

BME

FOR TECHNICAL AND ENGINEERING MANAGEMENT

INSIDE:
THE VIEW FROM
ABC, CBS AND NBC

25

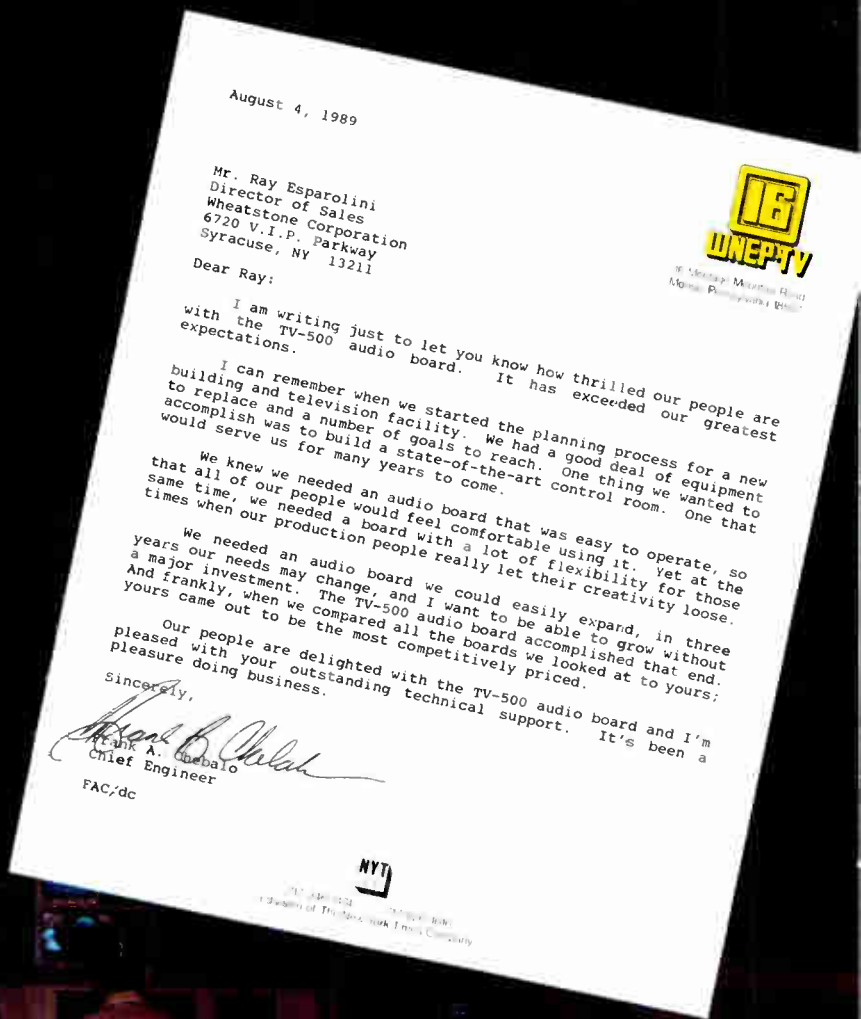
YEARS

SILVER ANNIVERSARY ISSUE

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16
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Frank A. Cusabala
Chief Engineer

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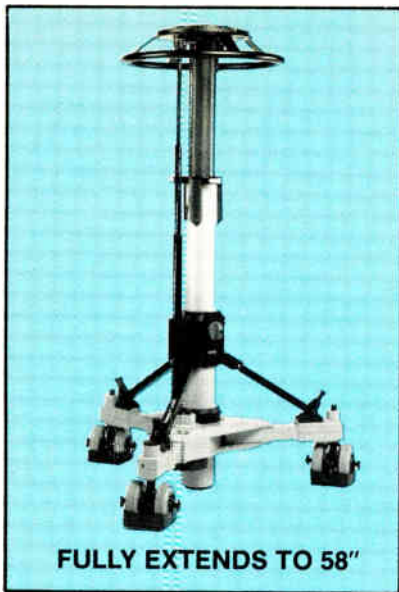
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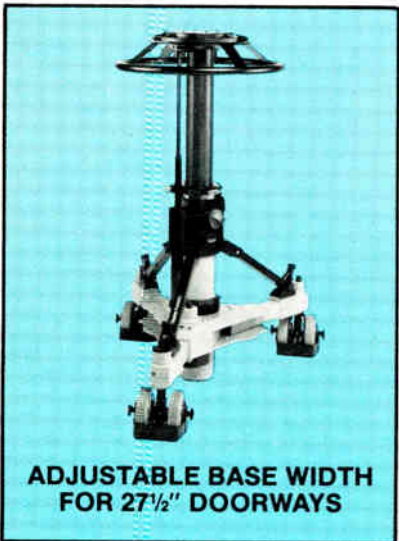
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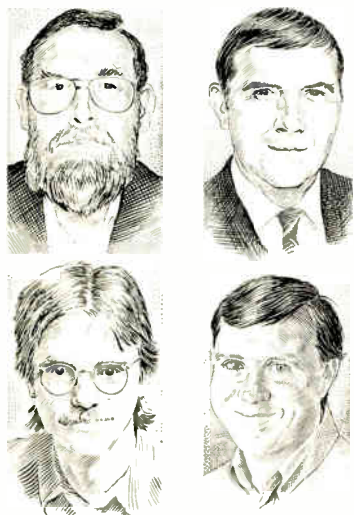
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On the cover:

Illustration by Tom Cushwa,
Design by Donald Krogman



60 The 12 members of BME's new Editorial Advisory Board look ahead. Shown here (clockwise from upper left): Roy Trumbull, Bob Murch, Jim Bartel and Bob Frey.



32 ABC's Julius Barnathan, one of the trio of network executives in an exclusive interview.

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Who's Setting The Pace For FM Transmitter Technology?



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VIEWPOINT

BME is looking forward as well as backward on the occasion of our twenty-fifth anniversary, which we celebrate this month.



Janus, the Roman god of beginnings, was depicted looking forward and backward simultaneously. Like Janus, *BME* is looking forward as well as backward on the occasion of our twenty-fifth anniversary, which we celebrate this month.

What will a U.S. TV network be like in the year 2000? We posed this question and others to the chiefs of engineering and operations of ABC, CBS and NBC when they recently joined us for an exclusive roundtable interview in *BME*'s offices. Julius Barnathan, Joseph Flaherty and Michael Sherlock disagree on many specifics, but they share a unique, birds'-eye perspective on the issues facing the television industry at the dawn of the 1990s. Their provocative comments begin on page 32.

In another exclusive, the members of *BME*'s recently formed Editorial Advisory Board offer their thoughts on what the next decade will bring for television and teleproduction. Meet our board members, starting on page 60. To round out this month's look at where we are and where we're headed, we surveyed a random sample of our readers, who shared their thoughts and feelings on the profession and its future. Turn to page 55 to see if you agree with our respondents.

With 25 years of history, we couldn't resist the opportunity to look backwards, too. We take you on a guided tour of *BME*'s history, starting with Volume 1, Number 1 in January 1964, highlighting the major technological developments in radio and television engineering each year. This walk through our back pages starts on page 41. For additional perspective, we asked the four editors who saw *BME* through its first 23 years to share their recollections of the technological and business changes that shook broadcasting during their editorships. The comments of Jim Lippke, Dave Hawthorne, Robert Rivlin and Tim Wetmore begin on page 68.

Finally, *BME* starts 1990 by introducing two timely new columns. ATV Watch, on page 23, will keep you abreast on the latest developments in improved NTSC and HDTV; Audio for Video, on page 27, will bring you the latest technologies and applications shaping this increasingly important area.

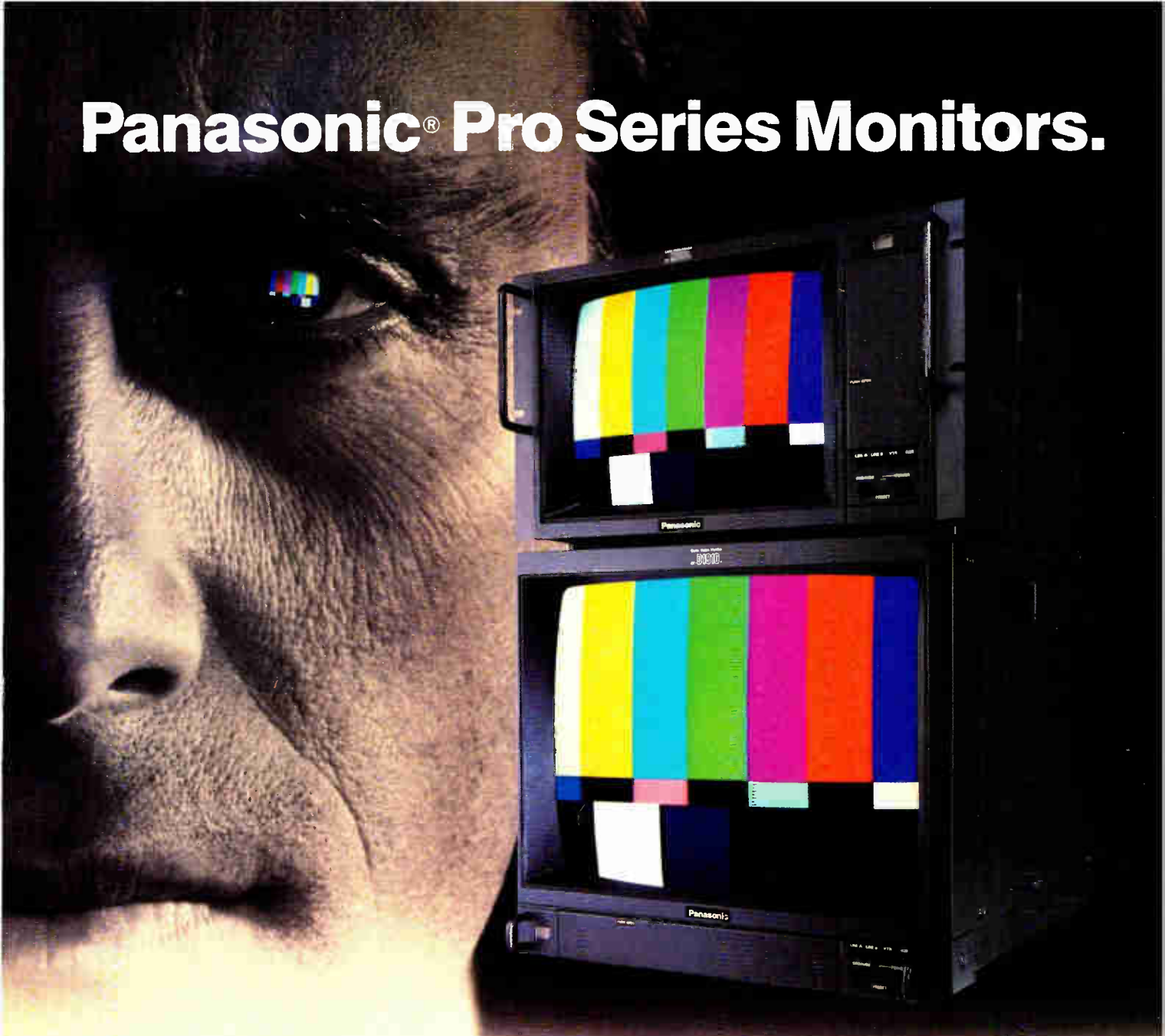
My kudos to *BME*'s director of editorial development, Peter Caranicas, for his excellent work in coordinating this special issue, and to art director Donald Krogman, for designing the "25 Years" logo that adorns our cover.

As always, we welcome your comments, thoughts and suggestions. ■

A handwritten signature in blue ink that reads "Eva J. Blinder". The signature is fluid and cursive, with a long horizontal line extending to the right.

Eva J. Blinder
Editor

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FEEDBACK

RF Jobs, Not Engineers, Are Scarce

I question the accuracy of the article, "RF Engineers: Endangered Species?" in the October 1989 issue of *BME*. If this is true, if RF engineers are in short supply, then where are the job opportunities?

In my location, a city of over one million, I can call 20 AM-FM radio stations, 10 UHF-VHF TV stations and the cable company, and still not find employment. I have 15 years' experience with AM-FM maintenance, and several years' experience of color television, VCR and camcorder repair.

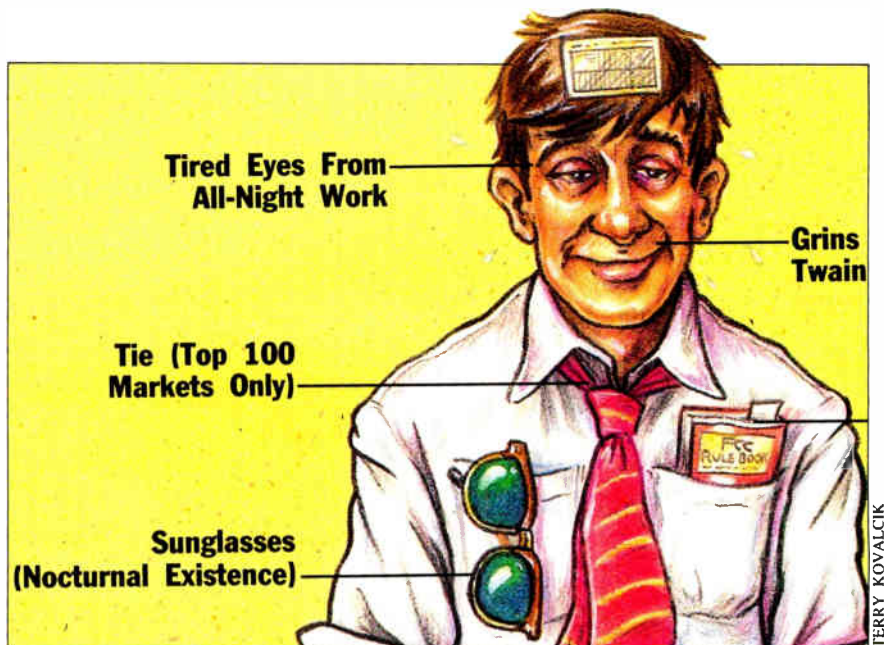
My background should impress any station chief to at least pick up the phone and communicate with me. Not so. As a result, I took employment with a major appliance company, doing circuit-repair work.

If RF engineers are diminishing, where are the jobs? Why isn't the broadcast industry advertising for help like the computer industry? The very issue of *BME* that printed this story offers no [RF engineer] openings in the classified section. There are some weekly publications that list openings for broadcasters, but look at the ratio: 10,000 radio stations across the U.S. and three job listings. In all fairness to your readers, the article should be titled, "RF Engineers: Limited Job Opportunity."

Name and city withheld by request

FAA Fair Play?

I just finished reading Harry Cole's column, "FAA's EMI Concerns Threaten Application Interference," which appeared in the October 1989 issue of *BME*. I very much enjoy Harry's monthly articles on regulatory issues, but I was disappointed that he did not raise what I believe is a major issue in the FAA/FCC battle.



This issue is the FAA implementation of a whole new set of rules and an algorithm which predicts interference for virtually any FM application, without a Notice of Proposed Rulemaking, and without public input. This is in apparent violation of the Administrative Procedures Act.

In March of 1989, I had an interesting telephone conversation with the manager of the FAA's Flight Information and Obstructions Branch in Washington, DC. The FAA official claimed that a 1987 amendment to the Airport and Airway Improvement Act gave the FAA authority to adopt whatever new EMI procedures it feels are appropriate.

Surely a Congressional mandate to improve aeronautical safety does not give the FAA *carte blanche* to ignore the Administrative Procedures Act (APA). This act requires agencies to issue a notice of proposed new rules, and to receive public comment before the rules are implemented. Other pertinent acts include the Regulatory Flexibility Act (RFA), which requires "a description, potential impact and number of small business entities affected," and an analysis of "federal rules which overlap, duplicate or conflict with the proposed rules;" and the Paperwork Reduction Act (PRA),

which requires an analysis of and prior OMB approval for "regulations which impose a new or modified information requirement on the public."

The FAA's recent demand that Form 7460-1 now be filed for "any change in frequency, radiated power or antenna characteristics," even when no new tower construction or height increase is involved, seems to be exactly the type of action that the PRA was designed to control. The contradictions between Part 17 of the FCC Rules and the new FAA regulations similarly exemplify the conflict the RFA was enacted to prevent.

The FCC adheres to the protocols specified in the APA, RFA and PRA. Shouldn't the FAA do the same?

Dane E. Ericksen, P.E.
Hammett & Edison, Inc.
San Francisco, CA

BME welcomes your comments and opinions. Write to us c/o Editor, BME, 401 Park Avenue South, New York, NY 10016. You may also contact us on MCI Mail at ID 326-8115 or on CompuServe at 71630,1236.

UPDATE

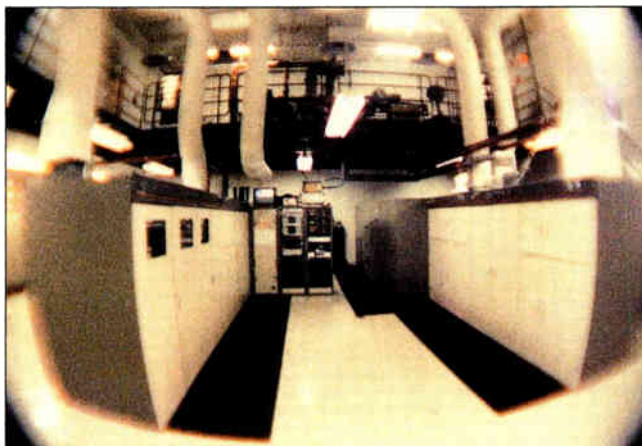
*NEC Pulls Plug on Broadcast Business ...
White House Moves to Fill FCC Slot ... AT&T
Rates and Services Questioned ... North
American Broadcasters Unite on Common
Issues ... Rocky Road to HDTV*

NEC Pulls Plug On Broadcast Business

Nippon Electric Co.'s Broadcast Equipment Div. has terminated North American sales of its transmitters, digital effects equipment and broadcast cameras. One NEC rep, who asked not to be identified, said NEC had notified him that cancellation of his contract would be immediate, with no reason given for the termination.

This was confirmed by a former NEC official, who also asked not to be identified. The official explained that the pullout was ordered by NEC executives in Tokyo, and reflected what they considered the failure of NEC America to gain the necessary market share in the USA to support continued operations.

NEC America's director of corporate communications, Lourdes Cogswell, confirmed the report. While refusing to characterize NEC's actions as abandonment of the North American market, Cogswell called the company's actions



NEC 180 kW transmitter at WBHS-TV in Clearwater, Fl.

a "restructuring; a time to refocus the company's resources on areas with higher growth potential." Cogswell called the company's December 1 suspension of sales "temporary, until further notice."

NEC's action follows several recent statements by the

company saying that it was committed to the U.S. market. As recently as March 6, 1989, NEC issued a press release announcing a planned transmitter assembly at its Richardson, TX, facility, stating, "NEC America's actions reinforce its commitment to the broadcast and production markets in the U.S." Cogswell refused to comment on the release.

Questioned about the future availability of parts and service, Cogswell told *BME* that the company recognizes its "obligation to continue supporting the installed base of NEC products." When asked about concerns expressed by the reps, Cogswell stated that the suspension of marketing efforts at this time was no reflection upon sales, and that the company had no intention of creating a direct, in-house marketing unit.

The shutdown of NEC's broadcast sales operation came as a surprise to both the reps and NEC customers. Several chief engineers with whom *BME* spoke expressed concern upon hearing the news. Charles Thurston, chief engineer of KSWO-TV in Lawton, OK, reported "excellent experience with his NEC transmitter," but said he'd had "no advance notice from NEC" of the pullout. For Garry Kenny, chief engineer of WHSL-TV in St. Louis, the news came from NEC's competitors. His station went on the air a few months ago with an NEC transmitter. And Dave Converse of Fresno's KFSN-TV was "not real pleased" with the news. His station put its new NEC transmitter on line the first week of December.

In Columbus, GA, WTVM-TV's chief, David Williams said his NEC was an "excellent transmitter," and added, "If [NEC] continues to support existing product," he would have "no major concern" for the future. Citing the example of RCA, Williams noted that while a number of major manufacturers have left the business, parts and service support are usually still available. ■

White House Moves to Fill FCC Slot

After almost six months, the White House has moved to fill the FCC slot vacated by Patricia Dennis

last June. Washington broadcast consultant Ervin S. Duggan has been nominated to fill the post, subject to congressional approval.

Duggan, a Democrat, was a speechwriter in the Johnson White House, served in the Carter administration as a member of the State Department policy planning staff, and was special assistant to Department of Health, Education and Welfare Secretary Joseph Califano. A graduate of Davidson College, Duggan is a former editor

of *Washingtonian* magazine, a gossipy upscale monthly covering fashion and foibles in the nation's capital, and co-author (with Ben Wattenberg) of the novel *Against All Enemies*.

Supporting Duggan's nomination is the National Association of Evangelicals, a religious group. Duggan, currently chairman of the Presbyterians for Democracy of Religious Freedom, is expected to support strict enforcement of FCC rules, particularly those on indecency. ■

AT&T Rates and Services Questioned

The NAB has filed two petitions before the FCC in protest of AT&T rates and services. The first is in response to the Commission's approval of an increase in the rates AT&T charges for Television Switch Operations (TSO), and the second in response to an AT&T request to discontinue television transport services in selected areas.

On September 29, the Common Carrier Bureau approved a 572 percent increase in the rates charged for Television Switch Operations, which provide hard-line interconnection between television stations and program sources, such as local sports venues and news pickup points. According to Kelly Williams, NAB staff engineer, the NAB believes the rate increases can cause a consid-

erable financial impact on local stations.

Supporting the NAB's contention is Fred Cotton, technical manager at WNET-TV in New York City. According to Cotton, while most feeds taken by WNET are via satellite, his station does a "couple of switches per day, primarily as backup, or when the satellite receivers are tied up." The new tariff still represents, in Cotton's words, a "significant increase in operational costs."

Joe Fedele, manager of technical operations for WCBS-TV, also sees a lesser reliance on TSO services, pointing proudly to his station's November election coverage, for which "the station did live shots from eight locations in New York and New Jersey, all with our own microwave." In addition, Fedele's crew provided microwave transport for CBS network broadcasts of

North American Broadcasters Unite on Common Issues

At their annual meeting in Williamsburg, VA, the Executive Committees of the National Association of Broadcasters (NAB-USA), the Canadian Association of Broadcasters, and La Camara Nacional de la Industria de Radio y Television (CIRT-Mexico) joined together on issues affecting broadcasting in all three countries. The group passed five resolutions addressing areas of mutual concern, ranging from advanced television to performing rights.

Following up on resolutions passed in 1987 and 1988, the group again resolved to continue the exchange of information on ATV technical standards, implementation and consumer research.

The group resolved to continue support of the National Radio Systems Committee's voluntary national standard on AM transmission preemphasis and 10 kHz bandwidth; encourage the implementation of AM stereo in all three countries; work to create a North American "quality" certification mark to identify high-quality consumer AM receivers; and support increased interference protection for new and existing AM services.

Another resolution signified agreement to lobby the respective governments for changes in the bilateral FM working arrangements that would permit a power increase to 6 kW for those Class A stations within 200 miles of the international boundaries.

Copyright liability is an issue of concern to the Canadians, as their Copyright Act has been amended to include the retransmission of broadcast signals, even if retransmission has been without prior consent of the originating station. This could result in possible legal liability for the originator. The group resolved to lobby the Canadian government for legislation to release all parties involved in the original communication from any liability resulting from unauthorized retransmission. The group also resolved to fight against the implementation of a performing right in sound recordings. ■

the U.S. Open last September, with links manned by WCBS-TV technicians. According to Fedele, this was the first time the network carried a major sporting event using 100 percent microwave transmission provided by the local station.

According to Michael

Campanelli, AT&T's staff manager of TTS, the company's rate increase for TSO was based on evaluation of the actual costs of operation, combined with the decrease in demand for TSO services.

NAB's second filing with the FCC is a Petition to Deny, asking the Commis-

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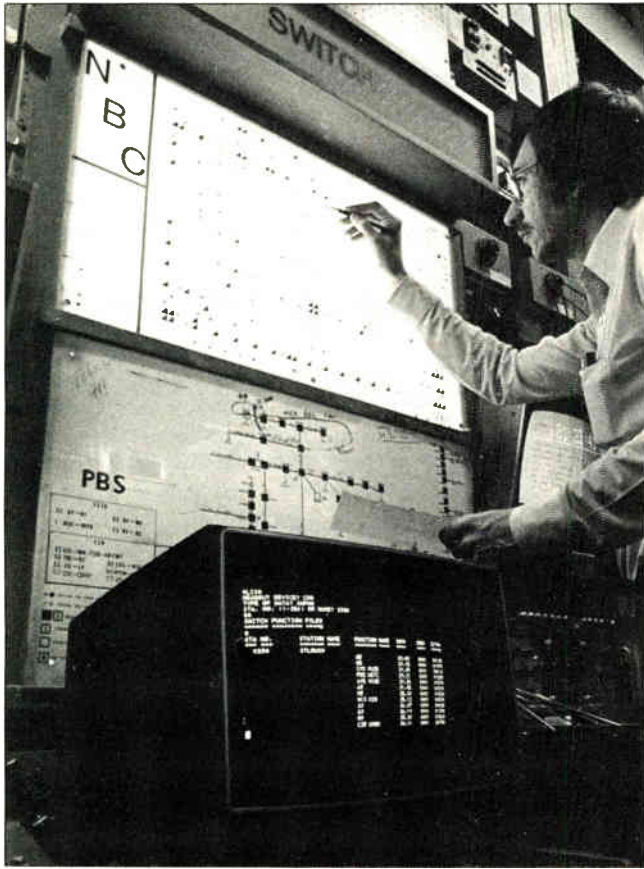
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An era past: AT&T Long Lines installation in New York City, pictured in 1977.

sion to reject AT&T's request to discontinue Terrestrial Television Service in certain areas. According to AT&T's Campanelli, the petition to drop service in many areas was based on a 13-month study, with termination the direct response to the decreasing number of service requests received. Most local transport is now done with microwave, and most long-distance transmission is provided via satellite services.

Broadcasters are not the only ones moving away from telco transport. Program suppliers, like Mizlou Communications Co., the sporting event syndicator and operator of the Mizlou

Sports News Network cable service, have also moved to alternative distribution. In the words of Mizlou's Stan Leshner, VP, network operations: "AT&T has always been efficient and cooperative." He adds, "We've gotten away from using them due to new technology," such as satellites and dedicated fiberoptic transmission. Commenting on the AT&T price increase, Leshner says, "For the few times a year that we do use [AT&T], the increase will have an impact, but not a significant one."

In its petitions, the NAB is supporting similar filings by Capital Cities/ABC, CBS and the National Broadcasting Co. ■

Rocky Road TO High Definition Television

With HDTV testing scheduled for July 24, 1990, industry relations with the FCC Advanced Television Advisory Committee (ATAC) appear to be somewhat strained. While the initial deadline for testing slot applications passed November 17, complaints arose concerning the costs of the testing process; both the initial deposit of \$25,000, and \$150,000 due to be paid March 1, 1990.

Test applicant Production Services Inc. reported it has charged that the

ATAC is, in effect, trying to freeze small companies out of the test process. The company claims the test process is designed to favor large companies based on their financial capability, rather than on the technical aspects of companies' proposed HDTV systems.

In a related move, the New York Institute of Technology has asked the ATAC to eliminate or reduce the testing fee for some of the applicants which are seeking fair treatment of both educational institutions and smaller companies that want to participate in the HDTV testing. ■

Facts on Quanta's Delta 1 and Orion CGs; No SLT Controversy

In November's feature story, "Antialiased Character Generators Come of Age," the table on pages 24-25 contained erroneous information about the Quanta Delta 1 and Quanta Orion character generators. The Delta 1 comes standard with a 30 MB hard drive; a 160 MB drive is optional. A removeable hard drive is available, and the unit is capable of variable speed roll. The Orion has composite as well as RGB outputs, a standard 30 MB hard drive, and variable speed roll. Both character generators come standard with five typefaces available in eight sizes, for a total of 40

fonts.

November's Radio Engineering section (page 35), reporting on the controversy over aural STL type acceptance, noted that pre-STL-8 Marti STLs might not be legal under the new rules. A Marti spokesman informed us that to his knowledge, no Marti aural STLs prior to the STL-8 are still in operation. All Marti STL models from the STL-8 on are type-accepted, according to him. ■

BME welcomes your comments and opinions. Write to us c/o Editor in Chief, BME magazine, 401 Park Avenue South, New York, New York 10016.

