can be programmed by the factory for any satellite format. Since the receiver can be used with either the new Ku-band or the company's C-band block downconverter, an earth station can have access to both types of satellites with a single receiver when the appropriate plug-in PROM and downconverter are used. International frequency formats can also be accommodated.

The system is intended to reduce installation costs by way of the antenna-mounted block downconverter. The relatively low 270-770 MHz band allows the use of lower-cost 75 Ohm cable and fittings for the run to the earth station headend. The lower frequency also reduces line loss. For multiple channel systems, further savings are possible with the use of lower frequency power dividers.

For More Information
Circle 256 on Reader Service Card

Videotek Unveils New Color Monitor

Videotek has introduced a new 13-inch rackmount color monitor. The VM-13PRO was designed for studio and mobile production applications and measures 12.25x19x19-inches and weighs 48 pounds.

Intended to be one of the most comprehensive monitors in terms of features, the new unit has three looping composite video inputs, tally light, internal/external sync, and presets for chroma, phase, brightness and contrast controls. Pulse cross, underscan, and individual RGB gun switches are some

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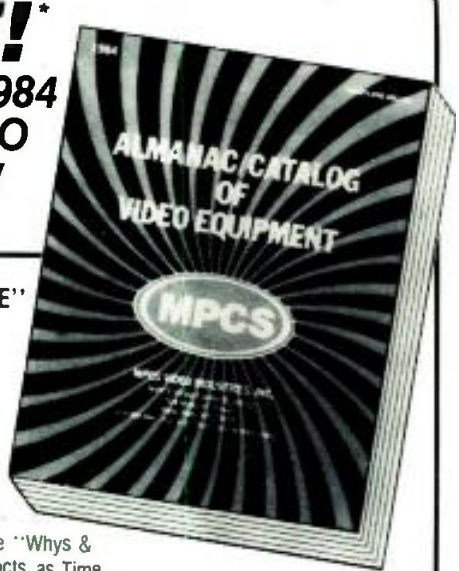

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of the other standard features on the VM-13PRO.

In addition, the new monitor has selectable horizontal time constant which enables the user to observe skew and tracking errors in non-time base corrected signals. Selectable automatic chroma control defeat is included for detection of chroma loss in the signal being monitored. The unit is available immediately for $1330.

For More Information
Circle 255 on Reader Service Card

Nagaoka Introduces CD Cleaner Kit

To meet the rising demand from CD owners among station personnel, Nagaoka has introduced a compact disk cleaning system. The kit, designated the CD-1100K, comes with three parts to be used together.

The first element in the kit is the spray, a non-corrosive solvent which removes foreign matter including smoke film without damaging the CD's protective finish. The solvent is used in conjunction with the cleaner, a lamb's leather pad, which is employed radially (across the disk rather than in circular motion). The third element is a buffer which stores in the case provided with the kit.

For More Information
Circle 253 on Reader Service Card

Phase Audio Develops Dubber

The new Phase Audio Dubbing Center is a machine that allows stations to operate several machines through the one control panel. Features of the new unit include a logic control device that starts a turntable and a cart machine and also operates an original digital timer and other auxiliary equipment.

The Dubbing Center can accept a phono preamp or a tape machine for dubbing from a disk or tape. It can dub for either stereo or mono broadcasts. The unit's monitor comes with two buffered, true VU meters and a phase meter.

Simultaneous monitoring of playback while in the dubbing mode is possible and monitoring can be done through the broadcast studio speakers or with a set of headphones plugged to the Dubbing Center itself.

For More Information
Circle 258 on Reader Service Card

Video Switcher From Leitch

A new compact unit, the HDS 481 is an eight by one video switcher with wide bandwidth and excellent crosstalk specifications for use with high definition and standard bandwidth systems.

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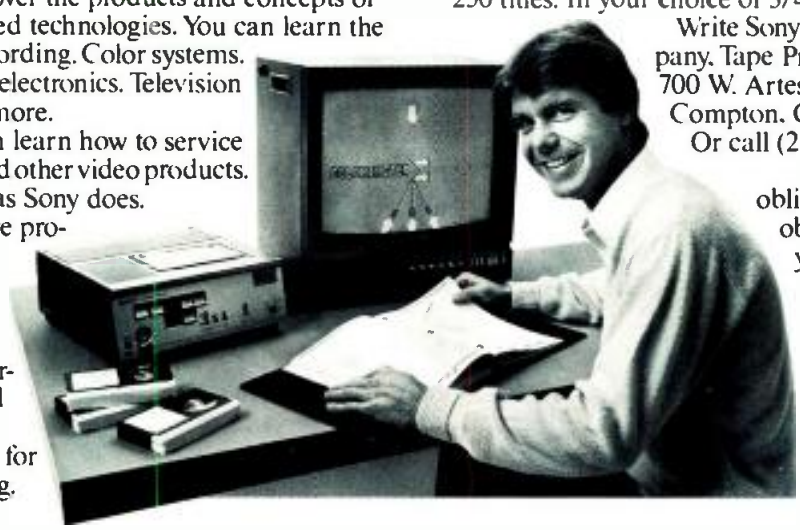

