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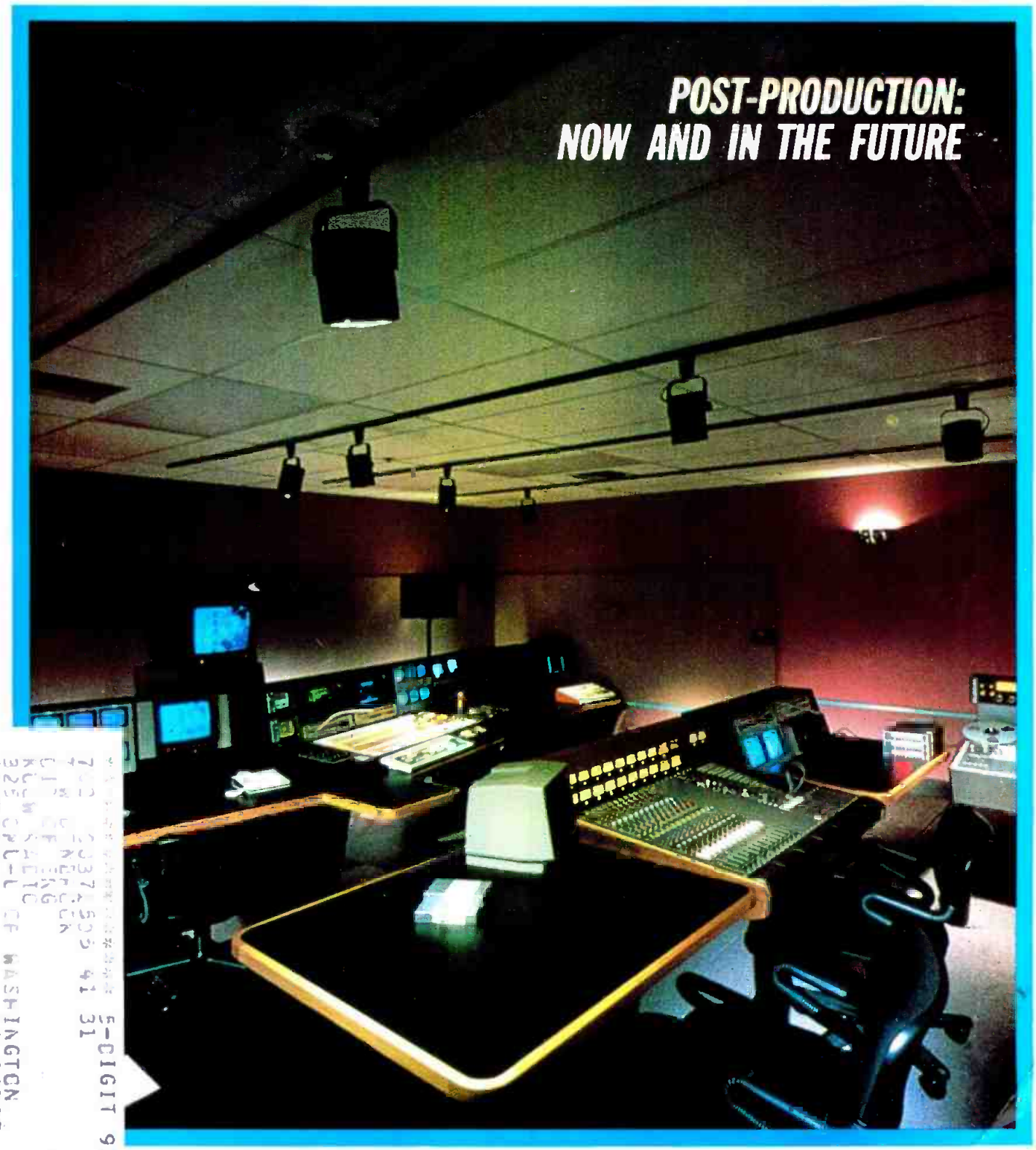