You may also contact us on MCI Mail at ID 326-8115 or on CompuServe at 71630,1236.

TECH WATCH

Where Pure Research Meets Business

By Robert Rivlin

Tech Watch has, from time to time, discussed the work of scientists at the IBM Thomas J. Watson Research Center in Yorktown Heights, NY, about 30 miles north of New York City. Recent stories involving Watson scientists have included the development of multiple lasers on a single microchip, and the AFM and similar scanning-probe microscopes.

This month, we thought it would be interesting to visit the research center itself, and profile some of the other activities of the scientists who work there, drawn together from the entire world and many different disciplines in a kind of think tank for new ideas.

The Thomas J. Watson center is the heart of IBM's research division, which carries out fundamental scientific research and explores product-related technologies. It is one of the few organizations in the world to do



Architect Eero Saarinen designed the Watson Research Center, which opened in 1961.

both. IBM scientists in physics, chemistry, mathematics and other disciplines work to advance basic scientific understanding. They also bring new scientific ideas to bear on practical applications. Much research at IBM is devoted to advanced computer technology that one day may replace existing technologies. This includes work on computer logic and memory, systems and programming, storage

Research departments at the Watson Center include user interfaces, minicomputers, communications and physical sciences.

devices, input/output devices, communications, manufacturing and applications.

IBM scientists often pursue research beyond their own laboratories, and may be assigned temporarily to other IBM locations foster the dissemination of knowledge throughout the company. To draw from and contribute to the world of science, they may take sabbaticals and work at universities or in government agencies.

Other research division locations are the Almaden research center in San Jose, CA, and the Zurich, Switzerland, research laboratory. In addition, the Tokyo research laboratory, which is part of IBM Japan, receives guidance from the research division. In total, some 3500 people are employed in the four locations.

Ground for the present-day Watson Center was broken in October 1958. Noted architect Eero Saarinen took an appropriately scientific approach to the design of the facility from the very beginning. Before the first sketch had been penciled in, he spent weeks observing researchers at work at other sites, noting how they moved about a room, how they used their equipment, and their furniture preferences. Something analogous to a "pilot plant" was created at the nearby Mohansic facility, with mockup

offices tested well in advance of actual construction. Even such seemingly minor influences as color schemes were tested during this phase.

But IBM's commitment to research activities considerably antedated this building. In fact, Thomas J. Watson, Sr., had founded a research department for the Computing Tabulating Recording Co. in 1914, a full decade before he became CEO and changed the name of the firm to International Business Machines Corp.

Interest in computational processes led, in the late 1920s, to what became the Watson Scientific Computing Laboratory at Columbia University in New York City. The nation's military needs during World War II proved to be a primary stimulus to technology, including the field of computing. It was in 1944 that a joint IBM/Harvard project led to the auto-

Much research at IBM is devoted to advanced computer technology that one day may replace existing technologies.

matic sequence-controlled calculator. The company's first fully electronic machine—the selective-sequence electronic calculator—appeared in 1948. Four years later, the 701, a scientific computer some 25 times faster than its predecessor, made its debut. In the 1960s, many of IBM's important advances in computing technology, including the System 360

and System 370 computers, grew out of the work of scientists at the Watson Center.

From 1914 on, IBM's commitment to research grew in parallel with the increasing sophistication of the company's product line. To supplement the efforts of the Watson lab at Columbia and other research sites at Poughkeepsie, San Jose and Zurich, IBM established a formal presence in Westchester, NY, as early as 1957. In that year, some 125 scientists and administrative staff members moved into an estate near Ossining, which served for a time as research headquarters. From 1956 until 1963, research activity was a corporate staff function under the aegis of Emanuel Piore. The estate served as a base for groups carrying out systems information and mathematical research, as well as other types of study not requiring laboratory facilities. Not long afterwards, the Spring Street laboratory was established in Ossining to house about 100 scientists and engineers working on research associated with memory, input/output, circuit logic and the theory of automatic control.

The Watson Center was dedicated in the spring of 1961. A special feature of the week-long celebration was the burial of a time capsule containing many of the devices and technological feats to which Watson scientists had already contributed. Among the contents were a description of IBM's automatic translation facility, with examples of machine translation of Russian and French; a manual and listing of the original Fortran programming language; manuals for IBM 1401, 305, 703 and 7090 computers; read/write heads and arms for the RAMAC memory unit; two experimental cryogenic low-temperature circuit planes; a ferrite-core array for the 7030 memory; experimental semiconductor components including a tunnel diode and a vapor transistor; and an optical MASER (the term *laser* had not yet become a household word).

Some idea of the size and scope of the Watson operation today may be gained from looking at its various

departments and laboratories and the work they do. The departments (with some areas of responsibility indicated in parentheses) include: computer sciences (large systems, design, modeling, organization management, storage architectures, multiprocessing,

*The Watson Center
draws together scientists
from the entire world
and many different
disciplines in a kind of
think tank for new
ideas.*

coupling); intelligent workstations (architectures, systems software, multiprocessor organization, performance analysis, distributed processing, advanced applications); user interfaces (speech recognition, handwritten input, graphics and dis-

play systems, image processing); minicomputers (architecture, compilers, high-level languages, symbolic and numeric processing, parallel processing, engineering and scientific computing); and communications (network design and management, telecommunications, interconnected systems).

Other Watson departments include VLSI design and design-automation tools; software development; knowledge-based systems; algorithms and computational complexity; input/output technology; printer technologies; input/output systems; manufacturing research; mathematical sciences; physical sciences; materials and processing science; surface and interface science; logic; memory packaging; lithography; and materials and processing science.

With this kind of broad-ranging, interdisciplinary approach, it's no wonder the Watson Research Center and its scientists can lay claim to so many developments. Its emphasis on practical applications makes it a focal point for the future of computing. ■

Former BME editor Robert Rivlin passed away on January 5.



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ATV WATCH

Advanced Television At SMPTE

By Eva J. Blinder

On the floor and in the sessions, there was no dearth of advanced television news at the recent SMPTE Conference. This month, we inaugurate our new ATV Watch column by recapping a few of the many important ATV developments at last fall's SMPTE.

Anyone who doubts the quality achievable by satellite transmission of HDTV should have been at the Saturday afternoon session, when attendees were treated to a live HDTV transmission from Japan. The broadcast featured a greeting from the president of the Motion Picture and Television Engineering Society of Japan, plus several recorded clips of HDTV productions. The satellite transmission itself was very clean, with excellent detail, and appeared almost artifact-free even when viewed from only a few inches away. The audio quality was excellent as well.

The broadcast used an all-digital transmission system developed by Kokusai Denshin Denwa Co. (KDD) of Japan, with processing gear developed by Canon. To meet the bandwidth requirements of the satellite, the transmission was compressed 10:1 (to 120 Mbits) by the Canon codec. The transmitting antenna was a 2.4-meter dish in Tokyo; from there, the signal traveled in a single hop over a 72 MHz transponder at about 40 dBW ERP, and was downlinked in Los Angeles on a seven-meter receiving dish.

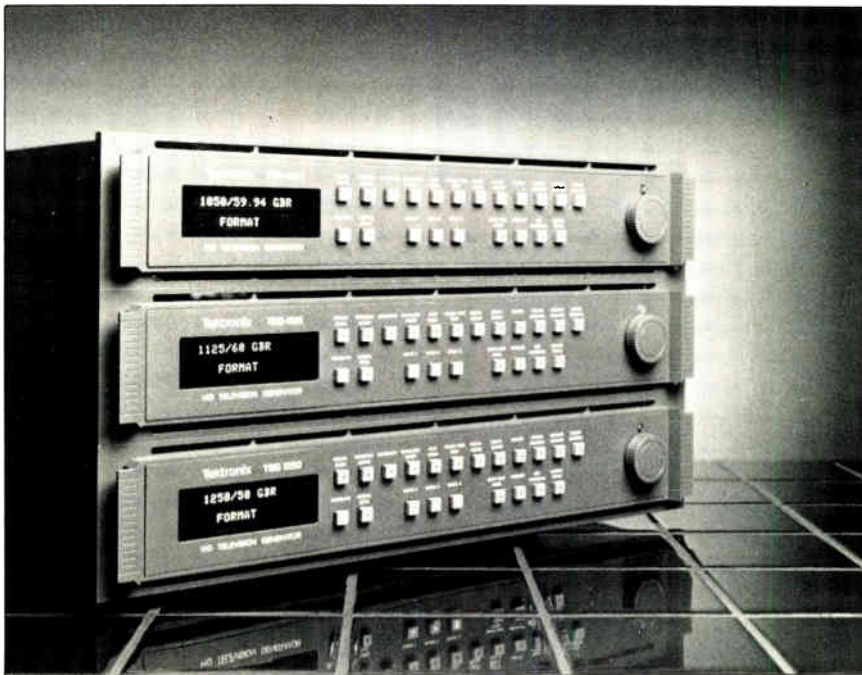
In this country, Canon is known primarily for its professional lenses and camera pedestals. The company's Japanese R&D operations go much farther, as evidenced by the use of a Canon-developed codec and HDTV VTR in transmitting and recording the live broadcast at SMPTE. The Canon HDTV-CODEC uses an image

protocol developed in cooperation with KDD. Canon says the codec is capable of switching between satellite and optical fiber modes, making it compatible with local area networks. Transmission rate in satellite mode is 120 Mbps (140 Mbps in fiberoptic mode). This is an integrated bidirectional system, with encoder and decoder in a single package.

The VTR is a half-inch, cassette-based model with 63-minute playing time on metal tape. Tapes of the live transmission played continually in the Canon booth and looked as sharp and clear as the original feed. Canon has also developed a digital half-inch HD VTR, a spokesman said. The company is presently working with NHK to develop an integrated HDTV system that will include a range of

products for audiovisual, broadcast and print applications. Canon is also working on the development of an HDTV zoom lens.

The recorded material in the international transmission consisted of clips from several Japanese productions: a joint Kabuki-Chinese Opera production (including some composited scenes); an experimental special-effects movie, *Genmyo* ("Profound Beauty"); and a Japanese-West German movie, *Die Tanzerin*. While the detail was crisp and clear on each, they reflected an aesthetic sensibility miles apart from Western-style feature films, with flat focus front to back, and bright, flat lighting. To a certain extent, this cartoon-like quality may be a result of the limitations of present-day HDTV cameras. As the



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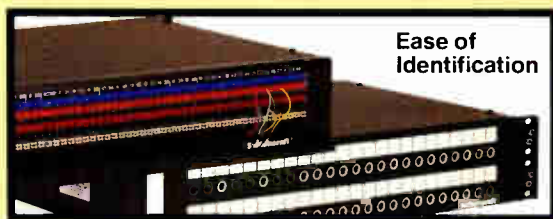
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ATV WATCH

production equipment evolves, so will the creative possibilities of high-definition production.

A somewhat different vision of the possibilities of HDTV came from Eastman Kodak. Kodak invited the press to its Los Angeles offices the day before the show opened to see tapes produced on an experimental HDTV telecine built by Kodak's Harrow, UK-based research facility. This material, which consisted of transfers of feature films, was easily the most aesthetically pleasing HDTV we've seen yet. The experimental telecine is designed specifically for the transfer of material originating on fine-grain 35 mm film stock, as opposed to HD

A live HDTV broadcast featured a greeting from the president of the Motion Picture and Television Engineering Society of Japan.

to disguise film grain or other defects. All transfers were recorded on the Sony 1125/60 digital HDTV VTR using one-inch metal particle tape, "a lot of it"—over two miles of tape for one hour of programming.

Kodak has entered into an agreement with Rank Cintel to produce the HDTV telecine as a product through its facility in Ware, UK, although a Rank spokesman with whom we spoke seemed to feel there was no rush in bringing the telecine to market. He added that Rank will continue to produce its flying-spot HDTV telecine.

Other new products on the floor showed the increasingly broad effect of HDTV development. Nikon showed several HD-related items, including an HD still camera system that uses the Rebo Research Frame Store Memory and an Apple Macintosh IIcx personal computer. Based on Nikon's HQ-1500C HDTV still camera, this system captures a frame of 1125/60 high-definition video in three-tenths of a second. The captured images have a resolution of 1920x1085 pixels, and the system features 24-bit color processing.

Tektronix, which has been a leader in testing and measuring equipment for high-definition television, introduced several additions and features to its HDTV T&M line. Brand-new was the 2467BHD oscilloscope, which the company says can trigger on any proposed HDTV production standard (1125/60, 1050/60 and 1250/50). Tek enhanced its TSG-1000 series HD television generators with an option-

al zone plate test signal for multi-dimensional frequency-response testing.

Symbolics, whose biggest news was a new PC-based animation system based on the company's Renderman software, also featured an experimental computer-graphics video, *The Little Death*, created and rendered in high definition on a Symbolics animation system. The animation was recorded simultaneously on a Sony HDD-1000 digital HD VTR and a Sony HDV-1000 analog HD VTR.

As a final note, SMPTE's usual array of honors and awards included special mention of a number of engineers who've made contributions to the development of HDTV and improved NTSC. Dr. William E. Glenn, a true pioneer in the field of broadcastable HDTV, received the David Sarnoff Gold Medal Award for the introduction of sub-band coding technology to data compression for terrestrial broadcasting of HDTV. Glenn, formerly with the New York Institute of Technology, is now director of the HDTV Systems Laboratory at Florida Atlantic University in Boca Raton. Eric Dubois, a professor at INRS-Telecommunications, the Verdun, Quebec-based research facility, and William F. Schreiber of the Massachusetts Institute of Technology shared the SMPTE *Journal* Award for Television for an article, "Improvements to NTSC by Multidimensional Filtering," published in the June 1988 *Journal*.

Finally, we'd like to mention that SMPTE awarded its Presidential Proclamation, posthumously, to the late Joe Roizen, whose contributions to the television industry are too numerous to list here. Roizen helped develop the first commercially successful color VTR at Ampex in the late '50s, and ran the VTR that recorded the famous Nixon-Khrushchev "kitchen debate" in 1959, to name just two of his many achievements. In later years, he wrote extensively for a number of industry magazines, including *BME*. He is missed by all who knew him. ■



Nikon's HQ-1500C high-def still camera was shown interfaced with the Rebo Frame Memory system.

video. Kodak is anxious, of course, to preserve 35 mm film as the medium of choice for high-quality production; the transfers they demonstrated made the point nicely.

The telecine incorporates two new CCD linear-array sensors designed and manufactured by Kodak's Microelectronics Technology Div., plus high-speed digital signal processing and an advanced illumination system that uses a xenon arc-light source and a proprietary light-integrating cylinder. The telecine is designed to work with both color negative and print films. At the demonstration, Kodak showed clips shot and transferred at 30 and at 24 fps; according to the company, no special steps were taken

WHY WTVH-TV'S BRUCE LEVY LOVES HIS EPO ROBOTIC CAMERA CONTROL SYSTEM.



For more than 20 years, WTVH-TV, the CBS affiliate in Syracuse, N.Y., has broadcast its news using EPO remote camera control systems. During that time, the systems have outlasted four sets of cameras—a clear testament to EPO's durability and reliability.

For most of those years, as Bruce Levy, the production chief at WTVH-TV, will tell you, the station was virtually alone among American broadcasters.

Now, of course, all that has changed. Americans are beginning to wake up to what their European brethren have known for some time—that **EPO Camera Control Systems can save them money. Lots of money!**

But even EPO Robotic Camera Systems don't last forever. Recently, when WTVH-TV's 20-year-old unit began to show some wear and tear, Bruce Levy confidently ordered three new ones from A.F. Associates, thereby continuing his and WTVH-TV's long association with the EPO systems.

If you would like to know more about Bruce Levy's favorite way to save money, call A.F. Associates. In the east: (201) 767-1201; in the west: (619) 277-0291.

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AUDIO FOR VIDEO

A Shure Thing?

By Dan Daley

Picture a rocky, desolate stretch of land that has been an anonymous part of the local landscape for as long as you can remember. Then imagine someone discovers gold on it. All of a sudden, everyone wants a piece of the land, and there are moments when the confrontations and disputes over claims get downright ugly.

This is what the current audio-for-video environment reminds me of, and the OK Corral is getting more crowded every day. The Main Street of this technological Dodge City runs parallel to the course of stereo. Stereo television has grown by leaps over the last few years, but it is an offshoot of stereophonic audio. That is the target of the shootouts in the parking lot. (And that's it for the Louis L'Amour metaphors.)

There are a lot of players in the spatial manipulation game, with a crosscurrent of claims and counter-claims that make the undertow at Malibu look like a babbling brook. Much of the controversy centers around three-dimensionality and sound localization and their absolute definitions. As of this writing, I am aware of no one who has a commercially available system that can absolutely, discretely locate multiple sound sources using only two speakers. I've heard at least one system can accomplish this, but that it requires additional software to make it non-sweet-spot dependent.

A range of other systems claim to offer some degree of three-dimensionality and sound localization. Within this range are the so-called "surround" technologies, which require more than two speakers to get the full effect. They've become familiar to us from their use in theaters, but the new focus on audio for video has swept them into the home as well. The latest is Shure's Stereosurround production process, a multichannel

system that is designed to be as much of a production tool as an end-user enhancement.

The Stereosurround process is a 4:2:4 matrix encode/decode production format derived from motion-picture studio production techniques, according to Bob Schulein, general manager of the HTS division of Shure, which handles the Stereosurround technology. By manipulating phase and amplitude of audio signals through a matrix, a two-channel signal can be generated that can convey the effect of four channels when used with more than two speakers. The optimum playback system would have three channels in front (stereo left, stereo right and center) and two speakers (single-channel) in the rear.

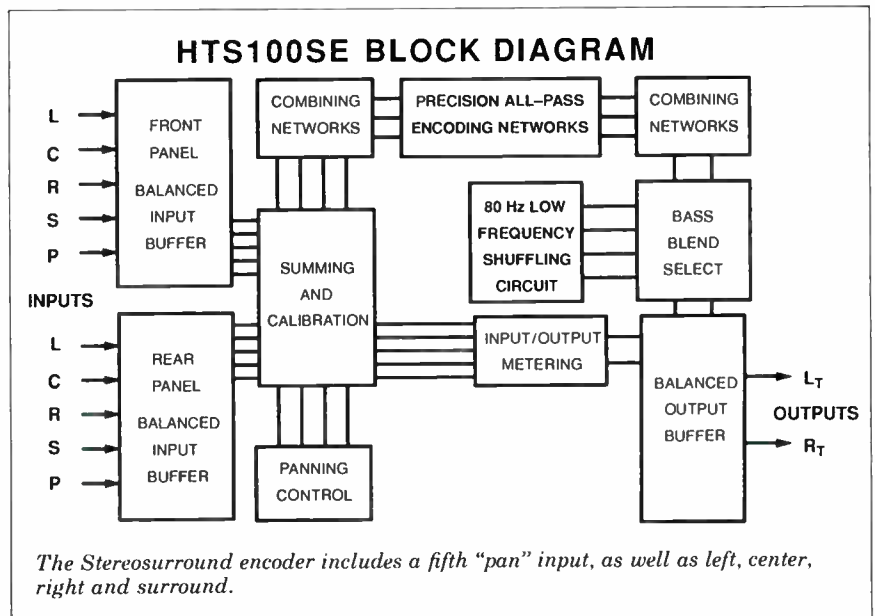
The system is non-discrete; however, in practice it has the attributes of a discrete system, within certain parameters, Schulein says. Music, soundtrack and dialog elements that conflict can be relocalized to become less conflicting.

"Once you know how the system

works," Schulein says, "from a creative standpoint, you can make the system sound very discrete, particularly in a post-production environment, because you have the opportunity to refine the mix."

One crucial key to the survival of any of these technologies is their ability to get their effect across two speakers.

What apparently isn't an illusion is the growing number of homes that can support this sort of technology and derive optimum benefit from it. Schulein says that research by Shure HTS and others has determined that



AUDIO FOR VIDEO

something on the order of two million American homes have some sort of surround-decoding technology, from the simple and relatively cheap Radio Shack systems to the more sophisticated and expensive ones. Furthermore, Schulein adds, the Stereosurround process will provide some degree of enhanced audio effect on both standard stereo and mono speaker systems. That is one crucial key to the survival of any of these technologies: their ability to get their effect across two speakers. Any audio professional over the drinking age can probably remember the brief and not terribly pretty lifespan of quad sound. Consumers rejected it because of the extra cost of additional speakers, among other reasons. While dyed-in-the-wool audiophiles may not balk at going for as many as three extra speakers to get the most out of a

Much of the controversy in audio for video centers around three-dimensionality and sound localization.

surround sound system, most people, including Schulein, acknowledge that two-channel delivery and storage systems will be the dominant format for some time to come.

It is virtually axiomatic that sound manipulation technologies will become more successful in the future. The consumer has grown used to

better audio storage systems with the advent of digital compact discs and vastly improved analog tape. And the transmission capabilities of broadcast have grown considerably, too, and have had their impact on consumers' ears.

"Because of the new robustness of the storage and transmission systems," Schulein says, "the new surround-type systems can be used with more assurance that they will work and work well."

The Stereosurround process is being billed as a production tool, as are some of its competitors. Stereosurround systems have been put into place and used at Howard Schwartz Recording in New York, and for NBC's *Saturday Night Live*, which is using the system for all 1989-1990 season shows, as well as for remixing previously broadcast ones. This year's

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Superbowl, along with WGN's broadcast of Chicago Bulls home games, will be the major sports applications thus far of Stereosurround. Universal Studios plans to use the process on its nontheatrical and cable-only releases.

"You'll be seeing more of this type of system in broadcast in the future," says Mark Gavulic, production engineer at Ron Rose Productions, Ltd., in Southfield, MI, where the system is being used for commercial work. "Stations are no longer the weak link in stereo productions. They're checking their programming material more carefully before airing it."

John Alberts, who does the post-production mixes on *Saturday Night Live* at Howard Schwartz Recording in Manhattan, has compared both the Dolby and Shure HTS systems and prefers the latter, citing its ability to increase the definition of stereo imaging. "It's very exciting to listen in surround," he says, "especially for music and stereo imaging." Alberts says that *SNL* was the big experiment in surround for NBC—a success. But few commercial clients are willing to chance it at this point.

"More people are aware of stereo these days," Alberts says, "but still, 90 percent of commercials are mixed in mono."

Bob Schulein says that the three major surround technologies can co-exist, that a single industry standard wouldn't preclude Stereosurround, Dolby Surround or Ultrastereo from operating and competing successfully in the same markets. "Stereosurround, Dolby Surround and Ultrastereo are compatible," he says. "The differences are subtle and lie more in how people use them than in fundamental technology."

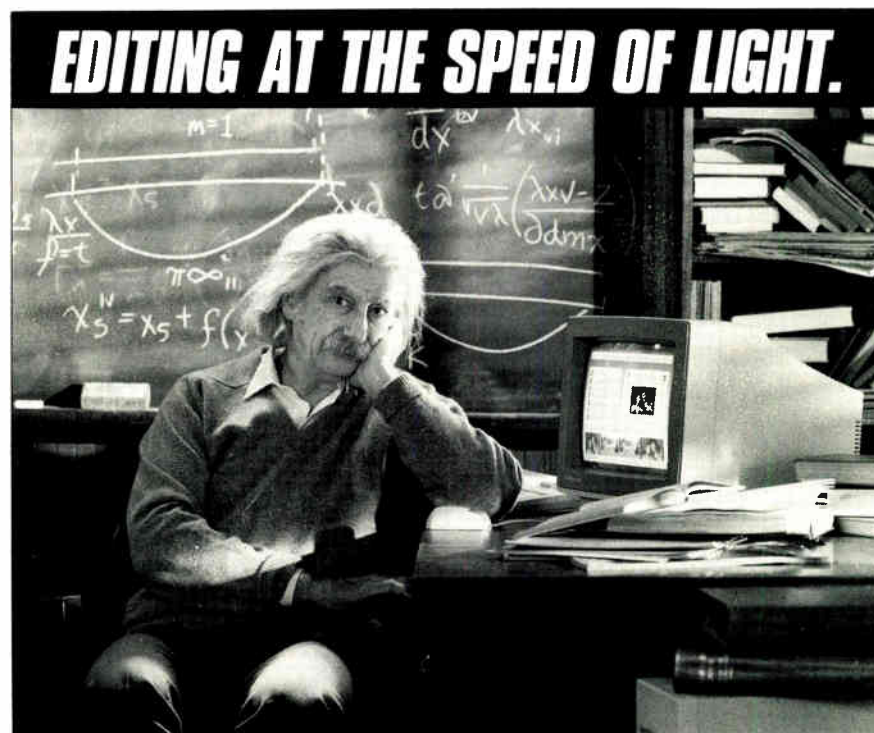
The Shure HTS Stereosurround process is another entry in a field crowded with players, most of which are very good technologies, and most of which overlap in some areas to one degree or another. And that's where the rub will likely lie in the near future. This proliferation of audio technology will soon have to shake

itself out. As with so many other technological advances, how this will be accomplished will be as much a function of marketing as it will of research.

But once this occurs and the dust

clears, audio for video will sound as good as the promises do now. ■

Dan Daley is a New York City-based freelance writer specializing in audio technology.