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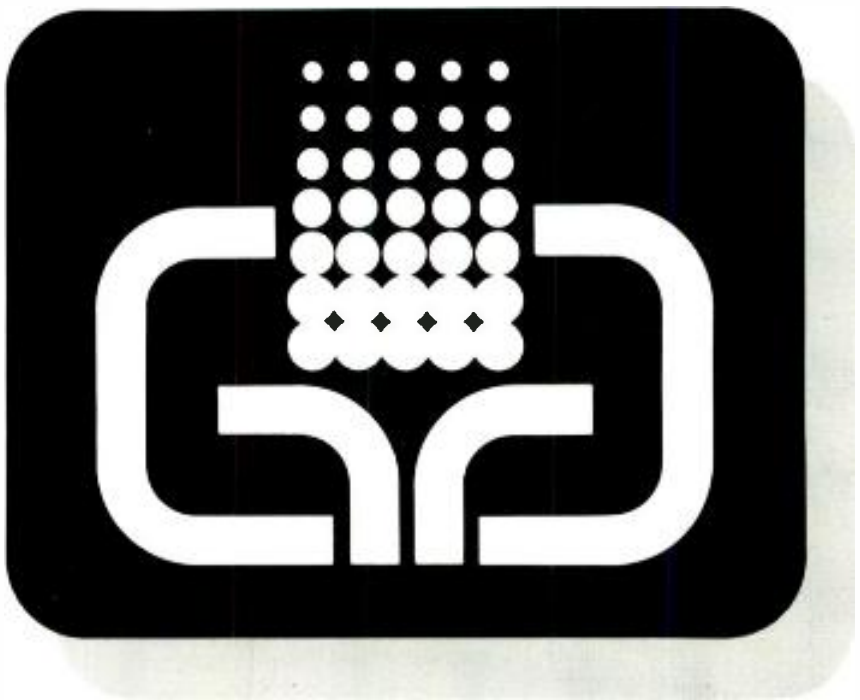

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restoration of each input signal to eliminate axis shift when switching between signals with differing APL. Other features are vertical interval switching, additional clamping following the switch, less than 0.3 ns input delay differential, and 60 dB crosstalk to 15 MHz.

The unit's inputs are bridging with greater than 52 dB return loss to five MHz, while two 75 Ohm outputs are provided. A remote control is available via a three-conductor cable and the control system allows multiple control panels, all of which provide active crosspoint indication.

Two slots are available and wired to accommodate any of the Leitch distribution amplifiers which may be used to provide additional switcher outputs or used independently for other distribution.

For More Information
Circle 259 on Reader Service Card

Comtech Complements Antenna Line

Comtech Antenna has introduced a new 3.8 meter transportable earth station to its line of five meter transportable dishes. The new unit employs a fold-up design that allows for a maximum over-the-road height of 8.5 feet.

The feed assembly of the new antenna also folds in, enchancing set-up time and handling ease. The 3.8 meter antenna has a receive gain of 42.9 dB.

Standard equipment for the antenna includes a dual receive motorized feed with control unit. An optional transmit feed is also available for uplinks.

For More Information
Circle 251 on Reader Service Card

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Battery Temperature Sensor From Anton/Bauer

Anton/Bauer has added a cold temperature sensing system to its Pro Pac 13, 14, and 90, as well as its 30/13 battery belt nicad batteries. This technology prevents a cold battery from being destroyed during charging if its temperature is too low.

When batteries are charged with the Lifesaver charger incorporating the new temperature sensors, the logic controlled charge monitor cicruit automatically starts the fast charge only after the batteries are within a safe temperature range. This cold temperature sensor, coupled with the all-cell sensing system, assures safe and reliable charging under all operating systems.

For More Information
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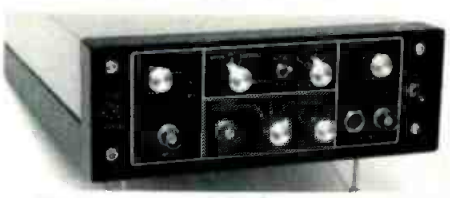
Xetron Unveils Digital Comb Notch Filter



The new Linx-160 from Xetron is a digital comb notch filter designed for the audio broadcast industry. The unit removes audio interference created by ac power lines and line operated equipment. A completely self-contained unit, the Linx-160 features automatic interference tracking for tape recordings or delayed signals.