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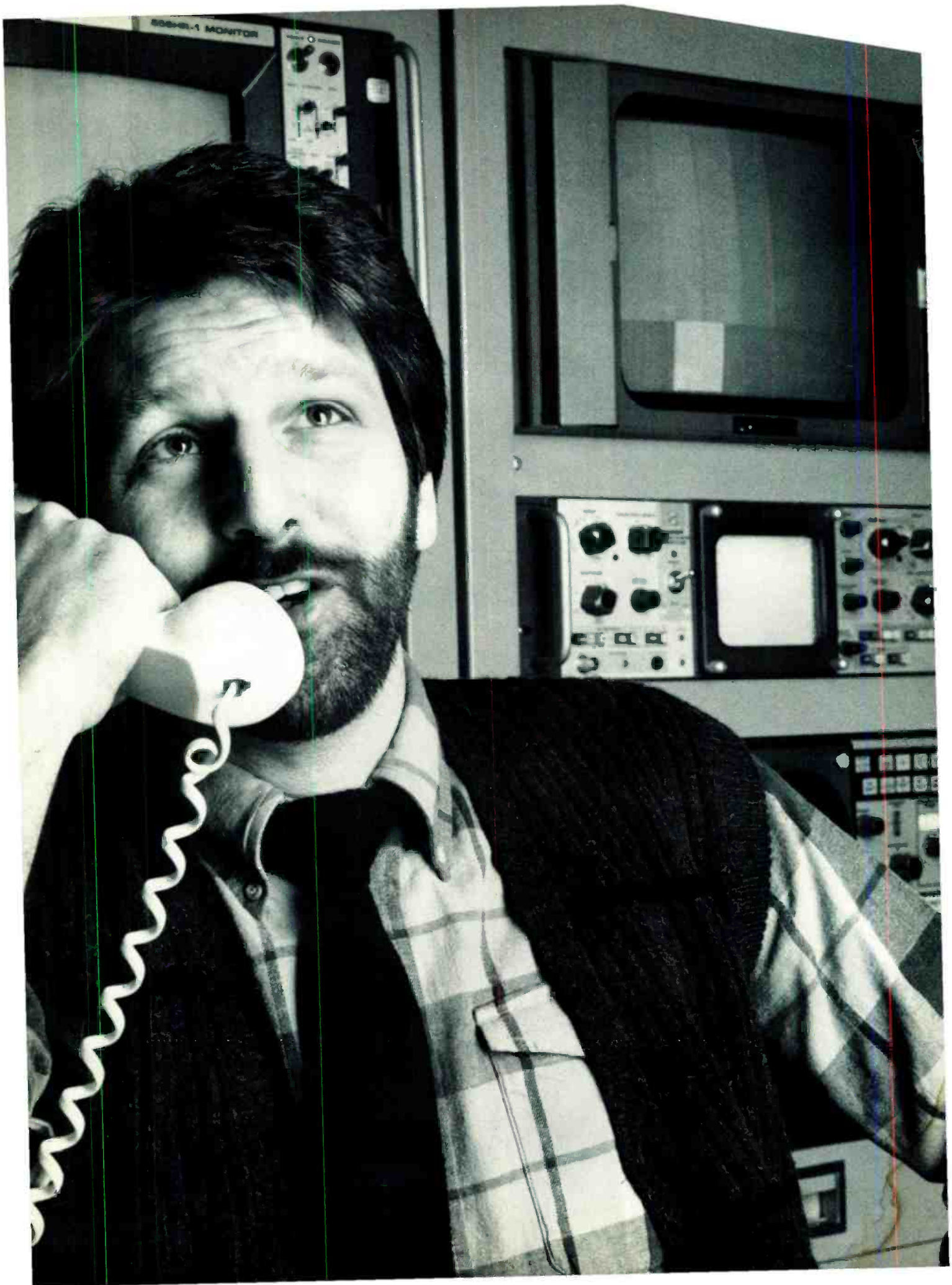