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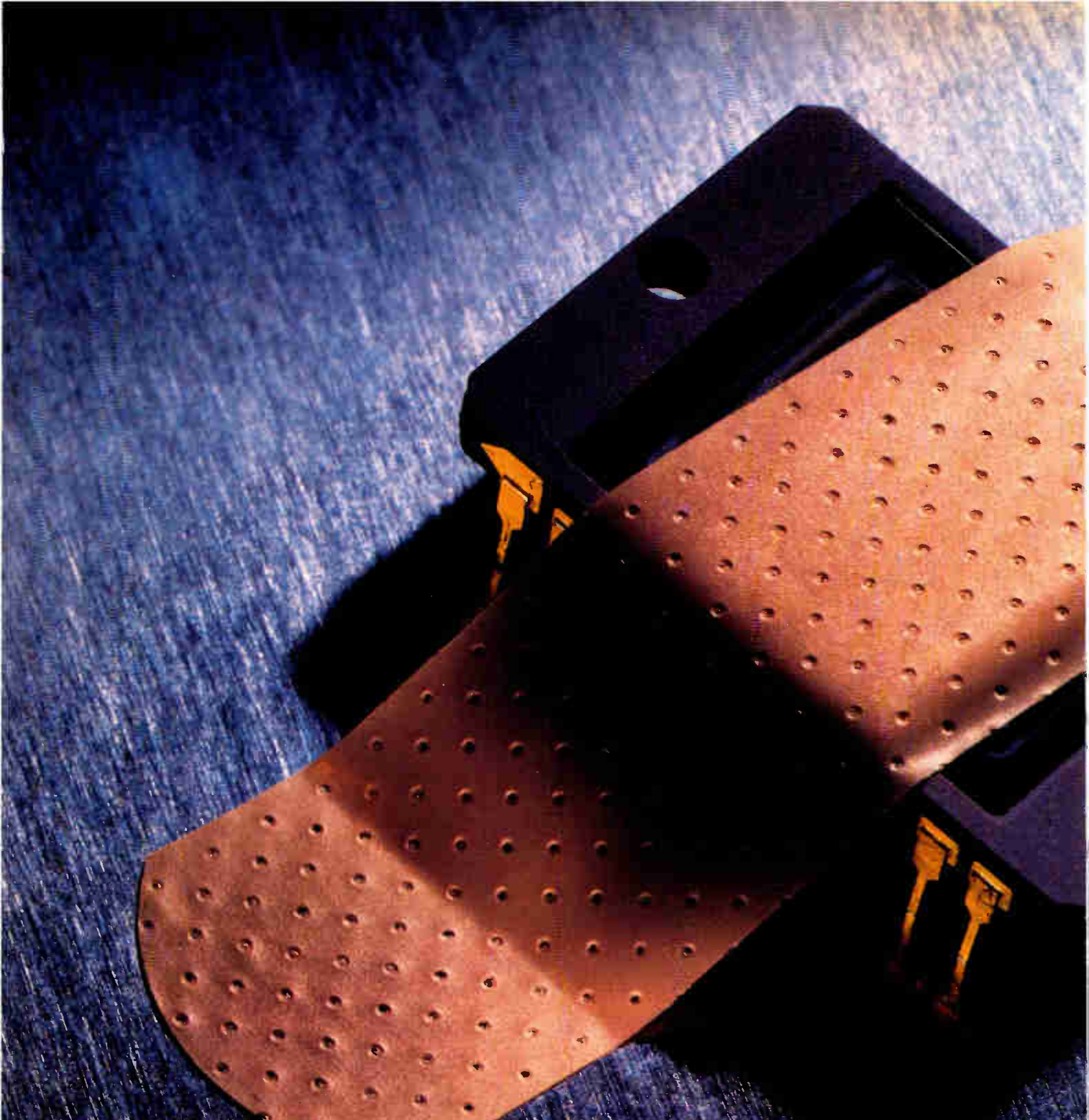
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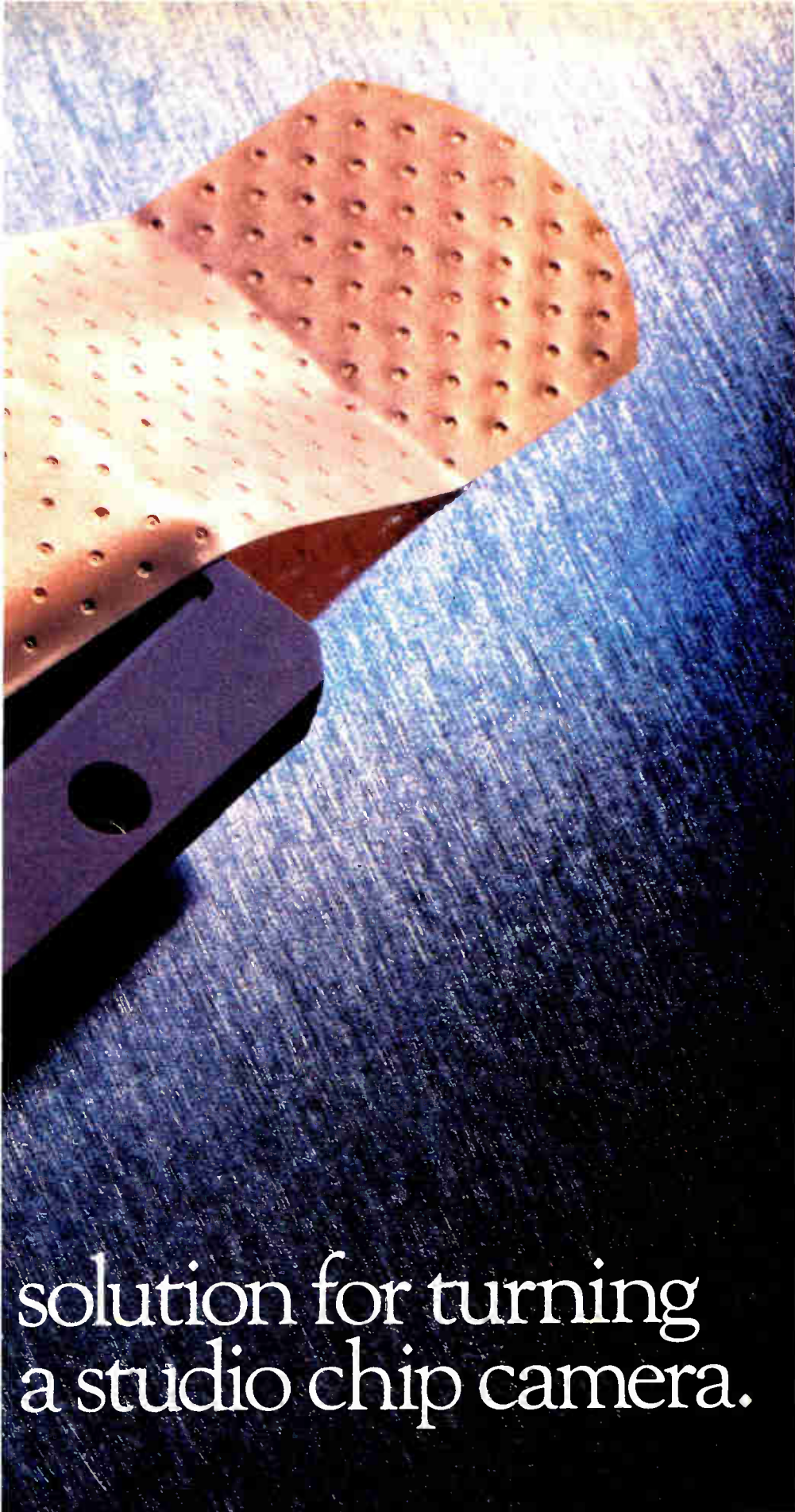


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SONY

BROADCAST PRODUCTS

VIEW FROM THE NETWORKS

In 1965, when *BME* was first published, the three commercial TV networks seemed omnipotent. Not only were they the fountainhead of all technical development in television, they also virtually monopolized the U.S. public's viewing attention.

But *BME's* first quarter century coincided with enormous changes in the world of broadcasting, both in technology and in business. The past 25 years have witnessed the rise of local programming, the growth of independent stations, the flowering of cable, and the advent of home video—all changes that have steadily eroded the networks' audience share. Yet the big three remain the most powerful players on the television stage, and the executives who head up their technology and operations are veterans in an industry known for its high casualty rate at the top.

Joseph A. Flaherty, vice president and general manager, engineering and development, CBS operations and engineering, is the senior member of this group. He joined CBS in 1957 as a TV design engineer after spending two years with NBC. During this interview, Flaherty gave

BME a QSL card dating back to an amateur radio and TV station, W0BVN/W0JMP, which he and his father, J.A. Flaherty, Sr., put on the air in Kansas City back in 1949. The station broadcast television on the RETMA (Radio and Equipment Television Manufacturers Association) standard, which preceded NTSC.

Julius Barnathan, senior vice president, Capital Cities/ABC, in charge of technology and strategic planning, oversees implementation of the company's long-range technical goals. He joined ABC in 1954 as supervisor of ratings, and rose through the company's ranks, working for several divisions, and has been in charge of broadcast operations and engineering since 1965.

Michael J. Sherlock, president, operations and technical services, NBC, has been head of that division since 1982, with responsibility for production, on-air operations and engineering. He first joined NBC in 1960, then moved to Hertz Corp. (owned by RCA, as was NBC) in 1973. A few years later, he rejoined NBC.

To mark *BME's* twenty-fifth anniversary, Flaherty, Barnathan and

7/15
focused
top
CSCG interview

PHOTOGRAPHY BY ANDREW FRENCH



In this exclusive BME roundtable, ABC's Julius Barnathan, CBS's Joseph Flaherty and NBC's Michael Sherlock debate the major engineering issues confronting broadcasters today.

Sherlock agreed to a rare joint meeting to discuss the major issues facing broadcasters and engineers today. They were interviewed by *BME* editor Eva J. Blinder and director of editorial development Peter Caranicas.

BME: The three major TV networks have always played an important role in the development of technology. Has that role diminished?

Flaherty: I'm not sure that it has changed much. NBC, which used to be the senior service, began the system we still have—a marriage of broadcasters and producers. From the start, the broadcasters worked side by side with the creative people, who could see better ways to do things, who identified what the problems were and what was needed to solve them. The television networks themselves don't "do" equipment. We have no tactical support for spare parts and such things. We go directly, or through specifications, to vendors and suppliers. We translate needs to them and try to cause things to be made.

Big breakthroughs have been made under this system. Julie [Barnathan] did the first slo-mo with Ampex. We did the first paint systems and still stores. NBC, of course, is where it all came from. When I worked there, we

did the first wipe amplifier and the first five-way split screen, at the 1956 conventions.

BME: In the early days, RCA owned NBC, and CBS owned CBS Labs. ABC was on its own. What effect did that have on ABC?

Barnathan: It's true we never had an arm for manufacturing. NBC had a big arm—RCA—and [CBS founder William] Paley got jealous that [NBC founder David] Sarnoff was going to make television sets and everything else on his own, so he set up CBS Labs under Dr. [Peter] Goldmark. CBS tried to emulate RCA in having a separate division for which the network was the "customer." We at ABC have practically never had royalties on the things we've helped develop. But our reward is being able to get the product that we need with only a small staff, and with no R&D costs.

BME: Is that the trend at the other two networks?

Sherlock: There's no question that while, as Joe says, many things are the same, there are also a lot of things that have changed. I can see tremendous change even from my more narrow focus, having been in the engineering side of television only during the last eight years. The big change is that there are so many more people in the industry making the suggestions—increasingly sophisticated station chief engineers, more cable oper-

ators, additional movie and TV producers, news directors. They all require equipment and therefore have input into what that equipment is like. And there are so many more manufacturers and marketers of that equipment.

Flaherty: That's true. I was addressing the fact that the mechanism at the networks hasn't changed a lot. Yes, RCA no longer owns NBC, but over the last few years so many new suppliers have emerged that I don't think it really makes much of a difference. But what's more important, in my opinion, is that the most fundamental development has passed from the equipment stage to the component stage. There was a time when if you invented a tape machine, you had several years' lead over competitors. Today, that sort of development is taking place at the chip level, and once a chip is available, all the suppliers in a short time can have it and build equipment. That makes it much easier for the producers, movie companies, individual stations—all entities that never before had large engi-



VIEW FROM THE NETWORKS

neering departments—to identify a need and get something done about it.

Barnathan: To amplify what Joe said, in the digital domain, the leading edge of technology has gone to post-production. Those houses, because they're trying to do so much more in 15 and 30 seconds, are leading the way in the use of certain kinds of technology—video effects, mixing film with tape, Ultimattes. In post-production, people are breaking the edge of technology, not as much for saving money as for creative reasons.

BME: What are your comments on the role of the networks in standardization? And is the standardization process itself more difficult because development times are shorter?

Barnathan: It has become more political. It's not a technical problem. On the committees are people with vested interests that are sometimes 180 degrees away from each other. They're there to protect the interests of their manufacturer or their company. They're not there to try to come up with a standard. I've said it many times: Everybody wants a standard, so long as it's "mine." There's a "Not-invented-here" psychosis, and it's difficult to get everybody together.

Flaherty: Because new developments are coming as a *fait accompli* from the

consumer industry up, and because the technology is moving faster than the standards organizations seem to be able to handle it, there are limitations as to how much you can change. Development now takes place at the component level, and the secret of lowering cost in components is mass production. So what's happening is that things are moving from the consumer level up to the professional level. That's where Betacam came from.

BME: Mr. Sherlock, NBC has now established MII as its internal universal format. How well has it worked; has it saved money, and if so, how much?

Barnathan and Flaherty: We wanted to ask you the same question. (Laughter)

Sherlock: NBC now has 1700 pieces of MII gear in operation. We're shooting all our network news on MII, as are our owned stations, except one which we bought that was already using Betacam. We are now transmitting all our commercials through MII equipment. We have used that cassette-based format to go to automation at the network and in most of our stations, so we feel the move to MII was a very smart thing. But, as with the introduction of any new technol-

ogy, there have been implementation problems. One of them is that some of our news crews are finding a compatibility problem. I'm sure, in like manner but to a lesser degree, the ABC guys have the same problem if they're getting material from a station that has converted to MII.

Barnathan: Most freelance people use Beta. When we were still on $\frac{3}{4}$ -inch, we had to have a Beta sitting there so that when [the freelance crews] came in from the field, we could bring Beta into our system. We're still in the process of eliminating all our $\frac{3}{4}$ -inch, replacing it with half-inch. It takes about four years to do it.

Sherlock: We not only eliminated $\frac{3}{4}$ -inch, but we decided to eliminate one-inch. That is a huge savings. In the beginning, we predicted we would save in excess of \$25 million in equipment-replacement costs, and that has been accomplished. So we feel good that we converted, although we would like to have seen Panasonic's marketing of MII be more productive.

BME: Mr. Flaherty, has CBS considered adopting a single format?

Flaherty: Well, yes, and we are going in that direction very soon. However, we decided some time ago that when we did, the format would be digital. With MII and Beta, for the first time, you achieved savings while reaching a quality level that was competitive with one-inch. So we started, as I think ABC did, moving hard news, and then documentaries, then commercials, onto cassettes, even though we had a one-inch plant in place. But now we're looking toward moving the whole broadcast operation to digital.

BME: What's the justification?

Flaherty: We have adopted the philosophy that we will no longer move videotape, we will only move signals. Thus, in massive library systems for our network and ultimately our stations, we will have on-line and off-line—active off-line—storage of virtually all commercials and programs that are in hand, that aren't live. And those will be moved by computer to





"In post-production, people are breaking the edge of technology, not for saving money [but] for creative reasons."
—Julius Barnathan

on-line buffers, which are digital machines. Those buffers then feed, in the case of the network, up to 10 output channels, four splits and so forth. Those can be continually dubbed. Tapes are not moved; only obsolete tapes are moved and new ones are put in.

Now, in order to do this, you have to have relative unconcern about the number of generations. You really need a digital tape machine. So a facility is being built now and goes on-line in a few months. The equipment is all in place and the software is now being put in. That's the reason that we didn't go to an earlier analog format.

However, I believe that moving in that direction is also the right thing to do. NBC certainly took the bull by the

horns. It was a very imaginative thing to do at the time, and we've all learned through some of the problems that they've had. But we have tried to move to the digital side, and I'm sure NBC will, too.

BME: Which digital recording format will CBS adopt?

Flaherty: Well, the output channels we are putting in this broadcast facility are all D-2 machines. The production and edit rooms use D-1 machines.

BME: Did you ever consider half-inch digital?

Flaherty: Well, vendors are beginning to show prototypes of half-inch digital. That simply means greater packing density, not only on the tape, but in the stores; the cassettes. I do think that the days of analog recording and playback are numbered. This change to digital is going to come, and the tape machine is the pivotal piece of equipment.

Barnathan: I don't think analog will become obsolete as fast as Joe implies. Not at stations. I still have stations running two-inch machines.

BME: Mr. Barnathan, what's ABC's view on a universal standard?

Barnathan: We are not concerned about it. It's like having a universal car or universal truck. You use the size you need for what you're going to do. But there are other savings that we make. For instance, we're still using oxide tape in ENG, instead of metal tape. When you consider how much tape they use in the field, the savings are humongous. We only use the metal tape for things like *20/20*. And we're using Beta SP in our mobile units now.

Sherlock: Our news people would take a different view and say they've got the quality of metal tape in everything they now produce.

Barnathan: I defy you to find the quality.

Sherlock: Well, I get a kick out of you saying that, because I remember when one of your engineers was helping you make the decision on whether to go Beta or MII, the biggest reason



"In the future, [NBC] will move to digital... We're looking forward to the half-inch digital format."

—Michael Sherlock

at the time that he wasn't going to go with MII was that Beta SP, with the metal tape, was better quality.

Barnathan: For first generation, you're not going to find any difference.

Flaherty: That's the secret. One of the reasons we chose the Beta is that you can go either way, either tape. If it's hard news you're shooting, oxide tape is fine.

BME: What plans does ABC have to move into digital video recording?

Barnathan: Right now we are studying D-2, putting it through a tremendous exercise, because we want to be sure it can do everything we want. There are some technical problems, but they'll be solved. We haven't made any determination. We're also

VIEW FROM THE NETWORKS

looking over our shoulder at what our friends at Matsushita are doing with half-inch. But if I were to look into a crystal ball, I'd say Betacam will be used in the field for at least the next three to five years—especially for sports. In post-production and graphics, we'll go to D-1; you need component if you want that kind of purity, especially with a paint system, or if you have to do manipulation. The workhorse in the plant—I mean one-inch—will be replaced by a composite machine, either D-2 or D-3.

BME: Mr. Sherlock, any comment?

Sherlock: When we went into the MII program, we said it would be for five years. Although we've already been in the program for three years, I feel that we'll still be in it three to five years from now. Therefore, we have time to look at what is the best thing in digital. We're looking forward to the half-inch digital format people are calling D-3. We hope it will be no more expensive than a Beta or MII machine. But whatever happens in the future, we'll move to digital.

Flaherty: From what both gentlemen have said, the choice of these technologies is not academic. Two things are very important. One is your schedule for a new plant. The day comes when you have to make a decision, and whatever is the best thing at that moment, you have to do. NBC has done one thing; we're doing something different. And Julie is right in saying that the analogs will be with us for a while.

The second point is the cost. We are focusing ever more strongly on keeping the cost of equipment down. But that also brings you to the question of formats: Half-inch digital tape will be cheaper than larger tape.

BME: Let's talk about advanced television. Starting with NBC, which has been the most vocal of the networks in this area, what's the extent of your financial commitment to the transmission system you're proposing?

Sherlock: Let's look at what we're after. As broadcasters, we want a friendly transmission system that

lets us play on a level playing field [with alternate media]. And we want a compatible production system that fits in there and keeps the quality as high as possible. At NBC, a while back, we decided to design a high-definition or advanced television system that fits what we feel are the American broadcast industry's needs. So we asked the David Sarnoff Research Center to come up with an invention that worked to our specification.

BME: How much does that effort cost?

Sherlock: Well in excess of \$10 million a year, shared by NBC/GE, Thomson Consumer Electronics, and the Sarnoff Center. The exact formula for [apportioning that money] is confidential. NBC is less a contributor than is Thomson.

BME: Why is Thomson interested?

Sherlock: For the same reason that RCA would have been interested in the past. The closer you get [to development], the better start you have in supplying consumers with the appropriate television receivers.

Flaherty: Let me ask, do you consider yourself a proponent?

Sherlock: We're a proponent of a system that keeps us in the ball game with other things like DBS. We started the ACTV effort, and you could define us as a proponent of that, certainly. But it is the Sarnoff system, not an NBC system, that we have been supporting. We have also considered support elsewhere, and are extremely interested in other developments that are taking place because, again, what we care about is a friendly transmission system.

Did I skirt around that enough for you, Joe? [Laughter]

BME: Is CBS supporting any of the terrestrial transmission systems?

Flaherty: No, but CBS is very anxious to have a transmission system for terrestrial broadcasters that will be fully competitive with alternate media, which at the present time are not being considered for regulation in the interim decisions of the FCC.

Neither DBS nor cable nor home video are regulated like terrestrial broadcasters. And we're looking for that system which does not disenfranchise the present audience. This means we cannot make obsolete, in one night, all television receivers. That would be madness. And we want sufficient headroom to be able to improve with time, as we have improved over the years with NTSC. We believe in encouraging competition on the part of many proponents, so we have not provided financial support, although we do meet with proponents to discuss our viewpoint.

BME: What's ABC's position on transmission?

Barnathan: We support what Yves Faroudja of Faroudja Labs is doing in SuperNTSC. It's a system we can do something with right now. We don't think we should wait. Faroudja is working on ghost canceling, on line-doubling chips, on chips for the color encoder he already has, and on noise reducers. The idea is to create the chips, which manufacturers can license and put into television sets.

We want to be competitive [with cable]. We want a level playing field, technically as well as in production. We've got to reserve the spectrum, and there are a lot of pressures on it. We need to [be assured] that this country's television system—which has, by FCC design, been locally originated for the last 50 years—will continue. All three networks are supporting ATTC. We've spent over \$700,000. I just got another bill for \$400,000. We've also supported the Sarnoff research. We've given them a half million dollars, and we don't even have any financial interest in it. Not even a license. And Faroudja was shocked when we gave him money.

Flaherty: I think *BME* has made a breakthrough here. You have the three networks sitting in front of you, and if you analyze what Julie and Mike and I have said, it's all very [similar]. We said we wanted a fully competitive system, competitive with all media. A compatible system that doesn't disenfranchise our current au-

diences. We said we wanted to take an evolutionary approach, with a lot of headroom, and that we want to start early. I think it's important that when you sit down and talk to us, we admit to the same general objectives. There are different ways of getting there, and we're all looking at them together: in the ATTC, which the local broadcasters also support; in the FCC; in the ATSC; and, in production standards, in the SMPTE.

BME: What are the real-world prospects for getting an over-the-air transmission system up and running?

Sherlock: Every high-definition system that anybody is looking at requires more spectrum. That seems to be a given. So before every station is literally granted and agrees to accept additional spectrum, through all the court battles and everything, and is actually in a position to implement that with a new transmitter—we feel that process will take eight to 15 years.

BME: That's for full availability of ATV for most people in the country. When do you think we'll start seeing some transmission?

Sherlock: After approval, and approvals won't come until 1993 or so. And even after that, it'll be 18 months longer because TV receivers have to be made. So you're already into 1995.

BME: Mr. Flaherty, do you agree?

Flaherty: Yes. It isn't just a technical problem. We have to achieve an agreement on a standard with which the FCC agrees. In the beginning, people thought high definition could be done on one channel with the present service. We have now learned, if you believe all the proponents, that whatever we do will take additional slices of the spectrum. We'll probably have a standard at the end of '92 or early '93.

From that point on, there are a lot of commercial decisions. When will the receiver makers make receivers, and when will each broadcaster, market by market—as it was in color—decide that in his market he should

now transmit this extra service? So with the standards decision, the technical decision ends, and a lot of business decisions begin. But while you might be concerned about which year it begins, it is certainly the television system of the 21st century. And those who don't take that seriously will end



*"[High-def] is the TV system of the 21st century. Those not taking it seriously will end up second-rate."
—Joseph Flaherty*

up a second-rate service. It certainly will be emerging by the year 2000 and become dominant in the first quarter of that century.

BME: Where do you each stand on a high-def production format?

Barnathan: In production, we're looking at the common image format and we support the State Department's position before the CCIR.

Sherlock: All of us do.

Flaherty: The ATSC is the focus of that, and all of us are exactly on the same track. We are determined to try to have as much commonality as possible for the smooth exchange of programs internationally.

BME: On another international front, dominance in the manufacturing of broadcast equipment has passed from American to Japanese hands. Would any of you venture a reason for this?

Barnathan: We've always had a major presence of European companies in the U.S.: Philips; Marconi; Bosch; Angenieux. And we still have major U.S. companies: Ampex in tape machines; Grass Valley in switchers; Tektronix in test and measurement. But the reason the manufacturing of many products went to Japan—and Joe hit the nail on the head a little earlier—is that the Japanese took an American product, the tape machine, and made little cassette players. That technology opened the door for them to go into broadcasting. That, plus the cameras we didn't want to make over here. They built a better mousetrap—finer products at lower prices. As a customer, we're delighted. As an American, I don't like it. It means we don't have jobs for engineers. We are losing technology we need to keep in this country. In Japan they have R&D incentives. We don't. The government should give full tax credit for R&D—take it right off the taxes.

BME: Mr. Flaherty, do you agree with that?

Flaherty: Well, our business is not to make equipment. Our business is to make, buy and distribute television programs. Talking about other people's businesses can be a little dangerous. I would only say that we seem, in all fields, to be inevitably heading toward a global economy. The equipment we get from foreign companies is very high-quality, but so is the engineering from the American companies that remain. Perhaps the time when we did everything was the artificial time. Today every company and country does the things it does best. ■

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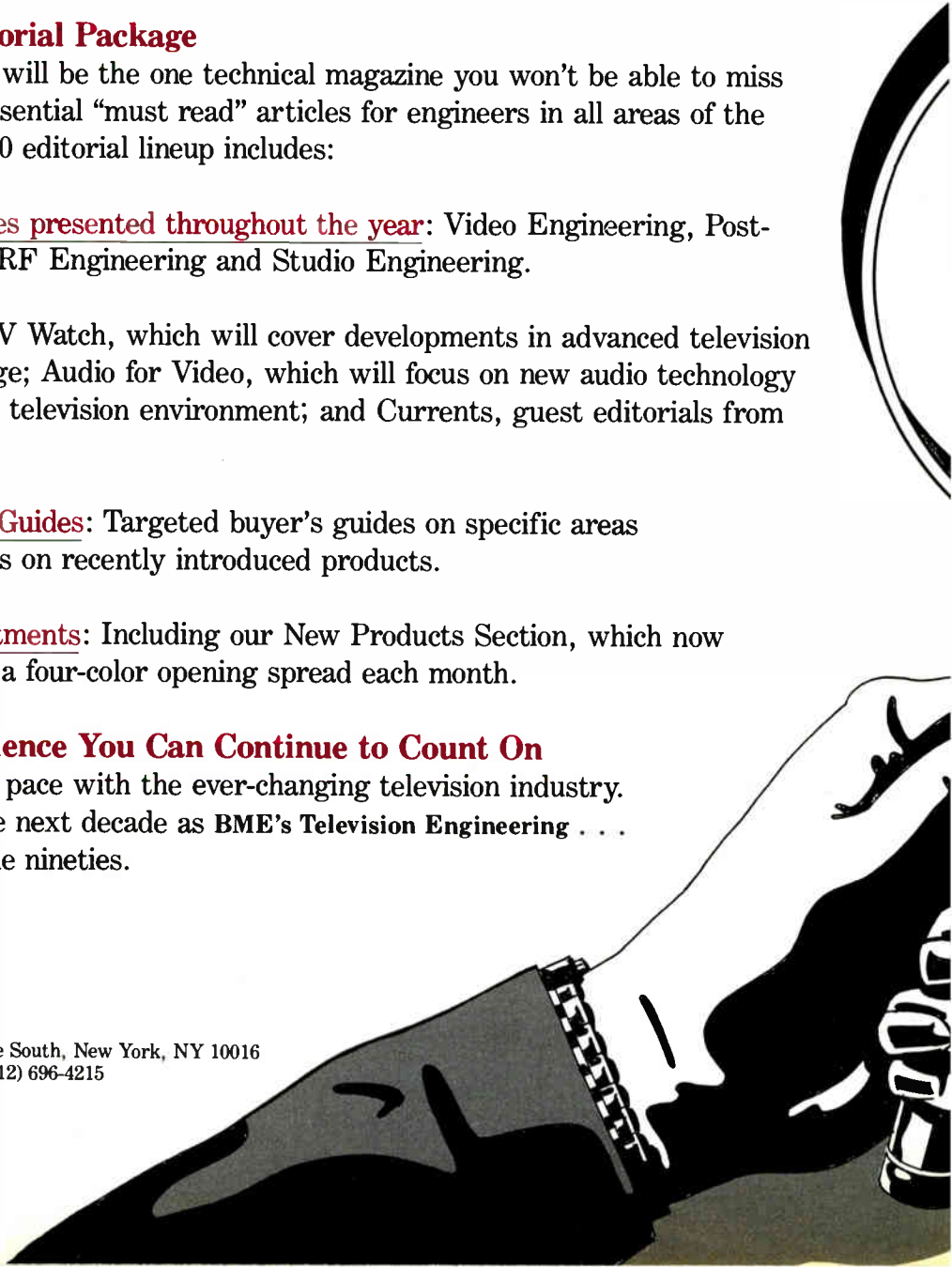
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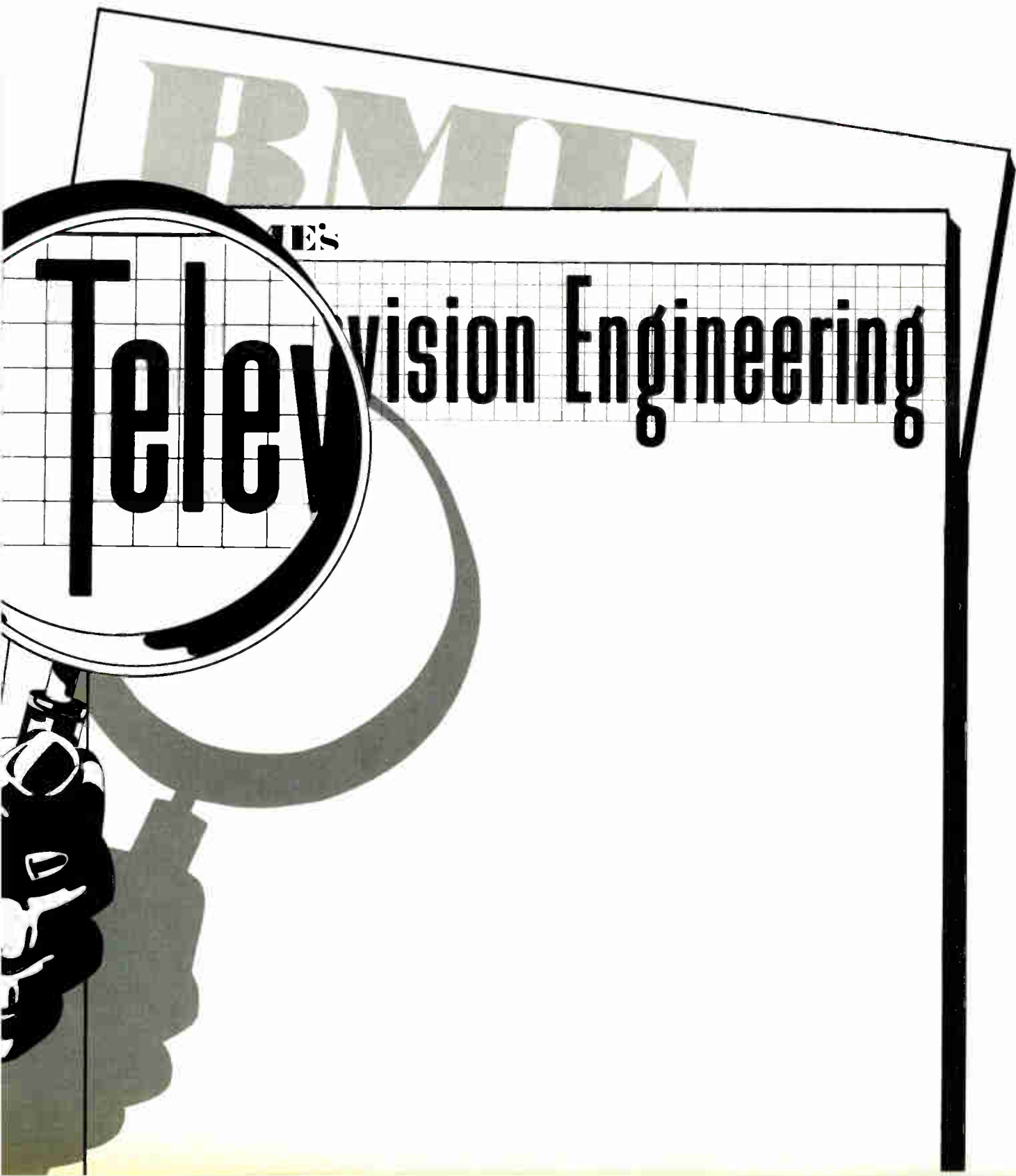
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TWENTY-FIVE YEARS OF BROADCASTING

A nostalgic journey through the past quarter century of television and radio, as recorded in the pages of BME from 1965 to the present.