The fundamental (line) frequency and up to 250 harmonics are effectively removed from the audio material by placing a deep (70 dB minimum, decreasing to 40 dB at 10 kHz), narrow notch at the fundamental frequency and at the harmonics. These notches effectively attenuate the interfering noise and, if the source material is completely obscured by the interference, the 160 will eliminate this noise and provide a clear audio channel.

Any fundamental frequency can be tracked between 40 and 80 Hz. The audio input is 0.1 to 3 volts rms into 75 kOhms. The output level is 3 volts rms into 600 Ohms. Frequency response is listed as dc to −10 kHz at −3 dB. Notch bandwidth is switch selectable at 0.3, 1, 6, or 30 Hz.

A reference frequency is also switch selectable for line or external, or can be extracted from the audio input and may range from 40 to 80 Hz. System THD is one percent maximum with instrument operation from 115 V ac ± 10 percent at 50/60 Hz. The system measures 3x8.5x11 inches.

For More Information
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BUSINESS BRIEFS

Ampex Corp. has announced its entry into the video display terminals market through an agreement in principle to acquire **ECS Microsystems.** Another announcement from Ampex came in the form of the installation of the company's 200th ADO system at **Today Video,** a production facility in New York.

Motorola has revealed that its C-Quam AM stereo system will be incorporated into the new line of products from **McIntosh Laboratories** . . . **Quanta Corp.** has developed within the company two distinct marketing groups: the Video Products Group and the Computer Products Group. This program further defines the evolution of the company's product line into the newsroom computer field as well as its activity in the video marketplace.

A new satellite communications company, **Cincinnati Uplink,** has begun operations to provide video transmission services to those who require access to Ku-band transportable uplinking and downlinking equipment . . . **Microdyne** has signed a contract for $260,000 to supply satellite network distribution equipment to the Alabama Information Network **(ALANET).**

able earth station to **Communications Carrier** of Austin, TX.

Center City Studios in Chicago are now operating with three **Harris** computer-controlled TC-85 cameras and an IRIS II digital still store system . . . **Artel Fiber Optics** has equipment installed at **WNDU-TV** an NBC affiliate in South Bend, IN to transmit video and audio for Notre Dame University sports . . . **RCA** has selected **United Media's Commander II** video editing system for manufacturing in-house videodiscs . . . **Mark III Productions** of Miami, FL has also chosen the Commander II for its post-production work.

One Pass Video, after eight months of development, has made its move into videodisc premastering . . . **Positive Video,** an authorized **3M** videodisc premastering facility, has added new hardware: a Bosch film to tape transfer machine, Harris two channel still store, Ampex slo-mo disc, and a special animation package for the **Quantel** paint box.

Center City Video announced its use of a **Dubner** CBG-2 video graphics generator for recent commercials filmed in Atlantic City, NJ . . . The CBG-2 was also used by **VideoCraft** for animated sequences for its client, GTE . . . Located in new quarters in Teterboro, NJ, **AVTEC Industries** has earmarked 1000 square feet for research and development of custom designed turnkey communications systems.

Lion Share Studios in Hollywood recently installed a new Mitsubishi X-800 32 channel digital audio recorder from DEC. From left are Jay Antista, Lion Share CE, Sonny Kawakami, DEC VP marketing, Bill Van Doren, DEC Western Manager, and DEC president Tore Nordahl.

New England Sports Network (NESN) has announced its acquisition of a 10 meter satellite earth station uplink from **Scientific-Atlanta** . . . **Satellite Communications Network (SCN)** is accepting orders for its transportable satellite uplinking service based in Las Vegas, NV.

NBC television has selected **Wold's** mobile uplinks for five major sports events in 1984 . . . **Dalsat** has delivered its D-42 model C-band transportable earth station to **Communications Carrier** of Austin, TX.

Personnel changes continue in the broadcast industry. George Sheehan has been appointed national sales manager/dealer sales for **Sony Professional Audio** Products . . . **American Satellite** has named a new president, John Lemasters . . . Glenn Wolk has received the nod from **Hitachi** to become the national sales manager of the Visual Products division.

There is a new president for **dbx, Inc.,** David Kennedy . . . Robert Stover has been promoted to VP sales for **Anixter Mark,** moving up from his position of responsibility for microwave antenna sales . . . **Comprehensive Video** has named a new marketing manager in Harvey Bass who will handle the overall direction and management of sales and marketing.