During the 25 years that *BME* has covered broadcasting, the industry has grown beyond anyone's expectations and assumed an enormous social role, becoming the main source of Americans' entertainment and information. The broadcast industry has also encouraged the application of new technologies, some of which have returned to haunt the business as it enters maturity. Coaxial cable, which started as TV broadcasters' ally, has spawned a vast new industry that competes with over-the-air stations. And video recording, invented for broadcast use, has entered the home, giving viewers new options. Now HDTV looms on the horizon, presenting television broadcasters with the formidable challenge of implementing it before alternative media do, but also with the opportunity to recapture the growth of the '60s, when the advent of color gave television its second golden age.

To read *BME's* back pages is to relive the sweeping changes of the past quarter century—the coming of ENG, computer control, one-inch helical, half-inch, digital, and so on. Some excerpts follow.

—Peter Caranicas

TV TRANSITIONS

That was then . . .

On January 1, 1965, there were 668 TV stations and 5249 radio stations on the air in the United States; 81 percent of the TV stations were VHF and 77 percent of the radio stations were AM. There were 54.9 million U.S. households (96 percent) with at least one radio, and 52.6 million (92 percent) with at least one TV set. A household had about 3.3 people in it, about two-thirds of them adults.

About 27 percent of TV households could receive UHF signals, five percent color, and two percent cable. About 20 percent had more than one TV set. Not one of them had an AM stereo radio, a

CD player, a color TV camera, a computer, pay cable, a personal headset stereo system, a satellite earth station, a stereo TV set, a VCR, a videodisc player, a video game or a video projector. Not one of them had access to all-news, all-weather or all-sports radio or TV channels.

The telephone company carried the signals of all U.S. radio and television networks, the telephone company owned everyone's telephone, and AT&T also owned most of the telephone companies. The average price of a movie ticket was just under one dollar. There was no such place as a video store or a video game arcade. The first 10 minutes of a satellite television transmission cost \$12,450.

. . . This is now

On January 1, 1989, there were 1403 TV and 10,461 radio stations; 52 percent of TV was UHF, and 53 percent of radio was FM. There were 89.9 million radio households (98 percent) and 90.4 million TV households (98 percent). A household had about 2.6 people in it.

About 96 percent could watch UHF; 95 percent had color TVs (but only 58 percent had monochrome TV sets); 63 percent had more than one TV set; 61 percent had VCRs; 53 percent had cable; 48 percent had prerecorded videotapes; 40 percent had video games; 30 percent had pay cable; 24 percent had telephone answering machines; 21 percent had computers; 15 percent had stereo TV sets; 13 percent had CD

players; seven percent had compact discers; four percent had video projectors; two percent had satellite earth stations; two percent had pocket TV sets; and about 0.5 percent had videodisc players. The average number of TV channels a household could receive was 27.7.

No full-time nationwide network was carried by AT&T terrestrial circuits, and the phone company could not own a customer's telephone. The average price of a movie ticket was \$4.25. About 28 percent of all the movies produced and released in the U.S. went directly to pay cable and home video, bypassing theatrical release. The first 10 minutes of a satellite television transmission averaged \$50.

1965

JANUARY Good Year for Color TV Forecast: Industry forecasts indicate two million color receivers will be sold this year. Last year, 1.3 million were sold, nearly double the 1963 figure of 747,000. Picture sizes will be 21, 23, 25, [and perhaps] 19 and 16 inches.

FEBRUARY Lady Reporters Ride Copter: Adventurous young ladies will make history, [becoming] the first women to broadcast traffic reports daily from a helicopter [when] WWDC Radio, (Washington, DC), launches "Copter 1260," carrying a lovely lady [on each trip aloft].

MARCH NAB Preview: General Electric will have its largest exhibit ever with 4225 square feet . . . new products include the PE-26 portable all-transistorized, three-inch I.O. camera . . . Sony will feature the BV-120 "Video-Corder," which includes a portable VTR (145 pounds).

APRIL NAB Report: 4175 attendees were registered, a record . . . [It] was so big, it was impossible for any one person to attend all events . . . Business was so good, exhibitors were unanimous in saying it was the "buyingest show ever."

JULY Ampex gets \$750,000 VTR Contract: Reeves Sound Studios Div. has ordered eight new high-performance Ampex "Videotape" recorders. Reeves will use the VR-2000 units to provide greater flexibility in color tape production and improved b&w production.

DECEMBER Storer Spends \$1 Million for Live Color: [The group broadcaster] has signed contracts [to buy] eight [RCA] TK-42 four-channel color cameras, and eight TR-4 color VTRs with full color record-playback capa-

bility. The Miami-based group has been telecasting network color since 1953.

1966

FEBRUARY Preserve Today's Events, Voices: The NAB is urging networks and stations to preserve on-tape events that may be treasured by future generations. Since cost often rules out film or videotape, [NAB] suggests use of audiotape.

MARCH Largest NAB Convention Ever: The big attraction will be color TV equipment, particularly studio and film cameras and VTRs. At least five manufacturers, including G.E., Marconi (in Ampex space), Sarkes Tarzian, North American Philips and RCA, will be showing new color studio camera chains.

MAY Low-Cost VTR System: At the IEEE Convention, two engineers, George Doundoulakis and Ira Kamen, described Sonic Vee, a system for producing video playbacks for under \$400, and instant home movie playbacks for under \$650, using 1/4-inch tapes at 15 ips.

AUGUST Fairness Doctrine Provisions Blasted: A group of 12 broadcasters and the RTNDA said the FCC's proposal to adopt two Fairness Doctrine proposals violates the First Amendment and vowed they would carry the fight to the Supreme Court.

SEPTEMBER Remote-Control Revision Asked: The NAB has asked the FCC to allow all radio stations of more than 10 kW to operate by remote control without waiting 12 months to demonstrate transmitter reliability. NAB says

the 12-month rule is outmoded by advances in transmitting equipment.

DECEMBER KXLS Programs Stereo: This Oklahoma city station has begun stereo operation with 50 kW ERP. Beamed at the 20-to-35-year-old market, "The Young Sound" was developed for CBS O&O FMs and features top pops of today.

1967

FEBRUARY High Mark for Network TV Billings: October, 1966 billings on network TV surpassed all previous monthly totals, Television Bureau of Advertising reports. Net time and program billings on the three networks totaled \$155 million, a gain of 15.2 percent over October, 1965.

APRIL Sign of the Times at NAB: Automation has stolen spotlights at NAB conventions before, but it's now practically omnipresent. We're not sure you'll see automatic program logging being done, but a paper will be devoted to the subject.

MAY Color News Film No Problem: NBC has shifted all news film to color, and finds no problem [using] Eastman EK7242 or 7258 with a daylight rating of 80. Processing time can be cut to 30 minutes.

SEPTEMBER Cable-Type Networks: Two companies, International Artists (Houston) and Cable Television Network (Palm Springs, CA,) have been formed to provide regular programming services for CATV operators. [CTN will provide] a feature movie once a week, plus other videotapes made for CATV use.

NOVEMBER CATV Steals Market: WBRE-TV (Wilkes Barre-Scranton, PA,) GM David Baltimore says CATV

Rise and fall

For most of the last 25 years, RCA was the dominant force in entertainment technology. The company, which once owned JVC and RKO, among other interests, introduced the quadruplex cart player, all-color prime time, fiber-optic camera cable, solid-state color TV, broadcast comcorders and broadcast CCD cameras. RCA's deal with Home Box Office to use the latter's domestic satellite services created the satellite television industry. RCA's choice of the VHS format, and its introduction of the first four-hour version in 1977, may have been the major factors that let VHS beat Betamax.

In 1973, however, RCA got rid of its training institutes. In 1984, it dropped its copolitive electronic videodisc system.

In 1985, it left the broadcast equipment business. In 1986, it was bought by General Electric, which, in the same year, sold RCA Records to Germany's Bertelsmann. The following year, GE sold RCA (and GE) Consumer Electronics to France's Thomson, sold the NBC radio network to Westwood One, and gave RCA Laboratories to SRI International. Even RCA's tube manufacturing and international transmission services are gone.

The cost of all goods and services rose 400 percent from January 1, 1965 to January 1, 1989; the cost of a television set fell 33 percent in the same period.

Here's what else happened in radio and television technology between January 1, 1965 and today:

Sources: EIA (penetration figures); Nielsen (TV audience); RAB (radio audience); MPAA (movie information). Specially researched for BME by Leelsoocson.

First commercial communications satellite (geosynchronous); first domestic communications satellite (non-geosynchronous); first regularly scheduled TV program carried by satellite (NBC's Today Show, which went color this same year); first electronic character generation (for typesetting—Hell Digiset); first robotic cartridge videotape recorder (RCA TCR-100); first variable-speed videotape recorder (Precision Instrument Variscan); first U.S. broadcast of instant replay and freeze frame (CBS/Mognetic Video Recording); first motion stabilization lens sold (Dynosciences Dynolens); first multistation master FM transmitting antenna (on Empire State Building).

1965

has stolen one third of WBRE's audience by carrying Philadelphia stations rather than his own, which was once viewed in 135,000 homes when these systems were owned by "ma and pa" operators. Now, he claims, "money-grabbing Wall Street financiers have moved in."

DECEMBER/Buyer's Market in Color Cameras: For the first time since the color boom . . . no longer need one buy from the supplier that offers the shortest delivery time after six months!

1968

JANUARY/Broadcast EVR to Be Available: A broadcast form of the Electronic Video Recording (EVR) system announced recently by CBS Inc. will be available in 1968 for educational television, said Dr. Peter C. Goldmark, CBS Labs' president. The [home] EVR . . . [shows] prerecorded programs at low cost on conventional TV sets.

MAY/"Broadcasters Shape Nation's Dialogue," Johnson Tells NAB: Broadcasters [must] face up to the social issues of the day, said President Lyndon B. Johnson in a surprise keynote address to the NAB Convention. He called for a healing of the deep emotional division in the land, and asked that stories of quiet progress be aired along with the dramatic [war reports].

JUNE/New TV Projection System: General Electric has introduced a large-screen color TV display . . . priced at \$35,000 . . . based on a single-gun Light Valve tube . . . that will produce pictures as large as six by eight feet.

JULY/Trinitron, Son of Chromatron: Directly descended from the Chromatron, the infant Trinitron has made its debut in New York. Sony Corp. Executive VP Akio Morita demonstrated the new color picture tube.

OCTOBER/Philips to Build and Sell CBS Tote Camera: CBS Labs' hand-held wireless camera, used at the 1968 Republican and Democratic conventions, will be manufactured for worldwide sale by Philips.

DECEMBER/WJYJ to Put 1.5 MW Signal on UHF: WJYJ, a new TV station in central Illinois, has ordered a \$1.15 million RCA color broadcast system, making it one of the nation's most powerful UHF's, radiating 4.3 MW of effective power.

1969

FEBRUARY/FM Turns the Corner: Once the poor, misbegotten stepchild of the broadcast industry, FM radio is rapidly coming into its own as a prime moving force and as a profitable medium.

MARCH/NAB Convention Preview: Ampex—feature attraction is the BC-210 color studio camera. General Electric—new TS-300A studio switcher as part of TV station automation system. RCA—new TT-30FL VHF transmitter; new transistorized AM transmitter. Sarks Tarzian—new TV products using digital techniques to get around noise problems.

APRIL/FCC Proposes to Make UHF, VHF Tuning Compatible: To remove "unnecessary obstacles to the progress of UHF television," the FCC has asked for comments on the technical capability, "to eliminate or reduce

disparities in the ease of tuning UHF and VHF channels."

JUNE/Now It's RCA: Shareholders have voted to change the company name from Radio Corporation of America to RCA Corp. President and CEO Robert W. Sarnoff said RCA has already started to change the names of foreign subsidiaries.

JULY/How's Your Videomagination? Lucien Lessard, director of Tele-Tape Productions, says, "Video people can do easily things that aren't feasible with film," citing the new Ampex HS-200 teleproduction system, [which] combines a disc recorder with a computer.

NOVEMBER/Quad Stereo Tested in NY, Boston: Four-channel (quadra-sonic) stereo is getting a work-over by interested FM broadcasters . . . and a mixed reaction from listeners. Big question: Is it really a worthwhile improvement, or just a gimmick to sell more home stereo gear?

1970

JANUARY/Easy-Load VTRs Add to Market Muddle: Two new non-compatible "home" VTRs have appeared, with the tape neatly packaged in cassettes. First, Panasonic (Matsushita) unveiled its ½-inch cassette . . . Almost on its heels came the Sony cassette VTR [which] uses ¾-inch tape.

MAY/New Ampex VTR at NAB: The AVR-1 third-generation VTR requires no preroll, records non-synchronous source material, has continuously synchronized output, and is adaptable to station automation through the use of digital control circuitry.

SEPTEMBER/Now It's Cartridge Color from AVCO: Stealing the

First full-color TV network (NBC); first backpack videotape recorder (Westel Coniscan); first network video slow motion (NBC); first Dolby noise reduction system purchased; FCC regulates all cable TV; amateur TV transmission received in Washington State from Antarctica; FCC revises table of assignments to add more UHF TV stations; Ampex sues Sony over VTR rights (settled out of court in 1968).

First electronically generated characters appear on broadcast TV (A.B. Dick Videograph 990; which later became Chiron I; Chiron later became Chyron); first low-cost portable camera and recorder (Sony CV-2400); first color slow-motion disc system (ABC and Ampex); first digital audio recording (NHK); first network TV transmission to Hawaii; first nationwide educational TV network; first proposal for home cartridge video playback system (CBS EVR).

First all-electronic international standards converter (BBC); first videotape synchronizer (Ampex); first azimuth videotape recorder (principle used in Betamax, VHS, 8 mm video, and D-2) (Panasonic); first Dolby B noise reduction (making audio cassettes high-fidelity media); FCC okays subscription television.

limelight from CBS's EVR and Sony-Philips' cartridge plans was Cartrivision from AVCO Corp., [which] announced the first U.S. mass-produced cartridge color TV system.

OCTOBER/Newest Video Player: Ampex jumped into a crowded arena, unleashing Instavision, its answer to CBS's EVR, RCA's SelectaVision, and AVCO's Cartrivision. It uses 1/2-inch tape compatible with the Japanese EIA Type 1 helical standard. Instavision is aimed at education and business, [Ampex says], and it could become a major factor in home video.

NOVEMBER/FCC's New Partner: OTP: The head of the new Office of Telecommunications Policy, Dr. Clay T. Whitehead, has made it clear that OTP will be President Nixon's voice in shaping policy affecting broadcasters and cable, and "conceivably could go into the courts to challenge FCC rulings."

DECEMBER/RCA Wins Antenna Contracts: San Francisco's Mt. Sutro and New York's World Trade Center will support \$6 million worth of RCA antenna equipment under contracts recently signed.

1971

MARCH/Sony Reveals \$1000 Color Camera: BM/E previewed Sony's prototype. Production is planned for 1972. The prototype uses a single vidicon tube with an integral optical grating and an electronic filter system to separate colors.

MAY/A Dollar-Conscious NAB: Last year's boastful theme, "50 Golden Years and the Best Is Yet to Come," dissolved in apprehension over how

many lean years are in the immediate future. Exhibitors demonstrated dollar-saving equipment.

JUNE/The "World's Most Powerful Transmitter": A 220 kW Gates Model BT-220U was installed at WDCA-TV in Washington, D.C. (UHF Channel 20). Station signed on the air March 16. The transmitter may also be the world's longest—nine cabinets take up 25 feet. Unit draws one million watts.

AUGUST/Film's Varied Uses in TV: That's the subject of a new exhibit at Eastman Kodak's Regional Marketing Center in New York, where Kodak's Thomas Hargrave and Hunter Low told the full story to NATPE's Robert Bernstein.

SEPTEMBER/Public-Access Cable Channels Get Big Start in New York: Stirling Manhattan, which serves the southern half of the island, announced a contract with the American Foundation on Automation and Employment for community studio and recording facilities connected directly to the system. Irving Kahn, chairman of TelePrompTer, which serves northern Manhattan, called his system's new access channel "an electronic soapbox."

NOVEMBER/TV Industry Profits Down: [They] dropped 18 percent in 1970 from 1969. Further, network profits fell eight percent in the first eight months of 1971 over the same period in 1970.

1972

MARCH/CBS Pulls Out of EVR Production: In a move that had been rumored but was stunning nevertheless, CBS announced a phase-out of its EVR operations . . . The gigantic consumer market

for videocassettes, a vision that gave the industry a wild fever, simply did not develop.

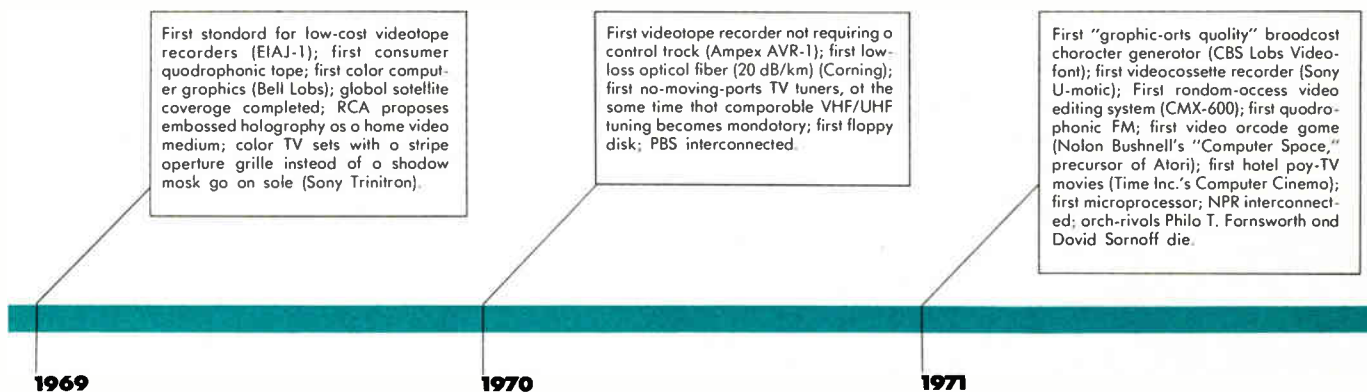
APRIL/Covering Nixon in China: Live TV of the event, which showed us such previously unthinkable events as Nixon and Mao smiling at each other, depended on equipment flown in from the U.S., and included nine Norelco TV cameras and an LTV Electrosystems 33-foot "dish" antenna for beaming the signals skyward.

JUNE/Computer Pervades NAB: At this year's convention, dancing girls were replaced by minicomputers, which could be seen in almost every aisle. If a computer wasn't always in view, readout terminals [indicated] that there was one there somewhere.

JULY/Ralph Nader Charms NCTA Convention: The consumerist saw cable as an electronic highway fitting into his scheme for conserving natural resources . . . Had he spent time on the exhibit floor . . . [he would have seen] pay cable as a means of extracting higher prices for entertainment and sports, or home cable merchandising as a means of upping compulsive buying.

OCTOBER/Trouble-Free TV Foreseen for 1985: In the future, television will be based on modular solid-state units that will make failure a rare event, says Dr. Robert Adler, VP, Zenith Corp.

NOVEMBER/First Demo of MCA Videodisc: A videodisc using laser-beam scanning of the grooves makes its first appearance Dec. 12 at the headquarters of developer MCA.



1973

JANUARY/Is Videotape Taking Over? Can Film Hang In There? There is no winner yet. Keep your film chain and your VTRs. Film is still in news, but the complex mix of tape and film in making entertainment programs and commercials is shifting strongly toward tape.

MARCH/Ampex Sells VTRs Worth \$3.5 Million to ABC: The first three AVR-1 VTRs have been delivered to ABC in Hollywood, and the first three ACR-25 videocassette systems will be delivered in April . . . two in Hollywood and one in San Francisco.

APRIL/Largest-Ever NAB Witnesses Turning Point in Technology: Helical VTRs challenge quad for first time, as digital time-base correction technique leapfrogs mechanical transport limitations; showstopper was \$8750 TBC from Consolidated Video Systems; digital techniques are used in special-effects generators and dominate control circuitry; era of digital transmission coming.

JULY/Beep Killed: The FCC has removed the 25-year-old requirement that recording of telephone conversations must be accompanied by a "beep" tone.

AUGUST/Time-Life Films on Cassettes: All titles in the Time-Life Films, Inc. library are being made available in the Norelco VCR videocassette format.

OCTOBER/Men's Thoughts on Women Explored by CBS Radio: Producer Norman Morris asked a random sample of men what came to mind with the word "woman." The answers will enrage women's-lib battlers: "Motherhood," "Shape," "Apple pie;" and nine out of 10 agreed, "A woman's place is in the home."

1974

APRIL/Private TV Bigger than Network: Business, government and nonprofit organizations produce more programming than the prime-time programs carried by all three major networks combined, according to a study by D/J Brush Associates . . . and the private TV industry is expected to triple in size over the next three years.

MAY/Biggest Excitement at NAB Was Nixon's Visit: The president's Houston press conference—and warm greeting by broadcasters—is still being discussed. Outside the hall, several hundred peaceful anti-Nixon demonstrators were kept at bay by police dogs.

JUNE/Western Union Flies First Domestic Satellite: Westar I went aloft April 11 to presage large changes in communications technology and economics in the U.S. . . . The company expects to begin comprehensive voice, data and television common-carrier service.

JULY/NBC Purchases Two NEC Frame Synchronizers: The first product of its kind, the FS-10, represents a revolutionary step . . . allowing switching and special effects of asynchronous video sources (studio/remotes/network/satellite) without program distortion.

AUGUST/Delivery of First IVC-9000: Trans American Video, Hollywood, got the first U.S. delivery of an IVC-9000, the segmented helical VTR.

SEPTEMBER/Computer Remote Control Runs TV Transmitter: An IBM system recently put on line at

WLOX-TV, Biloxi, MS, bridges a studio-transmitter gap of 25 miles. The link to the transmitter uses both microwave and telephone company lines. The FCC gave special approval for use of the system.

1975

JANUARY/Electronic News Gathering Off the Launching Pad: For several years, the quality/weight ratio of portable video cameras and recorders [has been] climbing . . . hacking away at 16 mm's lead. Video equipment is now clearly good enough to spur broadcasters into opting for ENG. Leading the march: the CBS network and stations.

MARCH/Tubeless CCD TV Cameras from RCA: Cameras that scan a photosensitive solid-state array by using the charge-coupled principle, eliminating evacuated tubes and electron scanning beams, were shown by RCA. The cameras are aimed at CCTV and industrial markets . . . Broadcast quality is an objective.

APRIL/All-Solid-State Transmitters: Harris Corp.'s M-1 1 kW AM transmitter was introduced in Quincy, IL. A Westinghouse 5 kW AM unit has been in regular on-air use at WIND, Chicago, since fall.

MAY/Cable Systems to Get Programs via Satellite: A milestone was marked when Home Box Office, a packager of movies and sporting programs for cable systems for an extra monthly fee (pay cable), announced plans to distribute programs via domestic satellite to UA-Columbia systems in various parts of the country. Ground receivers built by UA-Columbia will cost about \$75,000 each.

NOVEMBER/Americans Think TV

1972

First home video game (Magnovox "Odyssey"); first home color video projector (Sony); first geosynchronous, domestic communications satellite (Conodo's Anik); first prerecorded videocassettes for sale and rental (Cortridge Television Inc.'s Cortrivision); first laser videodisc demonstrations (MCA and Philips); first color CCD camera demonstration (Bell Labs); first pay-cable channels (Time Inc.'s HBO one of several); first stonolone time-base corrector (Television Microtime; now Microtime); FCC requires new CATV systems to have 20 channels; two New York TV stations transmit stereo TV with one channel each (WNET and WNEW).

1973

First multichannel distribution service (MDS) transmission in U.S. (Microbond); first teletext broadcasts in U.K.; first color electronic "point" system (Xerox Superpoint); first audio time compression/expansion with pitch correction (Lexicon Vorispeech); first digital TBC (first digital video processor of any kind) sold (CVS 500); first transportable satellite earth station (Scientific-Atlanta); first ENG camera (Ikegami HL-33); first fiberoptic communications system installed; first Winchester drive (IBM); TV households first exceed radio; first U.S. demonstration of HDTV (Ponosonic).

1974

First ENG cassette recorders sold (Sony VO-3800); first circularly polarized TV transmission authorized (WLS Chicago); first high-power video satellite (NASA ATS-6); first Dolby Stereo movie; first home frame-gripper (Hitachi Memory-Matic); first reel-rocking video editor (TRI EA-5); first 2/3-inch lead monoxide camera tube; first field synchronizer; first digital video effect (image reduction and positioning); FCC authorizes normal-scan amateur television repeaters.

Should Cover Congress: A poll by the Roper Organization reveals 68 percent of Americans feel TV cameras should be allowed in Congress to cover legislative debates.

DECEMBER/Sarnoff Resigns from RCA: On November 5, the chairman submitted his resignation to the RCA Board of Directors . . . There is speculation about palace unrest.

1976

JANUARY/Ampex Marketing New Portable Color Camera: Now in standard production, the new BCC-2 is hand-held and designed for both studio use and on-location coverage.

MARCH/Sony Introduces Half-Inch Betamax Videocassette Deck: It went on sale at \$1300 in several cities. Betamax in console form (record-and-play unit with integral TV receiver) was unveiled last year with \$2300 price tag. Sony is pushing system for the home viewer who wants to record and re-see TV programs.

MAY/Fantastic Affair: Early signs pointed to the 1976 NAB in Chicago as an ENG show. To the surprise of most, it was a helical VTR show: a big push by Bosch-Fernseh to establish its BCN line as the non-quad standard [through agreements] with IVC, Philips and RCA; Sony unveiled the BVH-1000 one-inch helical VTR, capable of still frame and slow motion; Ampex took the wraps off the totally new VPR-1, with automatic scan tracking.

JUNE/FM Station Rates Number 1: For the first time in Los Angeles radio history, an FM station is number 1: K-BIG FM 104, the

"beautiful music" station owned by Bonneville, got a 6.5 share.

AUGUST/44 Markets Receive Live Stereo: The largest live stereo network in history was established for the Live from Lincoln Center nationwide TV broadcast of American Ballet Theatre's *Swan Lake* on PBS. The stereo sound portion was received by cooperating FM stations.

NOVEMBER/Act Becomes "Obsolete": The 1934 Communications Act has become obsolete by the onrush of new technology, said Lionel Van Deerlin, chairman of the House Communications Subcommittee.

1977

JANUARY/Turning Point in Electronic Coverage: In the '76 elections, ENG was used almost exclusively by networks in covering candidates' travels . . . On Election Night, character generators combined with computer storage reached new heights in graphic presentation, and NBC and Chyron are working on how [to use] graphics more effectively in daily news operations.

FEBRUARY/Small Antenna Rule Hailed: The FCC decision to make earth station antennas of less than nine meters' diameter acceptable drew applause from HBO

President Nick J. Nicholas, Jr., who said the ruling "will encourage further growth of pay TV."

APRIL/New One-Inch VTR Formats Go Into Action: Never mind that there isn't compatibility. Bosch Fernseh has sold 140 BCN units abroad . . . Sony has 25 production models of the BVH-1000 in the U.S . . . Ampex has begun delivering the VPR-1.

MAY/Hottest Product at NAB: NEC's digital video processor DVP-15, exhibited by Grass Valley. With an NEC FS-15 frame synchronizer and GV-1600 switcher, it produced effects heretofore not possible except optically.

AUGUST/CBS Mounts Assault on 35 mm: CBS has built a videotape production and postproduction facility [in Hollywood] to radically reduce its reliance on 35 mm film for its prime-time programs. VP, Engineering and Development, Joe Flaherty said the system [will result] in a 40 percent savings in production costs.

DECEMBER/Digital Audio Explodes at AES: With five major firms demonstrating equipment . . . the meeting [was like] a curtain-raiser for this new era in audio.

1978

JANUARY/RCA to Market One-Inch VTRs Made by Sony: RCA Broadcast Systems will market worldwide Sony's BVH-1000, BVH-500 portable, and BVT-1000 time-base corrector . . . under the RCA label.

MAY/Biggest and Best NAB Yet: What became clear is that broadcast technology has taken a decisive step into the age of computers . . . Microprocessors are revolutionizing production switchers, audio consoles, character generators and test equipment . . . we are already beginning to witness dramatic price reductions . . . following volume purchases.

SEPTEMBER/"On Air" With New Earth Station: KXTL-TV, Sacramento, a UHF independent, has unveiled its owned and operated satellite receiving dish, which will

First successful home videocassette recorder (Sony Betamax); first personal computer; first full-time satellite programming (HBO); first videodisc system since 1930s sold (TelDec's TeD); first computer graphics broadcast (Xerox); first MDS pay-TV directly to homes; first joystick machine control for video editing (Convergence).

First North American low-power TV station (David Brough's in Pickle Lake, Ontario); first electronically colorized movies (BJA Systems); first videotape recorder with broadcastable variable-speed playback (Ampex AST); first nationwide stereo network; first electronic still store (Ampex ESS); first telephone line frequency extender (Comrex); first digital videotape (half-screen) demonstration (IBA); first intelligent machine interface for editing (CMX); first digital video zoom effect; fiberoptics become cost-competitive with coaxial cable; TV household saturation first reaches 98 percent (it has never been higher).

First home satellite earth station (Bob Cooper's); first component color recording system (TRI's Tri-Chromo); first odopter sold for recording digital audio on a videotape recorder (Sony PCM-1000); first two-way interactive cable TV system (Worner-Amex Qube); ABC/CBS White Paper distributed at SMPTE TV Conference forms the basis of the one-inch Type C VTR.

1975

1976

1977

receive signals from four satellites . . . improving programming possibilities.

OCTOBER/First Pay-Per-Program TV On the Air: KWHY-TV, Ch. 22, Los Angeles, offers current and classic motion pictures to subscribers from 8:00 p.m. weeknights and 7:00 p.m. weekends [via] a 25-fold transmitter power increase, from 107,000 W. ERP to 2.57 million. The service is called SelecTV.

NOVEMBER/One-Inch Type C Manufacturers on Track: By spring of '79, Ampex, Hitachi, NEC and Sony will be in full production on the SMPTE Type C format one-inch helical-scan VTRs. Ampex and Sony will retrofit existing one-inch recorders to the C format.

DECEMBER/Country's First Circularly Polarized UHF: WQTV, Boston, became the first station to own a circularly polarized antenna.

1979

FEBRUARY/First Portable Earth Station: Application for a portable high-performance satellite earth station transmitter/receiver has been filed with the FCC by United Video, Tulsa. The equipment will make video broadcasting available from any location to any other.

MARCH/Ampex Unveils Digital VTR: It looks like an AVR-3; its writing speed is a scant 15 ips. But this nameless VTR has a signal-to-noise ratio in excess of 65 dB and is capable of producing almost limitless generations of dubs with no signal degradation. The unit is an "engineering breadboard" produced in the

Ampex labs. A demo tape played at SMPTE [indicated that] the digital recorder will find its place among broadcasters.

APRIL/Age of Satellite Distribution for Commercial Broadcasters Begins: RCA Americom, Viacom and Post-Newsweek Stations have announced a major experiment in satellite distribution of syndicated programs.

MAY/Texas-Sized NAB: More than 7000 broadcasters and 6000 guests witnessed one of the largest displays of broadcast gear ever assembled. There was acceptance of microprocessor-controlled equipment in radio and TV, and people stopped calling ENG new.

JULY/Philips "Compact Disc" Enters Digital Audio Race: The player got its first press demo. It uses a laser recording and playback system for PCM audio.

NOVEMBER/ABC Lands '84 Olympics for \$225 Million: In history's largest single TV contract, ABC won rights to the L.A. games. The bid surpassed offers from NBC, CBS, Tandem Productions (associated with Norman Lear), and ESPN.

1980

JANUARY/Satcom III Takes Off: The third satellite in RCA's Satcom series was catapulted into orbit, with 24 channels earmarked for CATV service. Late bulletin: As BME went to press, radio contact with Satcom III was lost, and no trace of the satellite was found.

APRIL/FM's Audience Share Still Growing: FM radio continues to out-distance AM . . . commanding in spring/fall '79 52.4 percent of the nationwide audience of persons 12 and over, Mon. through

Sun., total day. This represents an increase of 1.9 percent over fall '78/spring '79.

MAY/New Applications for Graphics System: Just introduced at NAB, the Ampex Video Art (AVA) system [may be used] this fall for graphics during election reporting. A prototype was used by artist Leroy Neiman during 1978's Super Bowl broadcast. The system lets artists create original art or modify existing pictures . . . with no keyboards or dials . . . only an electronic stylus.

JUNE/New Entry into One-Inch VTRs: RCA showed its TR-800 Type C at NAB, a VTR of its own design and manufacture, confirming that it had been planning its one-inch entry for some time.

NOVEMBER/Closed Captioning on the Rise: This fall has seen closed captioning of programs increase 40 percent over last spring . . . 22 ½ hours on ABC, NBC and PBS will be captioned by the end of this year.

DECEMBER/Telco-Cable Rules Under Scrutiny: Seeking to overthrow a decade-old standard, the FCC has issued a notice of inquiry asking whether modifications of its telco-cable cross-ownership rules would be appropriate for cities. Immediate opposition came from NCTA.

1981

JANUARY/NJ Move for RKO's Ch. 9: The FCC has proposed to reallocate New York's Ch. 9, now licensed to RKO General as WOR-TV, to a Jersey city . . . to establish better TV service for the Garden State, which has no VHF outlet.

First television network switches from terrestrial to satellite distribution (PBS); first laser videodisc players sold (Magnavox); first home rear-projection TV; first full-screen digital videotape demonstration (Ampex); first video store; color sets in use first exceed monochrome; metal recording tape first sold; cellular telephone service begins in Chicago; SMPTE first recommends its own color bars.

First consumer computer databases (Comuserve and The Source); first personal headset stereo system (Sony Walkman); first satellite radio network (NPR); Satcom III disappears shortly after its launch; FM market share first exceeds AM; FCC deregulates TVROs; World Administrative Radio Conference (WARC) agrees to extend Western Hemisphere AM to 1705 kHz; WARC authorizes transportable uplinks in the 14 GHz range; FCC unanimously approves 9 kHz AM spacing, but reverses its decision in 1981.

First video point system goes on sale (Ampex Video Art); first digital video rotation effect (Quantel); first home camcorder demonstration (Sony); first 12,000 frame-per-second video camcorder and recorder (Spin Physics); first personal-computer-based video graphics system (Xiphos); commercial network closed-captioning for the hearing-impaired begins; FCC finds room for four more VHF stations; ¼-inch videocassette introduced (Funco/Technicolor CVC).

1978

1979

1980

MARCH/High-Definition TV Around the Corner: At last month's SMPTE Television Conference, American broadcasters got their first look at Japanese high-definition television ... NHK has now provisionally adopted an HDTV standard with 1125 scanning lines, a 5:3 aspect ratio, a 2:1 line interlace ratio, and field repetition of 60 Hz.

APRIL/One-Piece Cam/VTR: A Dream Come True: RCA announced it would introduce a one-piece, combined camera-VTR unit at this month's NAB. Called "Hawkeye," and weighing under 22 pounds, it halves the weight of existing separate camera/VTR packages. The recorder uses VHS cassettes and is made by Panasonic.

JUNE/One of the Best NABs in Recent Memory: Genuine technical advances left broadcasters and exhibitors in a state of euphoria. Heavy purchasing went on throughout. There was grumbling over the huge size of the show (479 booths, 31,035 attendees) ... and radio broadcasters were heard to suggest a separate "all-radio" NAB.

NOVEMBER/Kansas City VHF Bought for \$79 Million: Media giant Hearst Corp. has agreed to purchase Metromedia's KMBC-TV for \$79 million—the second-largest amount ever paid for a broadcast station.

DECEMBER/KRON-TV Sets Up Longest Local RF Link: The San Francisco station beamed live reports of demonstrations at the Diablo Canyon nuclear plant back to viewers over a 232-mile microwave link, the longest ever.

1982

APRIL/The Future of HDTV Is

Now: We cannot help but wonder where the Americans have been during the research and development of this technology. Why is NHK the driving force? Where are the U.S. manufacturers of HDTV equipment? Where is the innovation that made the U.S. the world's broadcast leader?

JUNE/This NAB Mood Was Different: [In the past], everyone was looking for the most sophisticated pieces of equipment. This year's conference frequently asked questions: "Will it last?" and "How reliable is it?"

JULY/Digital TV Standard Adopted: CCIR adopted a SMPTE-proposed digital video production standard. It calls for component coding based on the luminance signal and the two color-difference signals, a 4:2:2 standard for major digital studio equipment, and sampling frequencies of 13.5 MHz for luminance and 6.75 MHz for color-difference signals.

OCTOBER/WNEV-TV Chooses Half-Inch for Daily Magazine Show: In this country's first commitment to broadcast-quality half-inch, the Boston station has spent over \$1.5 million for equipment (31 Panasonic AU-300s, 12 Ikegami HM-100s); the show will stay on the RCA/Matsushita format "from shooting through editing to airing."

NOVEMBER/New Ampex VTR Wows IBC: The Ampex Nagra C VPR-5 is a portable, one-inch VTR that weighs less than 15 pounds. It costs \$45,000.

DECEMBER/Sony, RCA Score Half-Inch Sales: Field Communications has already started ENG

operations at four of its stations with RCA Hawkeye one-piece units; Corinthian Broadcasting spent \$5 million for complete conversion to Betacam for all its stations' news and EFP.

1983

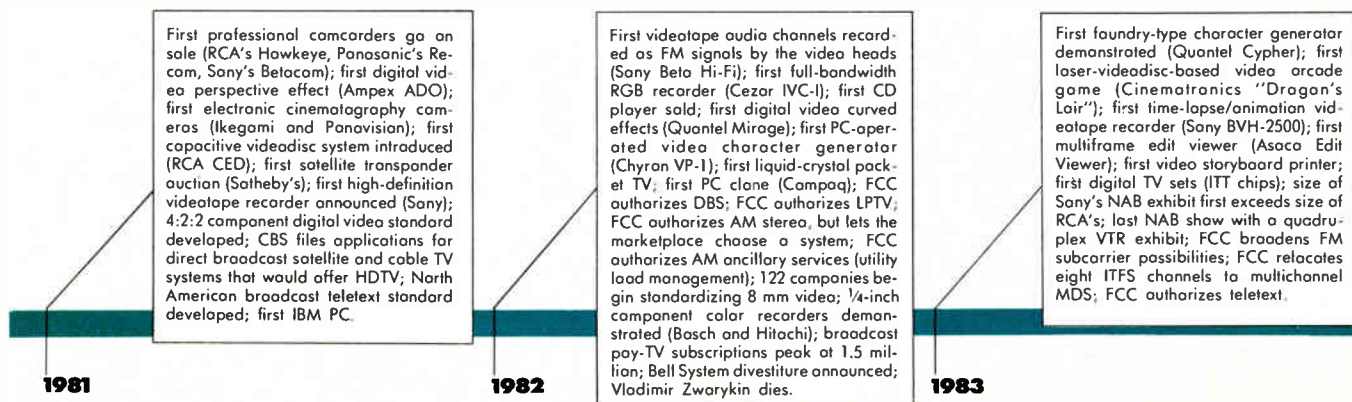
APRIL/NBC To Have Mammoth Routing Switcher: A multimillion-dollar deal was signed with NEC to expand the network's model TKA-105, already the largest in the world, with 150 inputs and 270 outputs for a total of 40,000 crosspoints.

MAY/Lottery Approved for LPTV: The FCC has voted to institute a lottery system for choosing among mutually exclusive applicants for low-power TV licenses.

JUNE/Slower NAB: There was a sense that manufacturers had cut back on R&D, faced with a broadcast economy considered sluggish at best. **SEPTEMBER/Broadcast Systems Attract Crowds at Siggraph:** Though many of the 20,000 in attendance were there to learn about computer graphics applications in atomic research, architecture, jet fighter simulation, etc., interest in broadcast-related products was strong ... biggest crowds were at demonstrations of MCI/Quantel Paintbox, Via Video Systems One, Dubner CBG and CGL IMAGES.

NOVEMBER/ABC Uses Ku-Band for Shuttle Coverage: The network's coverage of the first nighttime launch also marked the first use of a Ku-band satellite in the live pickup of a news event. ABC relayed its signal from Cape Canaveral to New York via SBS-3, which was launched on an earlier shuttle mission.

DECEMBER/NTSC-Compatible



HDTV DBS Scheme Proposed: CBS Technology Center has described a system using two 24 MHz satellite channels; one carrying a compatible, enhanced 525-line signal with 4:3 aspect ratio for standard sets, the other an augmentation signal that would combine with the first to form a 1050-line picture with 5:3 ratio.

1984

FEBRUARY/Kodak Enters Video Markets: Prepared to become a major force virtually overnight, Kodak announced a complete line of videotape and cassettes, [and] an 8 mm recorder/camera based on the worldwide 8 mm standard.

MAY/684 New FM Stations Located by FCC: Proposed locations of 684 new FM stations have been released, the largest block of FM assignments ever made.

JUNE/Everything New and Exciting at NAB: For the 35,000 attendees, everything pointed to the fact that, for the first time in several years, the broadcast industry is recovering from its economic slump.

JULY/Eight Stations Finish FM Antenna Project: The Empire State Building FM Master Antenna Project is complete. Eight stations have installed Harris FM-25K transmitters, along with transmission lines, patch panels and diplexers.

NOVEMBER/Betacam Gets CBS as Convert: CBS Operations and Engineering has publicly committed the network to a new ENG format with the purchase of over \$11 million of Sony Betacam equipment. This comes on top of CBC's [commitment], plus the Eu-

ropean Broadcasting Union's adoption of Betacam as its ENG format.

DECEMBER/Shake Hands and Come Out Compatible: It was an historic moment at AES in New York when Dr. Roger Laghade of Studer Revox and Masaru Nagami of Sony Professional Audio manufacturing operations in Japan each introduced new two-track ¼-inch digital ATRs in the DASH format. Thanks to intense negotiations, culminating just weeks before AES, tapes recorded on the two machines will shortly be completely interchangeable.

1985

MARCH/America's Most Powerful TV Signal: Transmitted by WTIC-TV, Hartford, using first omnidirectional Wavestar UHF antenna built by Harris. The station has added viewers up to 100 miles away.

APRIL/ATSC & SMPTE Formulate HDTV Production Standard: Working frantically to define a recommendation to put forward at the CCIR meeting later this year, the HDTV Technology Group of the U.S. Advanced Television Systems Committee (ATSC) has recommended an 1125-line, 60 Hz, 2:1 interlace standard with an aspect ratio of 5.33:3. SMPTE gave full endorsement.

MAY/NBC Switches to All-Satellite Distribution: NBC has become the first network to switch from AT&T lines to all-satellite distribution of programs to affiliates . . . and is the sole network using Ku-band.

JUNE/Yet Another Format Debuts at NAB: A funny thing happened on the way to the all-digital video studio: an analog component half-inch "transi-

tion" format popped up, designated the MII format by Panasonic. It has separate luminance bandwidth of 4.5 MHz and chrominance bandwidth of 1.5 MHz.

NOVEMBER/RCA Broadcast Division Closes Its Doors: Bowing to stiff foreign competition and continuing losses, RCA Corp. has announced it will phase out its Broadcast Systems Division, a major supplier of TV cameras, transmitters and other products. The division reportedly lost \$74 million in 1983 and \$15 million last year.

DECEMBER/Major Studios Sign with PPV Service: Several movie studios have signed up for pay-per-view distribution of their first-run films with Request Television. Service will be offered on cable.

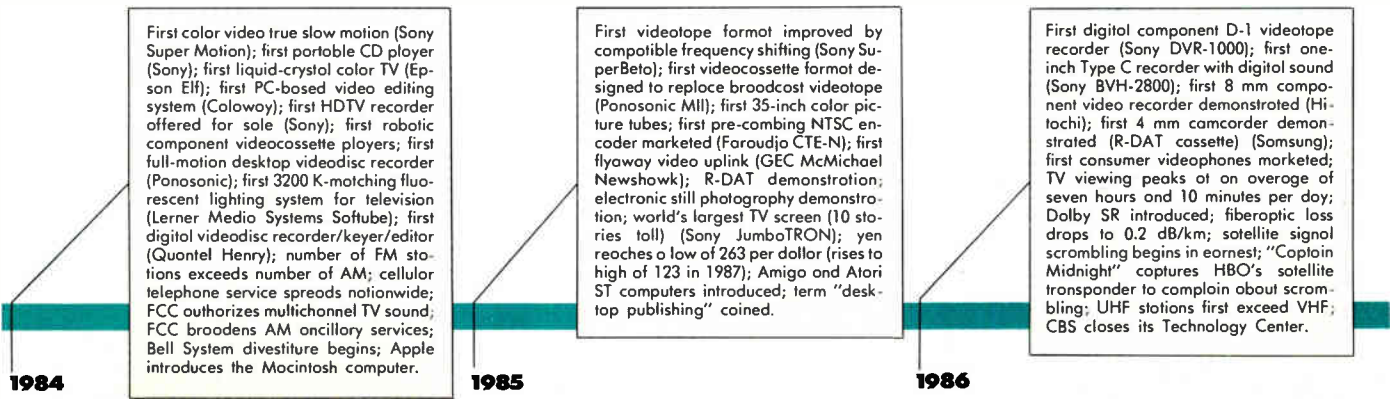
1986

FEBRUARY/Bosch and Philips in Joint Venture: Robert Bosch, Stuttgart, West Germany, and N.V. Philips, Eindhoven, Netherlands, announced their intention to form a new company [later named Broadcast Television Systems (BTS)].

APRIL/Ampex Will License Composite DVTR Format: Ampex said it will offer its recently developed 19 mm composite digital video recording format to other manufacturers.

MAY/Ampex, Sony to Share Recording Technologies: In a pair of historic agreements announced just before NAB, Sony has agreed to adopt the Ampex digital composite video recording format, while Ampex has licensed Sony technology to manufacture and market Betacam VTRs.

JUNE/Drama, Excitement at NAB:



A digital composite format arrived amid a few hisses; Comark stuck out its neck with the Klystron; NBC announced MII would become its "universal format"; and software pushed 3D picture-making and special effects to beyond tomorrow.

JULY/GE-RCA Merger Progresses: The FCC has paved the way for completion of the \$6.46 billion General Electric takeover of RCA . . . authorizing transfer of all units, including NBC, to GE.

NOVEMBER/CBS Tech Center Closing; Uncertainty for FMX: Among all the questions raised by the closing of the CBS Technology Center, concern runs highest for the future of new technologies, particularly FMX. The noise-reduction system intended to increase FM stereo's coverage area was jointly developed by the Center and the NAB. FMX was just getting off the ground when CBS decided to sell the Stamford, CT, facility to help the parent network's ailing financial situation.

1987

MAY/FMer Goes All-CD: WXCR-FM in Tampa, FL, has become the first classical radio station in the U.S. to feature full-time music programming on compact disc.

JUNE/Audio at NAB: Digital technology was duly represented at this year's show. The current lines of DASH and PD digital tape recorders were once again on hand, as were new production libraries on CD and professional CD players. Likewise, digital audio editors—used primarily for audio/video assignments—were well received, with several companies in-

roducing new software packages.

SEPTEMBER/TV News Expands: Twice as many network television affiliates increased their evening local news programming during 1986 as decreased it, according to a new study by the Television Information Office (TIO).

OCTOBER/CBS Black for Six Minutes: More than half the 204 CBS affiliated TV stations had to cope with six minutes of dead air on the evening of Sept. 11, when the network went black following CBS Sports' coverage of the U.S. Open tennis tournament . . . When the game ran two minutes into the *Evening News* slot, anchor Dan Rather left the set to phone CBS News President Howard Stringer in protest.

NOVEMBER/High-Def Back in the Spotlight: NBC, in conjunction with the Sarnoff Research Institute (SRI), announced it has developed an NTSC-compatible extended definition system.

DECEMBER/Vintage VTR Donated to Video Museum: One of the first videotape machines, an Ampex VR-1000, restored to full operation by Merlin Engineering, has been donated to the American Museum of Moving Images, Astoria, N.Y.

1988

MARCH/New Advanced TV Test Center Formed: Those concerned about industry fragmentation over the HDTV/ATV controversy should be reassured by the formation of an all-industry coalition to study pros and cons of various proposed transmission systems and to assess which is best . . . Results would be provided to help FCC's Advisory Committee on Ad-

vanced Television Systems in policy-making, and to help the industry's Advanced TV Systems Committee (ATSC) in standards-setting.

JUNE/Expanding TV's Boundaries: With cable breathing down the neck of broadcasting, HDTV was one of the hottest topics at NAB '88, on and off the exhibit floor. Our panelists agreed that over-the-air broadcasters will suffer without the quick adoption of advanced TV.

AUGUST/Sony, Studer Revox and TEAC Reaffirm Support for DASH: A joint statement announced ongoing support for the Digital Audio Stationary Head (DASH) recording format, and was issued in Tokyo as the three companies introduced DASH-format products.

SEPTEMBER/Faroudja Starts ATV R&D Operation: Faroudja Laboratories, which holds a portfolio of 20 patents in video processing, has set up a separate company—Faroudja Research Enterprises (FRE)—to develop its SuperNTSC ATV system.

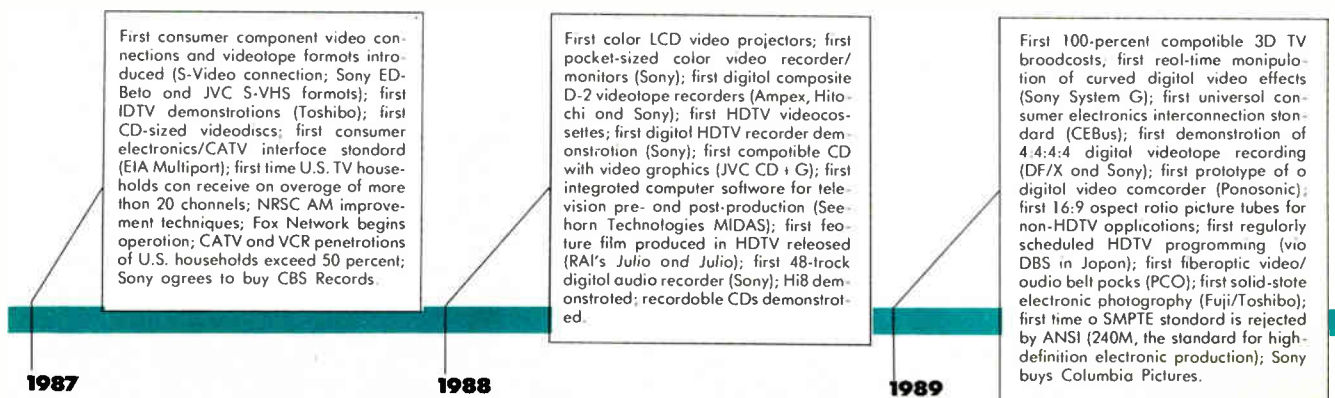
OCTOBER/3M Exits Two-Inch Quad Videotape: 3M's decision to leave the market by the end of 1988 spells the beginning of the final throes in the United States.

NOVEMBER/Stereo TV Increases in U.S.: Some 490 TV stations—more than one third of the total—are now equipped to transmit in stereo sound.

1989

JANUARY/ATTC Ready: The Advanced Television Test Center is

Continued on page 59





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JANUARY 1990

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- Government

- Consultant
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SOUNDING

OFF

BME polled a nationwide sample of radio and TV engineers on the challenges facing them today. Here's what they told us.

DILEMMAS OF THE PRESENT

These are the times that try the souls of broadcast engineers. Technology takes off in many different directions. Costs rise. The broadcasting business loses audience share to alternatives like cable and VCRs. And the engineers are caught squarely in the middle. Their industry is in such a state of flux that nobody is sure what it will be like in as little as five years from now.

As *BME* celebrates its twenty-fifth anniversary, the 1990s loom ahead like a great pivotal decade. There will be opportunities to implement new technologies, like digital recording, PC system control and advanced television, which could rejuvenate all of broadcasting and even attract new audiences. But there is also the danger that too many incompatible technologies will divide up the marketplace, and that broadcasters may not

be able to afford some of the most advanced systems, which could go to cable, the phone company or other entities.

With these issues in mind, *BME* conducted a mail poll of its engineering readership to find out what's on peoples' minds. The responses, which came back from both radio and television engineers, show a high degree of agreement on the relative importance of some technologies, disagreement about others, and reveal passionate feelings about the major challenges facing the profession, and about the state of the profession itself.

There were differences, in particular, between the views of radio engineers and TV engineers on some key technological issues. Both groups did agree that satellite distribution of programming is a highly important technology, and both consider any potential competition from the phone companies far too distant a possibility to be worried about right now (see Table 1).

However, nearly all TV engineers in our sample considered PC system control a major challenge, whereas less than half the radio respondents felt that way. In addition, TV people tended to place greater emphasis on such issues as format proliferation, relations with manufacturers, cart/commercial playback systems, station automation and robotics, and the escalating cost of hardware.

As might be expected, television engineers overwhelmingly declared high-definition TV to be a major chal-

lenge (97 percent, versus 43 percent of radio engineers, although this latter number is surprisingly high). The TV group also gave a high standing to the challenge of digital video (70 percent, versus 31 percent among the radio group) and was very concerned about the broadcast industry's loss of audience share (82 percent, versus 42 percent).

Radio engineers, on the other hand, understandably consider digital audio to be a major challenge by a wide margin (95 percent), although the concept also gains the attention of nearly two-thirds (65 percent) of the video group. Neither group seems to consider audio for video of great importance.

The loss of audience share to other technologies is considered a major challenge by 82 percent of television engineers and 42 percent of radio engineers. The issue of decrease of station resources shows these percentages precisely reversed: 42 percent of TV engineers consider this a major challenge, while 82 percent of radio engineers do.

The suggestion of declining station resources seems to have struck a sore spot in the radio community. One radio engineer with strong feelings was Richard Rudman, engineering manager at KFWB-AM, the Group

BY PETER CARANICAS

W-owned all-news station in Los Angeles. He writes that station resources are declining because of "the deterioration of broadcasting's infrastructure, due to servicing debts rather than investing in facility upkeep."

Echoing this sentiment, Bill Harris, technical director at KXLT/KRZN Radio in Englewood, CO, says: "Largely as a result of the sometimes indiscriminate buying and selling of broadcast properties, many stations are forced to operate with too few people and resources. Highly leveraged companies are unable or unwilling [to allocate resources]."

THE PRE-HDTV ERA

BME asked engineers to state their priorities and goals for 1990. In the TV group, answers focused largely on the implementation of existing technologies while waiting for HDTV. Mike Jackson, news director of WOAY-TV, Oak Hill, WV, says he plans "to improve the station's live capabilities and increase the use of personal computers." Del Parks, operations manager of WBFF-TV, Baltimore, says that in the coming year, "station automation/robotics will be used to increase efficiency." An engineer from a Des Moines, IA, station, who requested anonymity, says his goal is master-control automation, including commercial/program switching.