The new director of marketing for **Broadcast Technology** is John Bubbers . . . **Dynavid Corp.** has named Ronald Arendall to the position of president of the company, and he is responsible for system design, application engineering, and sales for the broadcast and industrial divisions.

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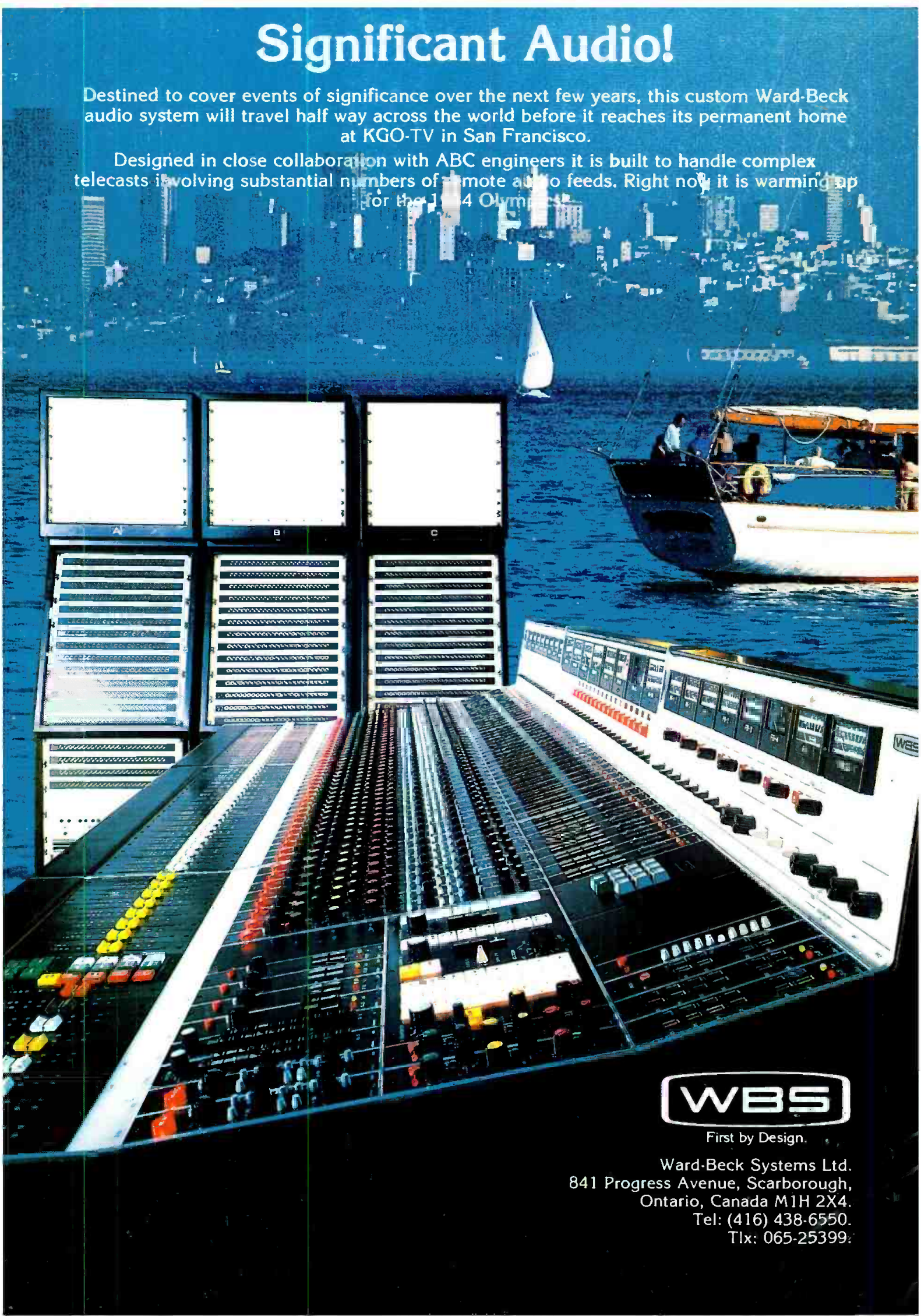
Destined to cover events of significance over the next few years, this custom Ward-Beck audio system will travel half way across the world before it reaches its permanent home at KGO-TV in San Francisco.

Designed in close collaboration with ABC engineers it is built to handle complex telecasts involving substantial numbers of remote audio feeds. Right now it is warming up for the 1984 Olympics.



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