Richard Mulliner, manager of news/sports operations of Capital Cities/ABC Inc. in New York, writes that his goals for 1990 include "improvements in the videotape area" and a "transition to digital." He's also interested in commercial cart systems and robotics, while keeping an eye on "all HDTV developments." Perhaps the sentiments of most TV engineers are expressed by Gene Napier, VP/operations of WJCT-TV, Jacksonville, who in 1990 will "continue the preventive maintenance program to make NTSC equipment last until HDTV and digital become mandatory."

Radio engineers' 1990 goals seem more general. Chris Cullen, chief en-

Technology	Percentage of responding TV engineers who consider it a "major" challenge	Percentage of responding radio engineers who consider it a "major" challenge
Audio for Video	29%	9%
Automation/Robotics	71	44
Broadcast Loss of Audience Share	82	42
Cart/Commercial Playback	57	39
Decreasing Station Resources	42	82
Digital Audio	69	95
Digital Video	70	31
Escalating Hardware Costs	68	34
Format Proliferation	43	22
High-definition TV	97	43
PC System Control	96	44
Relations with Manufacturers	41	12
Satellite Distribution	69	62
Telco "Threat"	28	32

NOTE: Percentages are rounded up or down to nearest percentile.

gineer at KWJJ-AM/FM, Portland, OR, says his goal is "to improve our coverage and dominance in the marketplace." Another radio engineer, based in Massachusetts, who doesn't want to be identified, intends "to technically bring my station to number one in the market through clean

and attractive audio." An identical goal is expressed by Gary Leonard, operations manager/chief engineer at KXEO-AM and KWWR-FM, Mexico, MO: "To keep my stations sounding as good as possible with state-of-the-art equipment."

More specific goals were expressed

by KSLT/KZRN's Bill Harris: "I hope to install eight-track production capability and build a mobile broadcast vehicle." Likewise, a radio engineer from the Asheville, NC, market who wishes anonymity says his plans for 1990 include a "digital/MIDI production facility and PC control for music and commercials."

MORE PAY, PLEASE

When *BME* asked engineers whether they felt members of their profession were adequately compensated, and whether they thought young people today feel sufficiently motivated to go into broadcast engineering, the responses were downright emotional.

To begin with, compensation is viewed as woefully inadequate among broadcast engineers, particularly on the radio side. On the TV side, nearly two-thirds of all respondents—62 percent—said TV engineers are not adequately compensated; an identical percentage said young people are not motivated to go into broadcast engineering today (Table 2).

On the radio side, positions are more extreme. Fully 86 percent of all responding radio engineers said their profession is not adequately compensated. And a unanimous 100 percent told us that young people are not sufficiently motivated to enter radio engineering today.

Why the pessimism in radio? Many respondents point to the attitude of today's job applicants. Chuck Porter, chief engineer at Bryan Broadcasting (WCAZ-FM) in Carthage, IL, says he "would not promote [his profession] to any young people. They don't understand dedication to a job you have to love." An engineer at a medium-size New England AM station emphasizes how times have changed: "As a young engineer, this job grew out of a hobby for me. I don't know too many others with my interests in this area . . . Is the romanticism of radio really dead?" A Wisconsin AM/FM engineer agrees: "The fun of live radio has all but disappeared, with automation

and satellite delivery to cut costs."

As for the determining the income of radio engineers, KFWB's Rudman has a suggestion: "Take yearly gross sales at one percent as a base. Subtract \$1000 for each minute of off-air time, down to a 'floor' of 60 percent of gross. For a \$15 million station, this would give the CE a potential income of \$150,000 with no lost air time, with a 'floor' of \$90,000."

Indeed, none of the radio respondents suggest engineers are hurting in the larger markets. They do believe, however, that rewards are penurious in the smaller ones. Bryan Broadcasting's Chuck Porter says: "The small-market engineer has no free time and isn't paid for 24 hours a day." However, even in larger markets, there can be discrepancies. KXTL/KZRN's Harris points out: "Most major-market engineers are doing pretty well. But there is often a very large gap between 'chief' and

Compensation is viewed as woefully inadequate among broadcast engineers, particularly on the radio side—86 percent of responding radio engineers agreed.

'assistant chief' positions."

This large market/small market dichotomy is echoed on the TV side of the fence. Frank Tyro, director and CE of Salish Kootenai College Public TV in Pablo, MT, writes: "Montana salaries in general are low. We eat a lot of scenery."

And as in radio, TV engineers believe young peoples' attitudes play a major role in their resistance to the profession. WBFF-TV's Del Parks says: "Everyone wants to be a 'producer'; there are very few colleges

that produce broadcasters." Cap Cities/ABC's Mulliner agrees: "Young

Radio and television engineers agree on the relative importance of some technologies, disagree about others, and reveal passionate feelings about the challenges facing their profession.

people have not been properly introduced to the value of technical side of our business. They are only interested in the glamour of becoming director-producer—and camera operator."

GUARDED OPTIMISM

When we asked the engineers we sampled to peer into the future and mention the technology that holds the most promise for the future, we got a variety of answers. Several television engineers answered the question with just one word: HDTV. Other oft-mentioned buzzwords were digital, PC systems and fiberoptics.

WOAY-TV's Mike Jackson sees promise in "Super VHS, or any increased quality level of video reproduction." WBFF-TV's Parks would like the industry to "pursue technology to deliver digital audio over the air, and to bring the consumer hardware manufacturer into the loop." And WJCT-TV's Napier expressed perhaps the most visionary approach, saying that the most promising technology would involve extending "digital/fiberoptics to the home [so the] broadcaster can become a multiple-channel programmer."

Radio engineers had their own buzzwords. Overwhelmingly, they

TABLE 2
ENGINEER COMPENSATION & MOTIVATION

Do you think broadcast engineers are adequately compensated?	Radio Engineers Responding:	YES: 14%	NO: 86%
	Television Engineers Responding:	YES: 37	NO: 62
Are young people sufficiently motivated to go into broadcast engineering today?	Radio Engineers Responding:	YES: 0	NO: 100
	Television Engineers Responding:	YES: 37	NO: 62

NOTE: Percentages are rounded up or down to nearest percentile. They may not total 100 due to rounding.

mentioned digital audio technology as radio's best hope for future progress; several focused on DAT applications. Other look forward to solid-state transmitters and to AM stereo.

All in all, the responses from both radio and TV engineers indicate guarded optimism about the new broadcast technologies slated to emerge in the next decade, mixed with a general caution about the future of the business itself. Fortunately, not everyone considers the outlook as bleak as one Upper Midwest radio engineer, who, requesting anonymity, said that his 1990 priorities may include a job change out of broadcasting. The vast majority of our respondents appear prepared to ride out any difficulties in the days ahead, in order to embrace the new prosperity that today's difficult technical changes are bound to bring.

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Twenty-Five Years of Broadcasting

Continued from page 50

ready to begin testing proponent systems.

JUNE/UEI Moves: In a plan to create a vertically integrated company, U.K. conglomerate UEI is trying to acquire Unitel Video. Unitel has branches in New York and L.A. UEI is the parent of Quantel and Solid State Logic.

JULY/Carlton Buys UEI: The combined company would have enormous clout in the TV facilities, manufacturing and post-production industries. Carlton owns Abekas, New York's Post Perfect facility, and the Technicolor video duplication and film processing facility.

AUGUST/Stations Must Prove Need for Terrestrial TV: The 40-year-old AT&T service once provided the only means of sending programming from city to city. Today satellites have largely supplanted it. Small stations still use AT&T for sports, but they face cuts, and the service itself faces extinction unless the affected users can prove they still need it.

SEPTEMBER Cable TV Labs and ATTC in Cooperative Tests: Under terms of the agreement, Cable Labs will pay ATTC up to \$2.5 million over three years for use of its facilities . . . [This] will not necessarily result in a single standard for broadcast and cable.



OCTOBER/ATSC Defines HDTV: The Advanced Television Systems Committee has announced official definitions: IDTV, improved definition, refers to improvements to NTSC; EDTV, extended definition, to

improvements that modify NTSC emissions, but are NTSC receiver-compatible; HDTV, to a system with approximately twice the horizontal and vertical emitted resolution of NTSC. ■

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INTO THE '90S

The members of BME's new Editorial Advisory Board mark the magazine's twenty-fifth anniversary by crystal-balling the technical advances of the next decade.

While this issue of *BME* celebrates a quarter century of broadcast industry coverage, we're not just looking back. *BME's* staff looks forward to another 25 years covering this fast-moving business. Technology is changing with amazing speed and has grown more complex with every passing year. As this process accelerates in the future—as it no doubt will—no individual, and no single editorial staff, will be able to stay on top of every single development and issue.

With this in mind, *BME* has established an Editorial Advisory Board. Our board, which consists of 12 top engineers from broadcast and teleproduction, will be closely involved in the editorial process. The members' role will include consultation with the editors on key technical developments, participation on *BME's* NAB panels, and helping to judge our annual Excellence in Engineering Awards. The 1990 winners will be announced next month.

To introduce the board to our readers, we gave freelance TV writer Tom Soter the assignment of getting the members' views on how technology will change in the '90s, and what these changes will mean for the broadcast industry and the engineering profession. His report follows.—Ed.

RICHARD L. EDWARDS
Vice President/Director
of Engineering
Guy Gannett Broadcasting
Services
Miami, FL

When Rick Edwards talks about the future, two issues dominate: high-definition television and fiberoptics. "HDTV is absolutely crucial," he says. "We're really late on this. We need to be in the implementation stage, more than the discussion stage. I'm very frustrated. There's too much politics, and at some point, the cable operators are going to get tired of this, and they're just going to move on their own if we don't get something

done in broadcast."

Nonetheless, Edwards voices optimism, partly because of the inevitability of fiberoptics. "That's going to happen [and it's] going to change everything.



Richard L. Edwards

When the country is wired, high-def becomes a non-problem, because you'll have the bandwidth you need." He predicts a fully fiber-wired U.S. by 2005, adding that such links will mean

"big changes, like newspapers downloaded on your computer. It's going to make radical changes in how we operate. [A few inventions] have made major changes in the way we do things. One is the automobile, another is the computer. Fiberoptics is very capable of being such an item. It's that big."

Edwards is pleased with digital recorders because of the virtual lack of noise problems, and he expresses hope for television audio. "The stumbling block has been that TV is a video medium. The audience doesn't really know what's there because they haven't heard it yet, and the producers have more interest in special effects on the video side. Audio's time will come in the next decade."

"There's too much politics [in HDTV] ... the cable operators are going to move on their own if we don't get something done in broadcast."

—Richard L. Edwards

JIM BARTEL
Chief Engineer
Post Effects
Chicago, IL

When he looks into the future, Jim



Jim Bartel

Bartel focuses on changes in sound systems, imagery and editing. "Certainly the 1990s are going to show a transition from analog to digital," he says. "It will be a decade of confusion, with a lot of different analog

and digital formats coexisting until analog goes away.

"The transmission bandwidth doesn't allow you to get all the benefits of doing real sophisticated audio work," he adds, "so people are choosing not to do it. They're saying, 'Look, it's heard by someone at home with two- or three-inch speakers, so why should I blow a third of my budget on real slick audio production?'"

He foresees a similar lack of motivation in the area of high-definition television, and believes that with too few sets available—and no agreed-upon standard—there will be few incentives to produce programming in high-def. In addition, he believes that unless the cost of producing high-def decreases, few producers will "bang down the doors" asking for it.

On the other side of the coin, speed and cost savings will be prime reasons for the dominance of random-access, off-line editing systems. Such systems are "a different way of looking at editing," Bartel says. The fact that many of them utilize pictures along with time-code numbers is significant because "it takes [the editors] a little bit out of the technology and more into what they're doing: cutting pictures."

Another development Bartel anticipates is better and more efficient workstations, combining paint systems, video mixers and DVEs into a

single hardware platform: "It's good to do everything at one station rather than having to run around."

ROBERT MURCH
Vice President, Engineering
WPIX-TV
New York, NY

To Bob Murch, robotic cameras will play a major role in the future of news broadcasts. "There is a certain savings there, and it helps us remain competitive," he says, pointing to WPIX's use of such systems. Similarly, he feels that automation will be aided by "a new generation of cart machines, to keep costs down."

Audio will improve as well: "It's a slow, evolutionary thing. People will start demanding better audio from TV stations, and stations will demand better audio from the shows' distributors. In some places in Europe, there are times when they show a film and have the mag track running sync-locked with it. Then they get very good quality audio. But here in the U.S., [stations] frequently just use the optical soundtrack. I don't think people are going to tolerate that much longer."

Satellite distribution will probably proliferate in the next five years, with the only potential roadblock being fiber optics. "I could envision a scenario where someone distributes by fiber to, say, Boston, New York and Philadelphia, and uses satellite more for SNG work and for stations that don't have access to fiber."

Murch also feels the picture quality on satellites must improve, along with the sound on audio subcarriers.



Robert Murch

"There are some groups trying to standardize that right now," he observes, adding that feeds are manpower-intensive since they

must be adjusted individually.

He foresees a future of solid-state equipment as well. WPIX has been using CCD cameras for two years and is considering a solid-state transmitter because they are "simpler; they have less power consumption, and they're more reliable." As for HDTV: "That's a tough one. The guy who knows the answer to that is worth a lot. I don't think it's going to be flooding the market. Viewers won't get as excited about it as audiophiles did when we went from records to CDs. There's not that enthusiasm."

NEIL FELDMAN
President
Video Post & Transfer
Dallas, TX

In evaluating the challenges of the '90s, Neil Feldman says, "There are two. One is the transition from all-analog to all-digital, [and the other is to determine] what the higher-definition format will be."

On high-definition television, Feldman is frank: "People are not think-



Neil Feldman

ing clearly as to why we need high-definition. How we broadcast it should not drive how we determine a standard. I don't think it matters one hill of beans whether we can broadcast it over the air, because I

don't think it's ever going to be done that way. It'll come through cable or fiber optics."

To Feldman, many are learning the wrong lessons when they compare the NTSC-HDTV compatibility question to black-and-white/color TV transition of 35 years ago: "HDTV is more akin to FM radio." He insists that when HDTV arrives, NTSC should continue, the way AM and FM coexist, carving out their own niches. "Picture quality should be the driving

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force in deciding on a standard," he notes, "not the needs of broadcasters. They will probably not buy it anyway. The post facilities are buying the highest-quality imaging formats they can get—and that will be the driving



"Picture quality should be the driving force in deciding on an HDTV standard, not the needs of broadcasters."

—Neil Feldman

force behind HDTV. If we don't go for the best, we're conceding this issue [to the Japanese and Europeans]."

On other matters, Feldman is equally straightforward: digital systems are "the immediate future." He predicts that disks will one day replace magnetic tape. He also feels that all-digital audio suites are only a few years away.

R. WILLIAM NAPIER
Director of Engineering
WBTV
Charlotte, N.C.



R. William Napier

Although high-definition is the most talked-about subject in broadcast circles these days, William Napier thinks it is only a subset of a larger concern the industry will face in the '90s: economics. "There's

no doubt that the decades of double-digit [advertising revenue] increases are no longer with us," he says. "We have to make sure that the equip-

ment we buy and the development we do is economically viable."

To Napier, surviving in the '90s will be a difficult balancing act, since "it is important that we do not become a second-class service. We will have to make a significant investment to remain competitive with other sources, such as VCRs and cable."

What that will mean is more automation of newsrooms and studios. WBTV has had a newsroom computer system for eight years, and Napier reports it has been "extremely cost-effective. It gives us much more productivity. If today we had to remain competitive without those robots, we would require a much larger staff. Over the last five years, the staff has been able to remain constant, and productivity has increased."

Studio automation, however, will make a slower entrance at the local news level, because of the longer newscasts and more complex camera setups. "We have multiple sets; four distinct areas capable of handling 12 people," he explains. "It's a lot more difficult than a network newscast. We are looking at robotics, but also at the ability to do the work."

Napier is critical of satellite distri-



"Equipment is a conduit for programming; good programming is what will give us viewers in the '90s."

—R. William Napier

bution, which he says delivers on speed, but falls flat on image. Which leads him to HDTV: "That will be a major issue of the '90s . . . yet good local news in black-and-white will win out over bad high-definition programming any day. What matters is

not the medium, but what's on it. Equipment is a conduit for programming; good programming is what will give us viewers in the '90s. Engineering is like a road. If you build a road and nobody wants to go on it, what's the use? We want to concentrate on a road that goes someplace."

ROBERT FREY
Director of Engineering
Pacific Video Resources
San Francisco, CA

The future will see a simpler, more centralized post-production process,



Robert Frey

according to Bob Frey. "There is going to be more of a blending of the skills of a graphics designer and an editor, especially in the area of multilevel graphics and effects editing," he says. "Our edit suites got

very, very complex in the late '80s, with one editor being asked to be an expert on a lot of different types of equipment—turning into a machine operator." Control equipment in edit suites of the future will cut down on that by centralizing paint systems, edit controllers and switchers, he believes.

Similarly, high-definition television will allow electronic effects to be created more simply than optical ones, as well as create new opportunities in the still-graphics end of the business. "There's a natural marriage between the business of teleproduction and electronic graphics. [In 10 years] you'll have devices that will be processing images whether they are still or moving." Because of the high capital cost of HDTV, he predicts, "The equipment isn't going to limit itself to as narrow a niche as TV broadcasting. There's going to be an expansion [of projects], and some of those will be print. We've already had

requests to use [our] video technology to do things like coffee-table books. The devices were designed for teleproduction, but already have certain applications for print."

He also sees digital taking off in the next decade, although "analog interfaces will continue to be necessary. A picture tube is an analog device. It's the pieces between the cameras and the display that are going to be becoming more and more digital." He notes that the big drawback for digital at this point is "cost . . . and the availability of digital signal processing devices. We have 30 to 40 years of analog device development [behind us]. It's going to take a while before all the tools you're used to working with are available with digital inputs or outputs."

The question in the future, he adds, will not be analog or digital, but digital composite versus digital component, and the latter will "win out as the high-end production format. Digital composite will be used by broadcasters."

He is not worried about the big NTSC-HDTV compatibility question, insisting that "people who go into high-def will add it as an extra capability, and not tear down an NTSC edit suite. We'll be working within the 525-line system for quite a while."

FRED J. STEURER
Vice President, Engineering
Pultizer Broadcasting Co.
St. Louis, MO



Fred J. Steurer

HDTV is coming, analog will be obsolete, and more computerization is on the way, according to Fred Steurer. "It's very difficult to say what direction high-definition television is going to take. We're holding off [on] buying studio cameras until

[we see] the parameters . . . regarding size of screen and how many lines and so on." Equipment upgrades will come in stages, he predicts, beginning with high-definition cameras, which "hopefully will have NTSC outputs,

"You'll have automated studio cameras, pedestals and newsroom computers—master-control automation industry-wide."
 —Fred J. Steurer

so that we could use existing DVEs and production switching."

Compatibility is his big topic: "Folks who have big-screen high-definition sets [at home] will be able to receive high-def, and the folks with the old sets will be able to receive an NTSC version of that." But the picture will not be pristine high-def: "It may have a bandwidth of, say, upwards of 30 MHz, and transmission will be either 6 or 9 MHz."

Analog will be supplanted by digital because of the latter's superior picture and sound qualities, and its multigenerational dubbing advantages. "I foresee digital devices such as field cameras handling digital output; recorded digitally, edited digitally; and the first time it goes on analog is when it goes on the air. Audio will be compact-disc quality, which is essentially what you get in digital video," Steurer says.

Finally, there will be more automation in newsrooms and studios, since "you have to cut costs. You'll have automated studio cameras, pedestals, newsroom computers—master-control automation industry-wide. We'll

have preprogrammed controllers for satellite earth stations. I see whole record logs put into the computer and updated periodically. There will be more accuracy and less manpower."

PATRICK HOWLEY
President
Post Perfect
New York, NY

Digital, and all its ramifications, is the most fundamental change of the next decade that Pat Howley discerns in his crystal ball. In his view, the biggest problem in today's editing suites is parallel cables. "A typical D-1 installation is a rat's nest of cables and connectors. I wouldn't attempt a D-1 suite until serial was available. I'm waiting for the day in about two years when everything has a serial output, and it's just connected to the coax and you're done with it. What I see happening next is that we'll start routing digital signals around serially; we won't even route parallel signals anymore."



Patrick Howley

Also on tap for the future: serial routing switchers for D-1 and D-2, affordable component digital editing suites (by 1992), price reductions for the next generation of D-1 machines, and D-2 switchers "with some kind of power . . . The early versions

"We'll start routing digital signals around serially; we won't even route parallel signals anymore."
 —Patrick Howley

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don't have enough power to warrant going all D-2." He sees an all-digital television station in the late '90s, adding "my hope is that broadcasters start buying D-2 cart machines so that we can make flawless clone copies of the spots."

Howley predicts that laserdisc editing systems will "become the rage" in the '90s, and that more studios will save on overseas costs by doing PAL transfers in the U.S.

He is reluctant to comment on the coming of high-def. Whether it becomes a big factor in the '90s is still an open question, he believes: "The whole time frame is slipping because people are afraid to get involved in it without a standard. And working in HDTV is like going back to the '50s, power-wise. Although picture-wise, it's gorgeous."

ROY TRUMBULL
Assistant Chief Engineer
KRON-TV
San Francisco, CA

Doing more with less is the main challenge foreseen by Roy Trumbull. "There is a general tendency in the



Roy Trumbull

industry to have a sort of zero-sum change in personnel. You don't want to add people, but you sure could use [employees] in more productive positions. You want to keep up your production values by using peo-

ple where it really shows on the screen."

Automation is the ticket, says Trumbull, adding: "Anything that's happening on a recurring basis, you'd like to be able to hand over to a system." His station, for instance, automated its master control switcher in the early '80s, thereby tightening up the on-air look. Robotics are being examined, although "the sys-

tems we've seen get bogged down [if the shots become too complex]." He feels that robotics will be perfected in the '90s."

He believes audio has room for growth, and will improve slightly, "but the interest in increasing the dynamic range is very limited. The problem is that you can't push it much more than 15 to 18 dB, or you can't understand dialog."

Satellite distribution will also increase, but only if it improves significantly. "The quality of stuff we're getting in from syndication is just awful," Trumbull claims, "particularly in sound. It appears as if they recorded it improperly, or overdeviated the transponder on the bird when they shipped it out, so we'll get an hour-long show that's incredibly distorted. There was one show with a commercial which had a young lady with a kind of light, breathy voice—you couldn't understand a word she said."

Trumbull foresees HDTV entering the market not before the end of the '90s, partly because there is no programming that currently needs high-definition. "If you look at most of the soap operas or adventure programs, they are all shot with film technique, where the foreground is in focus and the background is out of focus. So what's high-definition going to do? And if you took a mask that was cut to the 16-by-9 aspect ratio and try to imagine some of the shots on a news

"People will start demanding better audio from TV stations, and stations will demand better audio from the shows' distributors."

—Robert Murch

show with that ratio, it becomes laughable. At best, with [HDTV] costing what it does, the local station will be used strictly to pass through network programming."

The more realistic trend, predicts Trumbull, will be solid-state equipment, from transmitters to cameras. "As replacements come up, we'll be buying [solid-state equipment] because the cost of operation is less, you're not replacing tubes, and the technical operation is very consistent."

STANLEY KRONQUEST
Chief Engineer
HSN Telemation Productions
Seattle, WA

"Tomorrow's problem?" Stan Kronquest asks. "I have no idea. It hasn't happened yet." Although he refuses to be pinned down on predictions, Kronquest notes the industry's biggest challenge in 1989: "Finding good engineers. I don't think people are attracted to becoming engineers in this business anymore. The money may be okay, but the industry is changing too fast. You might find someone who simply says to himself, 'Why should I work in this business when the chief videotape editor, who is 19½-years-old, is giving me orders and receiving a star salary?'"

On equipment, Kronquest mentions two areas: D-1, which is going to have a small "pocket market" with the advent of a D-1 switcher; and

"As replacements come up, we'll be buying [solid-state equipment] because the cost of operation is less."

—Roy Trumbull

audio, which is catching up "because of digital storage and random-access devices. There's a lot of improvement in the sound department lately. Digital is just a way of getting random access in the sound department. [That's] important because you can figure out the sound effects for any specific visual . . . without any laborious editing. You can just push a button and hear all the door slams you have on file."

He feels that computer graphics in the '80s did not prove "the bonanza that was once envisioned. What you're finding is the facilities that have them are saying, 'Why did I put all that money into them?'"

As for high-definition, Kronquest believes that "as soon as we have a standard, we as an industry can begin



Stanley Kronquest

to function in high-def; we've been afraid to until now, because who wants to make a commitment to \$400,000 cameras if you don't know whether that's going to be the standard in a year?" He won't

pick a date for HDTV's adoption, but admits: "No question, HDTV is beginning. We're taking a big interest in it; not so much in delivery systems, but in production."

"As soon as we have a standard, we as an industry can begin to function in high-def; we've been afraid to until now."

—Stanley Kronquest

JOSEPH MAHEDY
Chief Engineer
Charlex, Inc.
New York, NY

Faster, more efficient nonlinear sys-

tems are going to be used for on-line editing, predicts Joe Mahedy. "It'll really come into its own when you can transfer your video and audio onto a laserdisc. Until now, you could only

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Small in size, big on features, the McCurdy ADS-500 packs high performance modular audio distribution qualities in its compact frame.

A complete 1 Rack Unit high (1³/₄") ADS-500 system contains as many as ten high performance modular DAs, each with six actively balanced outputs utilizing true complementary symmetry FET stages.

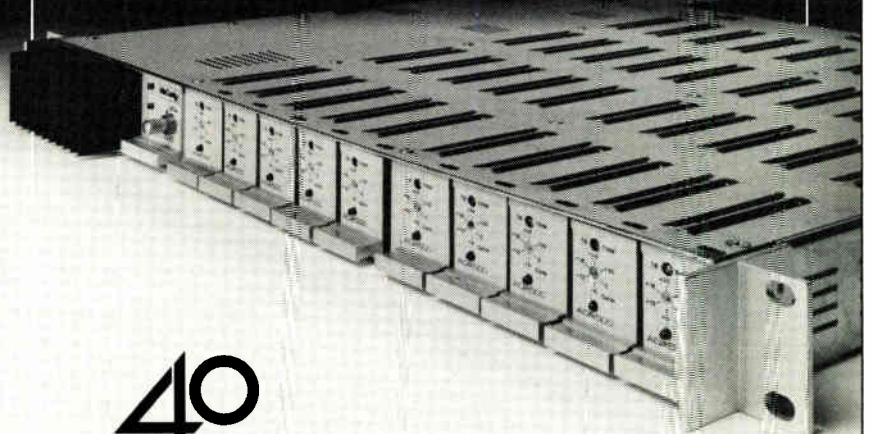
The quiet, toroidal, switch-mode soft-start power supply employs such advanced circuit features as: thermal

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40
 YEARS OF EXCELLENCE

INTO THE '90s

use that sort of system in off-lining or for edit lists."

He also foresees "faster computers for graphics, specifically in rendering time—accelerators just spitting out those frames as close to real time as possible. That's going to really improve computer animation, and you can sell it at a lower price.



Joseph Mahedy

With large-scale integration chips coming out, it's going to be a real fast change, just two to three years from now. There is a great demand for it." On other fronts, Mahedy foresees a D-3 half-inch digital composite record-

"[We'll see] faster computers for graphics . . . accelerators just spitting out those frames as close to real time as possible."
—Joseph Mahedy

ing standard by 1992 that is smaller and less expensive than existing digital VTRs. CCD cameras will move into studios, multichannel audio will become prevalent ("Our clients, like Paramount, are already requiring

more than two channels of audio"), and satellite transmission will be handled over smaller, Ku-band dishes. As for HDTV: "The cost of it is a big worry. We'll have a slow ease into it, but [the industry] is not going to agree on a standard for another four years. So it'll be close to eight or nine years before you see [HDTV] in the U.S. Cost is just outrageous at this point."

KENNETH D. MILLER
Vice President, Engineering
Capital Video Communications Inc.
Washington, D.C.

Ken Miller worries about "being able to bankroll all the technology that's being thrown at us. We could buy two-inch machines a decade ago for \$125,000; now [digital] machines are

Maxell has the classics.



on the horizon at \$160,000. Suddenly the technology is a bit more expensive than you thought it was going to be."



Kenneth D. Miller

Nonetheless, Miller does not see a future in which all pre-1990s equipment is obsolete. Instead, the future will be one that finds "everything integrated. Everything you're seeing now—Betacam SP, one-inch type C, D-2, probably a less expensive D-1 format, and even the half-inch digital format—those will all still be with us in 10 years."

A bigger concern is HDTV. Miller notes that it "has no focus anymore.

"Betacam SP, Type C, D-2, probably a less expensive D-1, even half-inch digital will all still be with us in 10 years."

—Kenneth D. Miller

It's pretty neat stuff, but it's too out of control now to be a viable product." He feels HDTV's biggest problem is the number of NTSC sets in existence, which creates a "Catch-22" situation: Few will produce in hi-def until there are enough sets to make it worthwhile, but no one will buy hi-def

sets until there is programming. Miller feels an 800-line compromise format may arise because "the bandwidth's not available for 1125, and the very sophisticated compression techniques that are going to have to be developed aren't going to give you 1125 lines anymore."

He predicts facilities will continue to exploit nonlinear off-line editing. "The only thing the [systems] fail to do is edit audio," but he believes that will change.

All of this will cost money, leading to the most predictable trend of all: "The investment of companies like ours into other fields, just to support our bad habits. This business is so capital-intensive and its margins are so narrow . . . we have to find some way to ease this tremendous crunch and keep a company going." ■

And now, heavy metal.



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BACK TO THE FUTURE

Four former editors of BME present a panoramic, though subjective, history of the magazine and its times.

JAMES A. LIPPKÉ
Editor, 1968-1978. Prior to becoming editor, Lippké was *BME's* corporate editorial director. From 1979 to 1987, he served as editorial director and editor emeritus.

Twenty-five years, by most historical standards, is a short span. But in broadcasting, 25 years is a long time. Station ownership is forever turning over, and call letters change with a switch in format. Formats evolve. Cutting-edge technology becomes obsolete in three years.

It is not easy to recall how it all was 25 years ago, or why *BM/E* came into being. There were fewer than 5000 stations then, compared to the over 7000 today. There were 100 supplier/NAB exhibitors, compared to today's 700-plus.

It was the genius of Mal Parks, Jr., and Verne Ray, *BM/E's* first publisher and editor, respectively, to sense the major shifts taking place in the growing industry. FM would soon be recognized for its quality. Color TV had just arrived. Station competition for listeners and viewers sharpened as more stations came on the air, with hundreds of applications awaiting FCC action.

All of this ferment led Parks and Ray to realize that the broadcast-equipment acquisition process would never be the same again. Television stations were already buying off-the-shelf equipment, as opposed to making it, as station managers every-

where recognized it was not a good use of manpower to build your own. Broadcasting had become a business.

Origination of programming outside the studio stepped up. Engineering became more than connecting up a simple signal path of mic and tape deck/turntable through a fader, and then on to the transmitter (with a camera and lighting added if you were TV). Chief engineers were becoming directors of engineering, in charge of systems of signal paths.

And *BM/E*—dedicated to recognizing engineers as more than maintenance techs, and managers as more than bottom-line people—became a success at the outset by serving equipment advertisers who were ready to tap the growing market.

I was fortunate to be on *BM/E's* masthead at the beginning—first as editorial director, simply looking over Verne Ray's shoulder, and then as

"I've covered 20 NAB Conventions and Exhibitions from 1968 through '87. What shows they were! What showmanship! Products that entertained. And every NAB produced a technical surprise or two."

editor-in-chief in 1968. I can't claim to have covered 25 NAB Conventions and Exhibitions—only 20 from 1968 through '87—before *BM/E's* ownership changed. So perhaps that doesn't qualify me as a historian. But what shows they were! What showmanship! Products that entertained. Nothing like what I was used to as a journalist for more general electronics publications. And every NAB produced a technical surprise or two, despite the thorough advance publicity which we press prided ourselves in delivering.

Here, I would pause to add one personal note—to explain why I opted to quit general electronics reporting for the narrower field of broadcasting. It would be simpler, I thought. I reasoned that I would be able to master the technology of broadcasting, whereas electronics as a whole was too divergent to comprehend. Of course I was wrong. The world of VLSICs (very large-scale integrated circuits) was soon invading the broadcasting domain. And we soon began to go digital.

Needless to say, broadcasting has progressed faster than the ability of many of us to keep up. Today's "consumer-type" CCD cameras put out a better picture than did the four-tube behemoths of the '60s. Broadcasting technology is not simple. It compresses; it expands; it samples binary conversions to conserve bandwidth and reduce noise. It employs fractals to develop exciting screen images.

This complexity, bordering chaos, is evident at every NAB exhibition,

particularly on the TV side of the aisle. In the '60s, it was the explosive growth of color and the remedies to NTSC (which some wags called, "Never-twice-same-color"); in the '70s, it was the revolution of ENG; in the '80s, it has been SNG and the onslaught of digital. It is not only the advent of a new technology, but the number of companies involved that rock the industry. In 1973, the big news at NAB was the unveiling of the digital time-base corrector by Consolidated Video Systems. Ten years later, it was the sheer number of suppliers of digital video effects and paint systems, each outdoing the other in performance or price or both. In the '90s, it will undoubtedly be advanced TV.

Radio technology developments in the '70s rarely startled. The challenge was to produce the loudest signal possible without bringing on listener fatigue due to excessive distortion. True, synthesizers and effects made it big, but solid-state transmitters grew only after fitful starts. Automated storage of inventory sputtered.

But by the '80s, radio got exciting. AM stereo was conceived; the industry sought improved AM quality; more FM subcarriers could be used; satellite feeds were available from everywhere. Radio became information channels. And CDs hit the scene. Now it's DAT. And the challenge of controlling inventory is here again.

Looking back, another shift should be noted. Once the market for equipment was innovation-driven: simply come up with a better mousetrap, and it would sell. Now, of course, sales are market-driven in response to what the customer wants. A new widget, a marginally superior technique, another bell and whistle are simply not enough. The larger question becomes, "How does this fit into my operations?" If it doesn't fit, it doesn't sell.

We live in an information age—and, indeed, ignorance can be fatal. But we are rendered nearly impotent by info glut. How does one get the information needed to assure personal survival, or global survival, for that matter? To me, this question

suggests that the ultimate user—listeners and viewers—must have a say. And it is hard to imagine that more of the same is the answer. It may not be HDTV that will motivate consumers, but rather some interactive capability for controlling what gets switched into one's home entertainment/information center. When we think of networks of the future, perhaps we will not have in mind program-distribution networks, but those developed by users to serve their own particular needs.

DAVID HAWTHORNE
Editor, 1978-1981. Earlier, Hawthorne served as
BM/E's associate editor
and managing editor. He
was unable to contribute
to this issue, so instead,
we've condensed an article
he wrote for the
February 1980 issue. It
looks ahead at the coming
decade of the '80s,
and is interesting to read
with the benefit of 20/
20 hindsight.

If they spoke with a single voice, broadcasters might paraphrase Mark Twain, who cabled the AP, saying, "The reports of my death are greatly exaggerated." In fact, radio and television broadcasting is coming off its best year ever with an enthusiasm for the new decade, which promises to be as exciting and profitable as any since the industry's foundation. The new technologies that have been reported as potential Brutuses to broadcasting's Caesar are, in fact, viewed by broadcasters as exciting new distribution systems for broadcast products. While narrowcasting has been offered as a dagger, broadcasters see it as a two-edged sword. The new systems will need programming, and programming has been, and is likely to remain, the province of the broadcast industry

In the long run, radio and television can expect sustained growth, as the national branding of products plays an increasingly important role

in the marketing strategies of major advertisers. Looking far into the future, Robert M. Coen [forecaster of ad agency McCann-Erickson] projects \$135 billion in advertising expenditures by 1990. [Editor's note: According to the December 1989 issue of McCann-Erickson's "Insider's Report," U.S. advertising expenditures totaled \$124.8 billion in 1989.] A very large share of this revenue will go to broadcasters, and much of it will come from significant local advertising growth

This is not to say that the new media will not play a role in the future strategies of advertisers. Should "specialized" programming develop successfully for particular audiences, it is conceivable that some marketers will look at the new media as more efficient. Nevertheless, this type of advertising is likely to be in addition to broadcast advertising and not in place of it. Marketers will still need the mass audience to launch new products. Retailers will continue to need the speed, ease, reach and frequency of television and radio commercials to handle shorter-term campaigns, such as sales and specials.

Not everyone is optimistic . . . John Reidy, an analyst for Drexel Burnham Lambert, sees a 15 percent loss of audience share by the networks to all other media by 1985, and even this projection expects a 14 percent increase in TV households

While most network and advertis-

"In [the] 1980s . . . competition for both radio and TV will be fierce, and both media are positioning themselves to win . . . To do this, stations will need to control the cost of hardware and operations."

ing industry researchers expect that the new distribution systems will have little impact on over-the-air broadcasting, competition within the industry itself could cause severe realignments . . . Satellites are likely to play an immensely important role in the strategies of both radio and television stations. The general tactics of the next decade are usually listed under the heading of "localism." Both radio and television managements are convinced that their stations will have to become increasingly involved in their local communities and markets to prosper in the '80s. For local radio, this will mean devoting increasing resources to local sales efforts, and developing better marketing techniques for selling the audiences served. Satellites will be the key tool in bringing in the high-quality programming which would otherwise be unaffordable or simply unobtainable. Satellites will carry music, news, sports and other program material that can be used to complete the individual station's package.

The use of satellite communications in television will be even more profound. While the number of television stations will not increase all that sharply, the relationships of television stations, both independents and affiliates, will change because of satellite technology.

While there are only about 50 satellite receiving stations in operation at commercial television stations now, this number is likely to grow astronomically in the coming years . . .

Other areas of technical change will also have an impact. With the cost of syndicated product zooming, the scarcity of off-network programming, and the tremendous 20-percent growth in the cost of news production, broadcasters will be looking harder and harder at the cost-effectiveness of equipment. The digitalization of elements in the broadcast system will continue, and the digital plant will appear increasingly attractive as broadcasters seek to control cost and increase efficiency. Digital recording of video is a very strong "maybe."

Unless digital VTRs can offer more operational flexibility and better cost-effectiveness than current analog one-inch VTRs, their introduction or adoption is chancy. The short-term wish by broadcasters in the video recording area seems to be for one-inch cassette or cartridge players, to enable them to shift commercial operations to the one-inch medium. Camera technology is a definite target for change. While ENG/EFP cameras have never been better, lighter, smaller or less power-consuming, broadcasters still demand more of the same. The development of an all-solid-state camera would seem to be a high priority. Competition in local markets for both radio and television will be fierce, and both media are positioning themselves to win, with local production, local control and local involvement. To do this, stations will need to control the cost of hardware and operations. Programming costs will continue to rise, so only the replacement of inefficient [systems] with efficient [ones], and the imaginative use of reliable equipment will offer radio and television managements any hope of cost control in the years ahead.

ROBERT RIVLIN
Editor-in-chief, 1987-88;
editor, 1982-85; senior
editor, 1978-80.

Business analysts are fond of looking at an industry in terms of its level of maturity. When it's just starting out, it is full of entrepreneurs and mavericks. This is followed by a shakeout, in which the industry begins to mature, companies consolidate, and major forces begin to emerge. Finally, an industry is said to be mature, dominated by a few large forces that act as a stabilizing influence on the whole business community.

In some ways, broadcasting can be said to obey this blueprint. In the manufacturing segment of the business, we find several large companies dominating the marketplace, with fewer startups and newcomers. But when looking at the industry as a

whole, a different picture emerges. Here there is no such thing as a steady flow from one stage to another, but, rather, a constant seesawing between different groups.

We are talking, of course, about the role played by engineers and engineering in the broadcast operation. Engineering has always been vital to the television process. But throughout the past 50 years, the role of the engineer has gone through several major shifts.

In the early days of the medium, the engineer was king. As new invention after new invention materialized, everyone looked to the engineer as the one man who could understand it all and make it work.

The first change in the engineer-as-god syndrome was about 25 years ago, not coincidentally the year *BM/E* was founded. Now others were involved in the capital decision-making. Managers themselves were becoming more savvy about their stations engineering needs, and a whole new group known as operations managers and directors had responsibility for how the entire station ran.

One of the most profound changes affecting the relationship between the chief engineer and the capital purchase chain at the station happened during the 1970s—the age of production. Invention after invention was introduced, designed not to make the signal look clearer and better, but to help the station people get on with the job of putting out increasingly sophisticated program content. It started with local news, which could now travel outside the studio to gather material. It quickly spread to EFP.

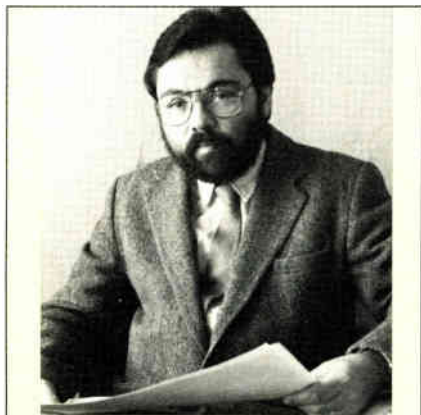
Special effects and graphics began to enter the scene in the '70s also. Engineering was still important, but what engineer ever said to management, "Gee, if only we had a new special effects switcher, I think we could deliver a much better newscast and boost our local ratings"? Rather, the production people ran the show, earning their place on the committee that made the station's capital purchase decisions.

Then, in the 1980s, things began to

shift once again. Declining station and network revenues, because of the increasing competition from cable, home VCRs and other program sources, meant that money was simply not as available as before to spend on every latest invention. The age of production gave way to the age of the accountant—with a new role for engineering once again. The engineer was called on to evaluate each piece of equipment requested by the station.

Now with the arrival of the 1990s, we can expect to see yet another change sweep over the broadcast industry. It is as if we were returning again to the earliest days of television, at a time when the invention of a new technology meant that engineering was absolutely required to assure signal performance. We are talking, naturally, about HDTV.

The eventual future of advanced television will not be entirely an engineering decision, but engineering will be involved to the hilt. The promotion people will have their hands full telling the public about the new marvel. The production people will have their hands full coming up with new varieties of programming to fill the newly expanded screen. But above all, it will be engineers who must deal with the new medium and be certain that Americans are receiving every line of increased resolution the HDTV signal allows.



IN MEMORIAM

Robert Rivlin passed away on January 5, 1990. He is survived by his wife Alice, son, Justin, and daughter, Meredith.

TIM E. WETMORE
Editor, 1986-1988; from
1981 to 1984; assistant,
then associate, editor.

In 1965, when the founders of this magazine were discovering how to cover broadcast technology, I divided my time between Little League and trying to figure out how my record player worked. It was one of those little blue and white turntables that had its own amplifier and speaker built right into it, hardly a technological marvel, but a level of technology that gave me what I wanted.

Our TV set was still black-and-white, but I didn't care because I had a good collection of 45s. A few years later, we had a color television, though I still didn't care much for the programming, and I had a better sound system.

Music changed. The broadcast industry changed at a very rapid pace as new technologies began to erupt. I contemplated military service, while network news tried to adapt the clumsy production techniques of the time to the sweat and squalor of Southeast Asia. The U.S. government was searching for a way to extricate itself from the Vietnam war, and the Japanese government was already trying to figure out a way to get itself into high-definition video technology. *BM/E* began to hit its stride in the 1970s, offering incisive reporting not only on the technologies of the day, but on the technological issues facing the industry at that time.

In 1981, I joined *BM/E*. A year after that, CBS and NHK jointly demonstrated a high-definition television system based on what we've come to call the 1125/60 standard. And if it did not exactly make everyone run back to the shop and toss out their Type-C machines, it did cause many manufacturers and facility owners to begin looking over their collective shoulder.

In 1983, the next salvo in the HDTV battle was delivered: the major broadcasting unions of the world resolved at a meeting in Algiers to make the NHK high-definition system the world standard.

The world greeted it with a yawn. After all, in the U.S., one must keep at least one eye on that NTSC screen at all times. Nevertheless, a few visionary producers began to embrace the only viable high-definition format, 1125/60. In the mid-'80s, this production standard gave rise to at least three studios dedicated to high definition: 1125 Productions, Rebo High Definition Studios and Zbigvision. With the acceptance of the D-1 format and the blossoming of the component digital suite, the only truly controversial issue in video was HDTV.

From the absurdly perfect seat of "industry observer," I was able to witness and report on these developments. Of course, nothing is so clear and precise as we'd like it to be. Not the HDTV picture, nor the political one. But what about the business picture; how defined had it become?

Beyond the occasional feature and a few made-for-TV movies, HDTV seems to have found its niche primarily in two areas of production: commercials and music videos.

Now, whether the song and dance of political influence will play in tune, and whether or not the industry will be "forced" to sing along, remains to be seen. The thing is, it doesn't matter. HDTV will happen in the U.S., and soon. It is not yet clear what exact form the system will take, but it will happen, and those who succeed will adjust to it. They had better. They're not in Little League anymore. ■

"After CBS and NHK jointly demonstrated a high-definition television system based on 1125/60 . . . it caused manufacturers and facility owners to begin looking over their collective shoulder."

New Products

BME's expanded coverage of the latest developments in new broadcast equipment.

NED Unveils Mid-Range Synclavier

The third model in the Synclavier series, New England Digital's 6400 Digital Audio System, features 32 stereo voices, 64 MB of RAM, an enhanced velocity/pressure keyboard, SMPTE and VITC interfaces, 320 MB of hard disk storage, stereo 100 kHz inputs, and a Macintosh IIx graphical interface. Hardware options include a 2 GB optical disk storage system, DSP-70 digital signal processing card, Direct-to-Disk recording system, MIDInet processor/patchbay module, VITC and 640 MB additional hard disk storage. Software options include time compression/expansion.

Reader Service #200

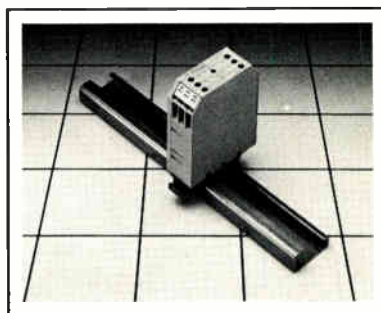


NEW ENGLAND DIGITAL

Canon Demos 55X Field Lens

The J55x 9B IE is a 55:1 field production lens introduced by Canon USA at SMPTE 1989. Designed specifically to meet the stringent requirements of CCD cameras, the lens features a focal length of 9 to 500 mm, with a maximum relative aperture of 1:1.4 at 9-202 mm and 1:2.8 at 500 mm. A special function control macro permits close focus within millimeters of the front element, according to Canon. Also featured are an external LED indication system for zoom, iris and extender positioning; two microcomputer-controlled four-position built-in extenders (1.5x and 2.0x); and a compact, lightweight design.

Reader Service #201



ELECTROVERT

Electrovert Premier's Modular Terminal Blocks

Electrovert's Signal-Processing Modular Terminal Block series is designed for mounting to standard DIN rails. The series includes the REB series relay modules, which have built-in LEDs to indicate switch status, and a built-in rectifier, and are available in 24 V, 48 V, 110 V and 220 V versions, with five variants. Also included are the ASV series measuring amplifiers, the AKG/AKT series analog coupling modules and the UEB series monitoring modules.

Reader Service #202

Perrott Piggyback Power Unit Holds Two BP-90 Batteries

Perrott Engineering Labs' PRB 9037-2 piggyback power unit is a dual container for BP 90s, which can either power camera and light or camera, with an extra BP 90 in container two for longer shoots. List price is \$425.

Reader Service #203

Yamashita Intros Computer-to-Video Scan Converter

The YEM CVS-900B uses 24-bit real-time processing to convert analog RGB computer graphics into NTSC or PAL. The CVS-900B converts computers with 15 to 38 kHz scan frequencies, allowing for front-panel switching between PS/2s, VGA video and MAC II computers. It also offers flicker elimination, freeze function, genlock sync generator and color encoder. The CVS-900B outputs component, Y/C for S-VHS, and two channels of composite video.

Reader Service #204

Audio Kinetics Upgrades Console Automation System

Audio Kinetics has introduced the MasterMix II console automation system, an upgrade of the Reflex system that provides local control of fader functions such as read, write, update, grouping, solo and muting, as well as central control. It is available with interfaces for digital grouping consoles (in 16-, 32-, 48- or 64-channel configurations) or for dc grouping consoles. MasterMix II also provides automatic online edit and merge, independent level and mute, offline splice and instant mix comparison.

Reader Service #205

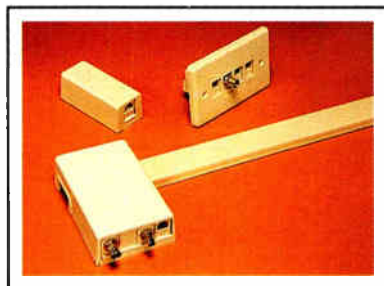
Rohde & Schwarz Introduces Affordable Signal Generator

The Model SMHU from Rohde & Schwarz is an affordable 100 kHz to 4.32 GHz signal generator with frequency setting time of less than 1 ms (fast mode), harmonics below -30 dB, and no subharmonics at all for carriers below 2 GHz, according to the company. Phase noise at 100 MHz is -144 dBc/Hz for a 20 kHz offset; residual FM at 500 MHz is 0.5 Hz. Two fixed frequencies plus a continuously variable 1 Hz to 100 kHz audio generator produce the internal modulation sources. List price is \$36,700.

Reader Service #206

Panduit's Modular Wiring System Links Voice, Data or Video

A new modular system of wiring components from Panduit Corp. includes surface-mounted boxes, wall plates and snap-in connector modules for



PANDUIT

voice, data and video wiring. Low-profile surface mount boxes hold up to four connector modules; modules for twisted-pair, coax and fiberoptic cable may be used in any combination.

Reader Service #207

Evertz Intros LTC/VITC Reader LTC/VITC Reader from Evertz

The Model 627 full-speed LTC and VITC time code reader from Evertz Microsystems features a built-in phase restorer and RS-232/422 serial interface on a single Eurocard module. LTC or VITC mode is selectable from the front panel. An optional character inserter is available.

Reader Service #208

Schneider Offers Lens Adapter

Schneider Corp. of America has made available a special focusing mount adapter that permits Schneider enlarging lenses to be used on C-mount cameras. This ensures maximum sharpness when recording at close range. The focusing mount can be used with a wide angle of T-mounts and extension tubes as well.

Reader Service #209



TEKTRONIX

Tektronix Upgrades Video Measurement Set

Tektronix' 1780R Series Video Measurement Set now utilizes electronic graticules to perform K-factor, short-time distortion and ICPM measurements. The graticules change size incrementally to fit the waveform, eliminating the need to estimate the amount of distortion when the trace falls between the fixed lines. Measurement resolution of 0.1 percent is achievable.

Reader Service #210

Ampex's New ESS 5T Still Store is Intended for Telecine Suites

A new version of Ampex Corp.'s ESS 5 electronic still store system, the ESS 5T, is designed specifically for use in film-to-tape transfer. It is a dual-format system that selects the video standard by the incoming signal source, and switches automatically between 525-line and 625-line standards. RGB and CCIR 601 inputs and outputs are user-selectable. The unit comes standard with a 160 MB hard disk, and stores up to 200 frames of video in NTSC format (up to 160 frames in PAL). List prices begin at \$35,000 for a single-channel system.

Reader Service #211

Current Technology's OptiSiftor Breaks RS-232 50-Foot Limit

OptiSiftor is an optically isolated RS-232 transceiver that adapts older RS-232 circuits to behave as if they were fiberoptic, according to the company. Data can be transmitted at speeds of 19,200 baud for up to one mile and received without error, even in a high-noise environment with different ground potentials. Available as single or multiple units.

Reader Service #212



CURRENT TECHNOLOGY



INTERFACE

Interface Offers Business and Scheduling Tools for Facilities

Interface Video Systems has introduced the Series 5000 Facility Management System, a software package designed for production houses. Its four submodules include production management, accounting/financial, general office and personal productivity tools. The production management module includes job tracking, facility scheduling, client and freelancer data, and videotape library cataloging, among others. Available for various hardware platforms.

Reader Service #213

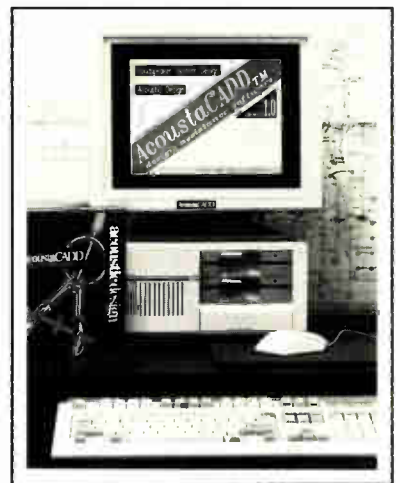
Magni Debuts Compact Programmable Generator

Magni has introduced Signal Creator, a programmable test-signal generator in a half-rack package. Signals are stored on a wallet-sized memory card, from which they are downloaded to the generator within seconds. One memory card can accommodate up to 100 different signals, depending on complexity. The unit is configurable (up to a maximum of five internal modules) for any combination of NTSC, PAL, 525- and 625-line component analog video, and 525- and 625-line digital.

Reader Service #214

Altec Lansing and Electro-Voice Unveil AcoustiCADD Software Package

Mark IV Audio's AcoustiCADD is a new sound-system, design-assistance computer program that integrates calculation and high-resolu-



ALTEC

tion, computer-generated graphics of sound paths. It runs under DOS-MOS on IBM or IBM-compatible PCs. Acoustic design tools include statistical ray-tracing and rapid calculation of the space's area and volume, and the resulting Sabinian reverberation times on surface material characteristics.

Reader Service #215

Schwem Bundles Camera, Lens

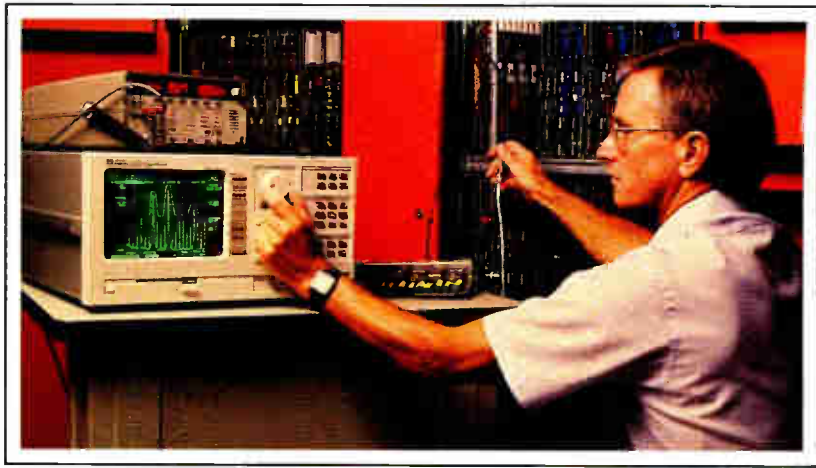
Schwem Technology has enhanced its GX-3 stabilizing lens, which incorporates a small CCD camera. The new GX-3 "ENG" version, which includes hand grips and a small viewfinder, weighs six pounds and measures 11 inches long by 4.5 inches diameter. The lens has a 6X zoom and focal length of 1.25 to 75 mm.

Reader Service #216

Listec Offers Lightweight Prompter

The new A-2009 ProPrompt prompter from Listec is a lightweight unit with a fold-down mirror housing that allows fast setup with small EFP cameras. It features a compact design with a sliding support bracket, collapsible mirror and soft hood.

Reader Service #217



HEWLETT PACKARD

HP Intros 3588A Spectrum Analyzer

The new Hewlett-Packard HP 3588A spectrum analyzer covers the 10 Hz to 150 MHz frequency range and offers a wide variety of frequency spans and resolution bandwidth settings from 20 kHz down to 0.0045 Hz. It combines new digital filter and fast-Fourier transform technologies with traditional swept technology. A built-in tracking generator allows high-quality scalar network measurements. BASIC is available as an option. List price is under \$20,000.

Reader Service #218

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NEW PRODUCTS

Graham-Patten Premier Video Keyer

Graham-Patten's 1241 Video Keying System replaces the Model 1231, both capable of combining up to six independent key sources over a single background key picture. New features include full linear keying capabilities through a wide-range gain control, individual clip adjustment for each input, serial or parallel control capability, and advanced edging effects.

Reader Service #219

Time Logic Intros Delay Unit

The APDU-200 Automatic Program Delay Unit from Time Logic can handle delays from a few minutes to days; playback to multiple feeds simultaneously (each with a different delay); incoming feed record-only sessions; and more. All delay activity is time-code driven, frame-accurate, and locked to house reference clock.



ALTA

The software features recurring event programming and schedule shifting in short increments. System hardware can interface up to 15 VTRs and switchers; optional software allows the system to be used for editing.

Reader Service #220

Alta Group's Pegasus is Full-Featured Production Switcher

Alta's Pegasus is a full-capability production switcher, featuring eight external inputs, plus black and color. The three-bus architecture and

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unique keying system allow the Pegasus to perform multileveled transitions, with up to four video levels displayed simultaneously, eliminating unnecessary recording levels. The two keying levels operate in either the linear or hard keying modes, and an optional RGB chromakeyer is available. List price is \$8500.

Reader Service #221

Cablewave Announces Rigid Coax Connector

Cablewave Systems' expansion inner connector assembly is designed for rigid coaxial transmission lines. The assembly was developed to minimize center-conductor galling between line sections, caused by movement from thermal expansion and contraction. It provides a low-friction sliding contact inside the inner conductor, ensuring a longer wear life of both anchor connector and inner conductor. The assembly is available for Cablewave Systems rigid line sizes 3 1/8-inch, 4 1/16-inch and 6 3/8-inch.

Reader Service #222



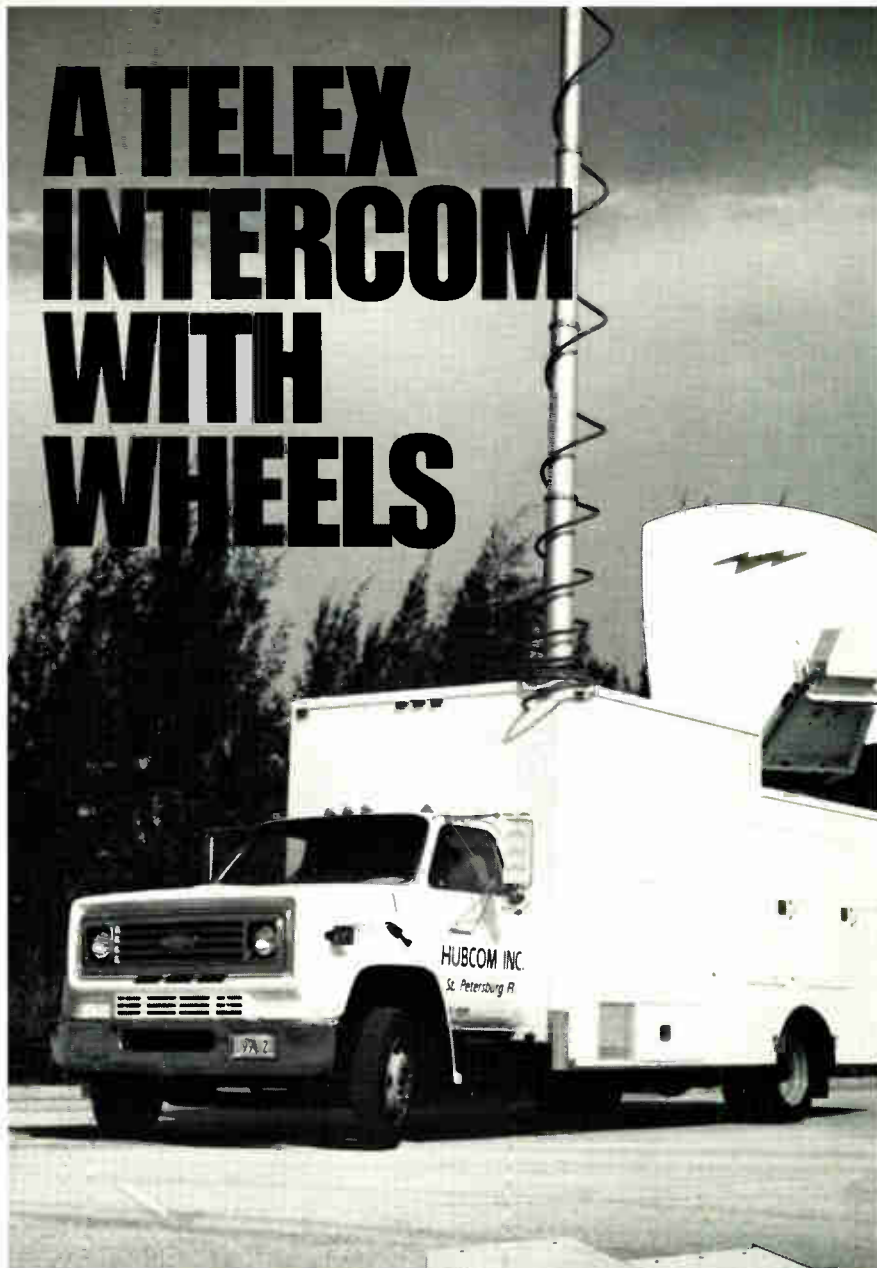
CABLEWAVE

Symbolics Presents Rendering Subsystem

Symbolics' Render Server is designed to process animation data created on the Symbolics Animation and Paint Systems. The subsystem is based on Silicon Graphics' new 4D/25S and 4D/210S computers. The Render Server software delivers the full feature set of S-Render, while the new Symbolics 4.2 Render Client provides a Renderman-ready format communications link with off-line renderers.

Reader Service #223

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clear, reliable communication. The IC-4M is easily flush-mounted and is built ruggedly to take the punishment of a fast-moving news crew. Telex intercoms can take it.

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NEW PRODUCTS

Kinematics Intros UTC Clock Synchronized Clock from

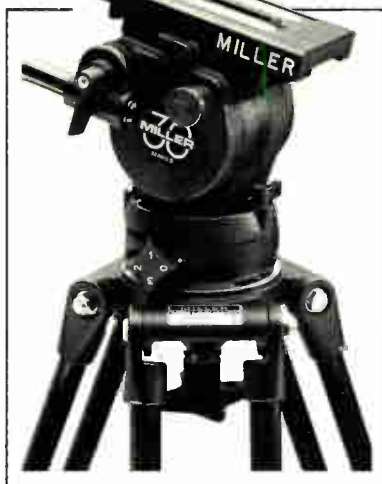
The Model OM-DC synchronized clock from Kinematics/TrueTime offers reliable worldwide access to UTS traceable time, accurate within ± 1 ms. Features include digital display; RS-232; IRIG-B; slow code; 1 Hz, 1 kHz and 1 Mhz outputs; and ac/dc operation. List price is \$3000.

Reader Service #224

Nikon Shows Compact ENG Lenses

The TV-Nikkor S15x8.5B and the TV-Nikkor S13x9B from Nikon are a pair of new ENG zoom lenses designed for $\frac{2}{3}$ -inch CCD cameras. Both are made of Nikon's ED (extra-low dispersion) glass and incorporate a new anti-reflection coating. The S15x8.5B has a 15x zoom ratio.

Reader Service #225



Miller Upgrades Fluid Heads

Miller Fluid Heads has upgraded its Model 30 and Model 50 heads. The new 30 and 50 Series II heads feature all-new construction designed to withstand moisture and dust. A quick-release attachment allows both

hands to be on the camera when locking it onto the head. New counterbalancing systems, rated for 30 and 50 pounds respectively, are fully variable and feature a simple switch-in adjustment control. A leakproof fluid damping system operates independently of the load-bearing counterbalancing system.

Reader Service #226

Target Technology Premiers Power Amp

The TTD-200 Studio Amp, new from Target Technology, incorporates two separate, independent 40 W (8 ohm) amps, each with its own voltage control gain cell. The level of each amp may be controlled remotely, eliminating the need for console installation. The Studio Amp can be bridged for 90 W mono operation or operated as a 40 W stereo amp.

Reader Service #227

6129

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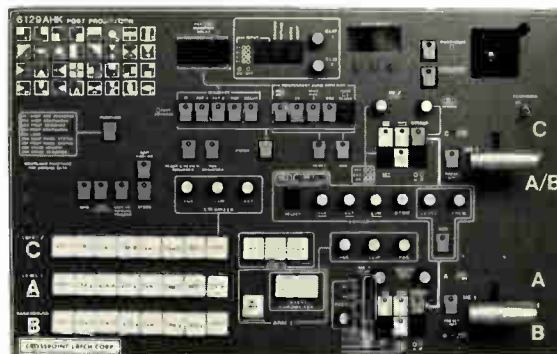
The spectacular architecture and features of the 6129 encourages creativity. It also delivers better quality tapes. The 6129 can produce effects in fewer generations than any other switcher in its price range - bar none. This in turn creates tapes with a higher quality and lower noise, than is possible with any other switcher. Effects which the 6129 can perform in one pass, require as many as three passes with other switchers. No other switcher, comes even close to matching the performance of the 6129. Two mix effects systems, five levels of keys and linear keyers for clean smooth edges, are only part of the story. The 6129 is a very high quality precision product. No other switcher can produce 100% frame accurate transitions under full editor control: the 6129 can.

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ALPHA

Alpha Audio Presents Digital Disk Recorder

Alpha Audio Automation Systems has introduced the DR-2, which can record up to 60 minutes of 16-bit stereo audio, with time code at 44.1 or 48 kHz sample rates. The DR-2 connects directly to audio and video editing systems via dual RS-422 serial ports, and emulates a Sony BVU-800 for serial control. Pricing starts at \$10,000. Thirty- and 60-minute versions with doubled storage time, available in mono mode, are priced at \$12,500 and \$15,000.

Reader Service #228

Rosco's Fog Machine Features Handheld Remote Control

Rosco's new Fog Machine, model 1300, is based on the model 1500. The 1300 is designed to generate ultra-dry smoke on command, operating by the remote instead of the control console. The handheld remote provides on-off control and momentary switching, but does not adjust smoke volume. A carrying case is available. List price is \$565.

Reader Service #229

JVC Unveils BR-S611U Streamlined S-VHS Player, Edit Feeder

JVC's BR-S611U, an S-VHS next-generation recorder/player and edit feeder, is nearly identical to the BR-S811U, but does not include the BR-S811U's insert editing functions. Both models are part of the Professional S video system. The new model includes a chroma enhancer and improved crosstalk cancellation circuitry, as well as a precision-machined, tape-stabilizing head drum and a new impedance roller. List price is \$3750.

Reader Service #230

Cipher Digital's Phantom II Allows Edit System Control of VTRs

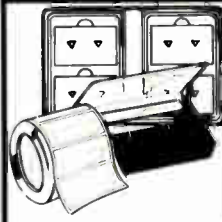
Cipher Digital's 4815 Phantom II is a protocol converter, synchronizer and time code reader that allows any video editing system using an Ampex, Sony or CMX protocol to control virtually any parallel-interface audio or video transport. The emulator has a dedicated, hybrid I/O port and special-case integral protocol conversion circuitry, and allows editing with Sony's 5800/5850 machines. The Phantom II maintains synchronization accuracy to within $\mu\text{-}50 \pm \text{sec}$, and is PAL/EBU- and NTSC-compatible with simple switch selection.

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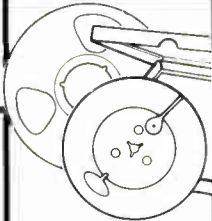


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Type Acceptance Meets Deregulatory Catch-22

By Harry F. Cole

Way back at the dawn of deregulation—say, six or seven years ago—this column dared to raise a question about life in a deregulated industry. That question went something like this: If an industry is going to be regulated and, therefore, subject to penalties for failure to comply with governmentally imposed standards, how can members of that industry know how to avoid penalties if the government declines (in the name of “deregulation”) to tell the industry what the applicable standards are?

Recently, I encountered a situation relative to FM modulation monitors that demonstrated to me that my fears were not groundless. As you may recall, the FCC’s rules used to contain very explicit specifications for such equipment. In fact, the Commission required that such monitors be “type approved,” meaning that a manufacturer not only had to design its equipment to meet the FCC’s specs, but also had to send a sample of the equipment to the FCC’s lab for testing to make sure the equipment complied. If an FM licensee properly installed, maintained and operated such a modulation monitor, the licensee could be confident that it was complying with the Commission’s modulation rules.

Then, in 1981, the Commission proposed to eliminate the requirement that licensees install type-approved modulation monitors. In fact, it proposed to eliminate the type-approval process altogether. In the FCC’s view (as expressed in a Report and Order released in August 1983), if an optional testing program were available, it “might create the impression that an ‘approved’ monitor was better than an ‘unapproved’ monitor,” and therefore manufacturers “probably would request testing . . . to avoid the competitive stigma of not having the Commission’s approval.”

In shutting down the type-

approval process, the Commission suggested that it might actually be helping the industry by encouraging the development of a greater variety of modulation equipment than had previously been available. Presumably, the Commission was thinking that by removing the detailed technical specifications, it would liberate the collective engineering genius of the free world, permitting it to build a better mousetrap (or at least a better modulation monitor).

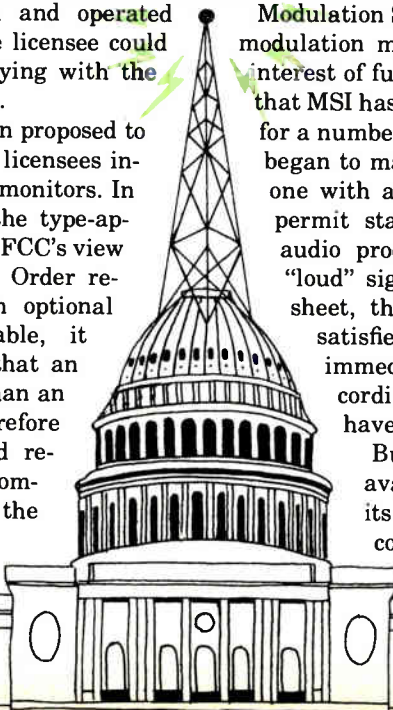
As those who have been in the modulation monitor market in the last five years can probably attest, the FCC’s rationale does not appear to have been validated. There appear to have been few, if any, radical innovations in monitor design made possible by the 1983 deregulation. From this perspective, then, it might be said that deregulation has not worked all that well. If that were the only bad news, it would be regrettable, but perhaps not all that noteworthy. Yet the story gets worse.

Modulation Sciences, Inc. (MSI) manufactures modulation monitors for FM stations. (In the interest of full journalistic disclosure, we note that MSI has been a client of this author’s firm for a number of years.) Earlier this year, MSI began to market a new modulation monitor, one with an innovative design intended to permit stations to reduce the amount of audio processing, while still providing a “loud” signal. As apparent on MSI’s spec sheet, the company’s new monitor fully satisfied the FCC’s 1983 specifications immediately prior to deregulation. According to MSI, the new monitor would have been eligible for type approval.

But type approval is no longer available, so MSI began to market its monitor without it. Of course, the company provided purchasers and prospective purchasers with



Cole is a partner in Bechtel, Borsari, Cole & Paxson, a Washington, DC-based law firm.





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finger on the edge of a record.

A great deal of thinking also went into things like our balanced outputs (-10 dBm nominal into 600 ohms). There's even a port for a wired remote. And separate power supplies for digital and analog circuits. Given this, it's not surprising that its S/N ratio is 112 dB.

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complete specifications, so they could satisfy themselves, their engineers and engineering consultants that the new monitor would do what was expected of it. This was consistent with the Commission's own words back in 1983: "Manufacturers generally furnish technical specifications, including a description of accuracy, for their equipment. Certainly licensees ... can review technical specifications to determine equipment accuracy."

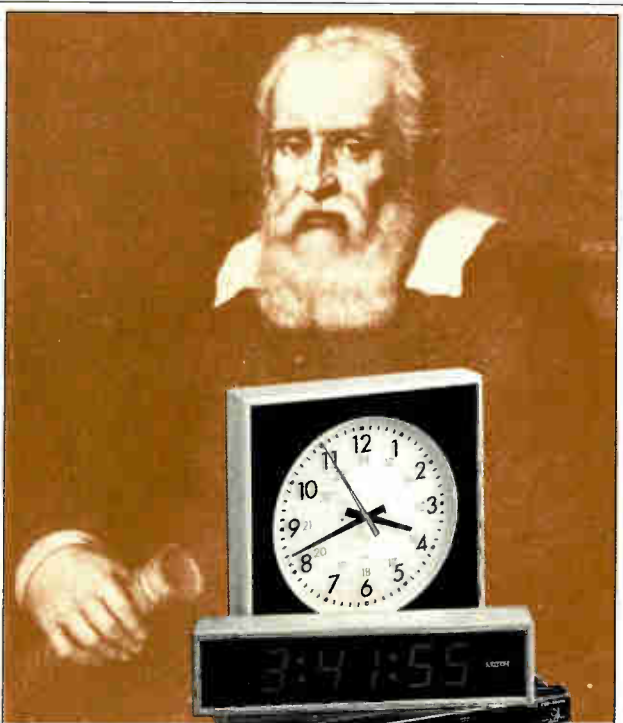
After a while, MSI received word of rumors that its monitor had been the subject of a negative assessment by the FCC. Sales dropped as skittish licensees stayed away in droves. That put MSI in a difficult position. In order to prove the rumors untrue, the company would have to get some kind of approval from the FCC, but the FCC specifically no longer gives such approvals.

MSI determined that the rumors apparently arose from an offhand remark made by a well-intentioned FCC field inspector unfamiliar with MSI's new design. Despite his remark, the inspector had not issued any citation or notice to the station with respect to the MSI monitor. Nevertheless, reports of the comment circulated. The company approached representatives of the Commission, asking for some kind of clarification so that second- and third-hand reports of the unofficial remark would not be the kiss of death for the new monitor.

To their credit, representatives of the Mass Media Bureau, the Office of Engineering and Technology and the Field Operations Bureau all expressed concern about MSI's situation. Yet they declined the company's offer to give several of the new monitors for testing.

True to the its 1983 decision, the FCC is still out of the type-approval business and is not inclined to get back into it, even on a limited case-by-case basis. After several meetings, some involving MSI personnel, some involving only FCC folks, the Commission provided MSI with a letter confirming that "equipment meeting the pre-1983 requirement is satisfactory for determining compliance with the current FM modulation requirements."

Ideally, this letter will undo the damage and will level the competitive playing field so that MSI can market its new monitor on a fair and equitable basis. I am not saying here that MSI's new monitor is in fact consistent with the 1983 specifications, or that it is superior to other available monitors. Such determinations must be made by each individual licensee and its engineering braintrust after reviewing the equipment itself. I am simply saying that only now,



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after limited FCC intervention, can the competitive marketplace perform its intended function.

This is one example of the difficulties the FCC has inadvertently created through its deregulatory activities. Difficulties such as MSI's may be more common than you might think, even though they may never be publicized because of the

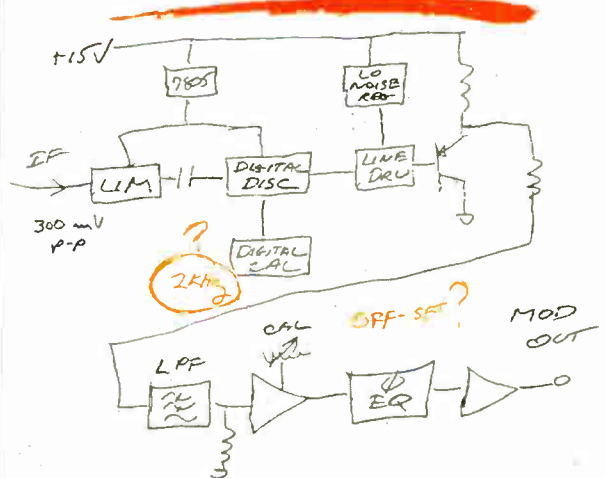
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FCC's single-minded determination to keep itself out of the marketplace. Who can say how many companies may have come up with superior equipment designs, only to find resistance among potential purchasers because the FCC refuses to "approve" the equipment (or even to set standards of acceptability)? Members of the regulated industry are understandably reluctant to roll the dice when their license, or at least a potential fine, is on the line.

It is ironic that despite the Commission's belief that deregulation might encourage innovation, no such innovation appears to have occurred in the modulation monitor area for the first five or so years following deregulation. The first apparent innovation to hit the market has run into problems because of the Commission's reluctance to approve the equipment. If innovation and technological advancement are to occur, the FCC will have to come up with a more effective way of encouraging them.

Deregulation is not in and of itself a bad idea. Many benefits may be derived, both by the industry and by the listening and viewing public, from the elimination of unnecessary and intrusive regulations. But the FCC should be concerned that its efforts may, in some instances, be counterproductive. Where that is the case, the Commission may be well-advised to take appropriate steps to get back on the desired course, even if those steps happen to smack of "regulation." ■

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BUSINESS BRIEFS

Two Los Angeles post-production facilities, The Post Group's Digital Center and Planet Blue, have installed A84 digital component production switchers from **Abekas Video Systems** The Post Group has also installed a VGV D2500 digital composite post-production switcher in its main facility Tuner Broadcast System's TBS Super Station has purchased four **Sony** DVR-10 D-2 VTRs for use in its new post-production suites.

IDB Communications Group has purchased a second **BTS** 3000 routing switcher to meet the needs of its recently expanded Audio Control Center on Staten Island, NY E/S Pictures, a New York City production house, has purchased an **LDK-91** camera from **BTS** **WHSE**, the HSN affiliate station in Newark, NJ, has purchased a **Sony** Betacart to automate feeds to its sister station, **WHSI**, in Smithtown, NY **PBS** has installed a dual-redundant, multi-time zone, automatic program-delay system, the **APDU-100M** from **Time Logic, Inc.**, at its Alexandria, VA, HQ. The system uses **Panasonic** AU-660 MII VCRs.

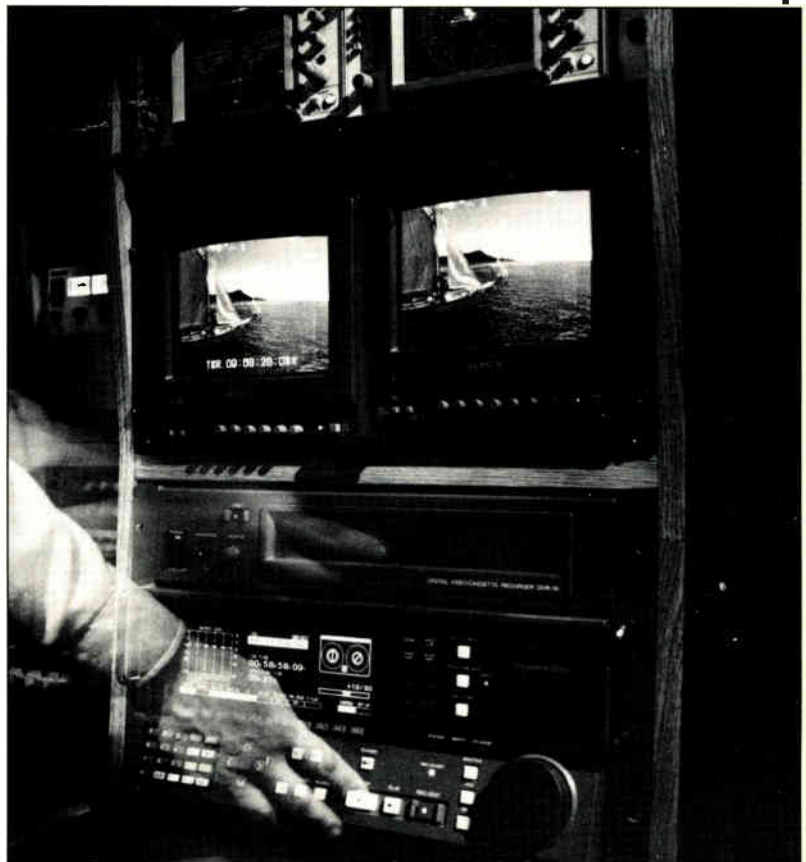
Comark Communications will supply a new 120 kW Klystron-equipped UHF TV transmitter to **WNTV**, Ch. 29, in Greenville, SC **Stevens Institute of Technology**, Hoboken, NJ, has purchased a low-power antenna from **Bogner Broadcast Equipment** for use in an experimental HDTV transmission study.

DSC has announced a sale of its **DiSC** digital recording system to **Straight Furrow Productions** of Birmingham, AL, and Atlanta, GA **NBC's** business-oriented cable service, **CNBC**, has installed two **Chyron** Scribe character generators. The facility already owns three Super-Scribes **Image Projection** of Ottawa, ON, has purchased an **Aurora**

AU/240 paint and automation system Ten television and cable broadcasters have recently taken delivery of **Pinnacle** Video Workstations. They include **WCBI-TV**, Columbus; **KETH** Television, Omaha; **WNEO-TV**, Salem, OH; **Continental Cablevision**, University City, MO; **Coaxial Communications**, Columbus; **Mid Canada Communications**, North Bay, ON; and **KNPB Public Broadcasting**, Reno. **KOTA-TV**, Rapid City and **Heritage Cablevision**, Lincoln, RI, purchased workstations with the **PRIZM** option, and **KMBH-TV**, Harlingen, TX, added an **SV-1000E** system.

Midwest Communications and

Chyron Corp. will merge under an agreement in principle reached early this month. Negotiations had been abandoned early in November, but resumed recently, resulting in the merger plan **Ronald J. Ritchie** has been appointed president and CEO of **Ampex Corp.**, succeeding the retiring **Max O. Mitchell**. **Mitchell** will continue as a member of the **Ampex** board of directors and as chairman of its executive committee **W. Tom Beams**, president of **Aurora Systems**, a subsidiary of **Chyron Corp.**, has taken on the additional post of president of **CMX**, a **Chyron** division **Thomson-CSF Broadcast** has named **Harvey Caplan** national sales manager. ■



Video-It, the Culver City, CA, post-production company, has added a second interformat digital composite editing bay. In addition to two Sony DVR-10 D-2 recorders, the suite offers a Grass Valley Group 100 switcher, a Sony VO-9800 U-matic deck, a BVW-10 Betacam VCR, a Panasonic AG-7300 S-VHS deck, and a Convergence 204 editing system.

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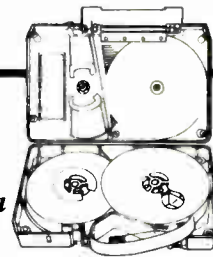
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Streamlining Standardization to Meet the Challenge of Future Technology

By Stanley Baron

The Society of Motion Picture and Television Engineers (SMPTE) faces the challenge of setting standards in an environment in which technology is changing at an ever-increasing rate. The Society has a proven record of success with processes in place, and a tradition that assures those who wish to creatively utilize the technologies we serve that the product of their creative efforts will be presented to audiences around the world with a faithful consistency.

The adoption of a standard that may endure a half-century or more deserves the consideration necessary to assure that it is correctly formulated. Our standardization process must ensure that all substantially concerned parties have an opportunity to express their views, and must make an objective effort to resolve dissenting viewpoints. It must also ensure that substantial agreement is reached by all concerned interests. The process presently in place at SMPTE meets these criteria, and has been approved by the American National Standards Institute as meeting its requirements for due process.

Nothing in our tradition says this process is sacrosanct, however. In an effort to make the process more efficient and responsive to the Society's needs, the Engineering Department of SMPTE has undertaken a review of our standardization process. This review has resulted in several recommendations.

First, it is recommended that standardization be streamlined to allow for one level of due-process committee. The proposed new system assigns the Working Groups (currently the second level of due process) and other subgroups specific tasks and scope of activity, includ-

ing a work schedule. Upon completion of their work, these subgroups will be dissolved. Working Groups remain open to all who are affected by their work, and their recommendations are no longer required to be by consensus; majority and minority reports are provided for. Moving controversial items to the parent Technology Committee for final disposition will save an estimated 13 weeks in the standardization process.

These proposed changes, when adopted, will bring the minimum standardization cycle to just under one year, half of what it is now. Other proposals include:

- Clarifying the standardization program by reorganizing the text to draw together into a single section those paragraphs dealing with the same activity;
- Explicitly stating voting requirements for all levels of decision-making, not just document approval; and
- Including specific requirements for meeting reports in the Administrative Practices, to establish a firm basis for the public record.

The proposed set of changes gives us an opportunity to streamline the Society's engineering process and reduce the cost of personal time and resources required to support this effort, without

risking the quality of the result. In taking these steps, we can assure the industries we serve that SMPTE will continue to nurture and care for those future imaging services, to maintain that essential stability in our field of endeavor, and to standardize technologies with a faithful consistency. ■



Baron, managing director of technical development for NBC, is engineering VP of SMPTE. His comments are excerpted from a speech he delivered at the 131st SMPTE Conference.

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