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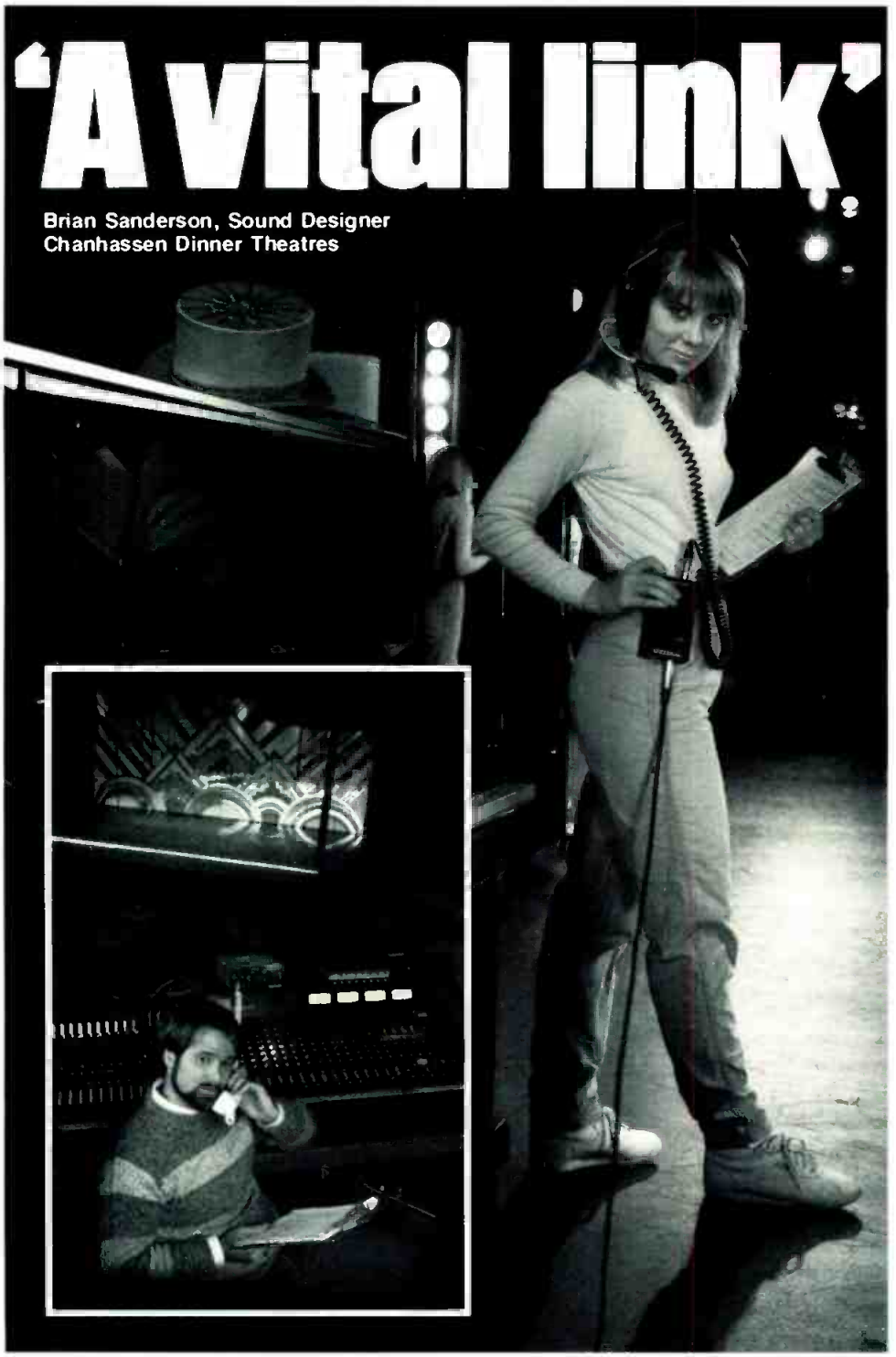
Brian Sanderson, Sound Designer
Chanhassen Dinner Theatres



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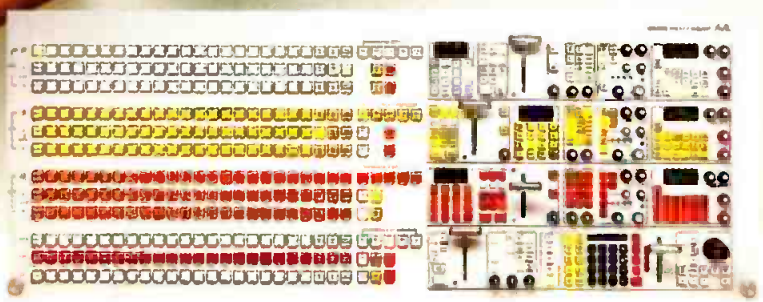

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NOVEMBER 1987 VOLUME 23/NUMBER 11

BM/E
BROADCAST MANAGEMENT/ENGINEERING

20

46

Features

Television Post-Production 20
How much and what kind of video post-production work a station undertakes depends on many factors. If you're in the game, you need the right equipment . . . *by Brian McKernan, Television Editor*

Editing on the Cutting Edge 31
As new technologies jostle traditional tools and techniques, high-end editing stands at a turning point . . . *by Eva J. Blinder*

Making Tracks in Radio Production 43
Today's production studios are technological crossroads where analog and digital hardware meet in myriad audio applications . . . *by Steven Schwartz, Radio/Audio Editor*

Advanced, Enhanced, Expanded, Compatible: The Search for Higher-Definition Television 55
The advent of NTSC-compatible HDTV delivery systems has sparked the interest of broadcasters in a technology that may hold the key to television's future. . . . *by Robert Rivlin, Editor-in-Chief*

FM Allocation: Headaches and Opportunities 63
If the major proposed technical changes take place, the headaches and opportunities may occur sometime in the 1990s . . . *by Harry Cole, FCC Counsel*

The NBC Satellite Experience, Part I 69
In early 1982 all television networks distributed their programming terrestrially, supplemented by occasional satellite use. Driven by progressive affiliates and a changing industry climate, NBC embarked on a complete satellite distribution campaign . . . *by O.S. Paganuzzi*

Cover:

Edit Suite A at Tele-Image in Irving, TX, represents state-of-the-art post-production capability for both audio and video. The room was designed by Russ Berger of the Joiner-Rose Group, Dallas. Photo by Chas McGrath.

Departments

10 Editorial
A Letter to Our Readers

14 Industry News
NBC live from China

76 FCC Rules & Regulations
Petition to Deny

78 New Equipment

81 Business Briefs

82 Advertisers Index

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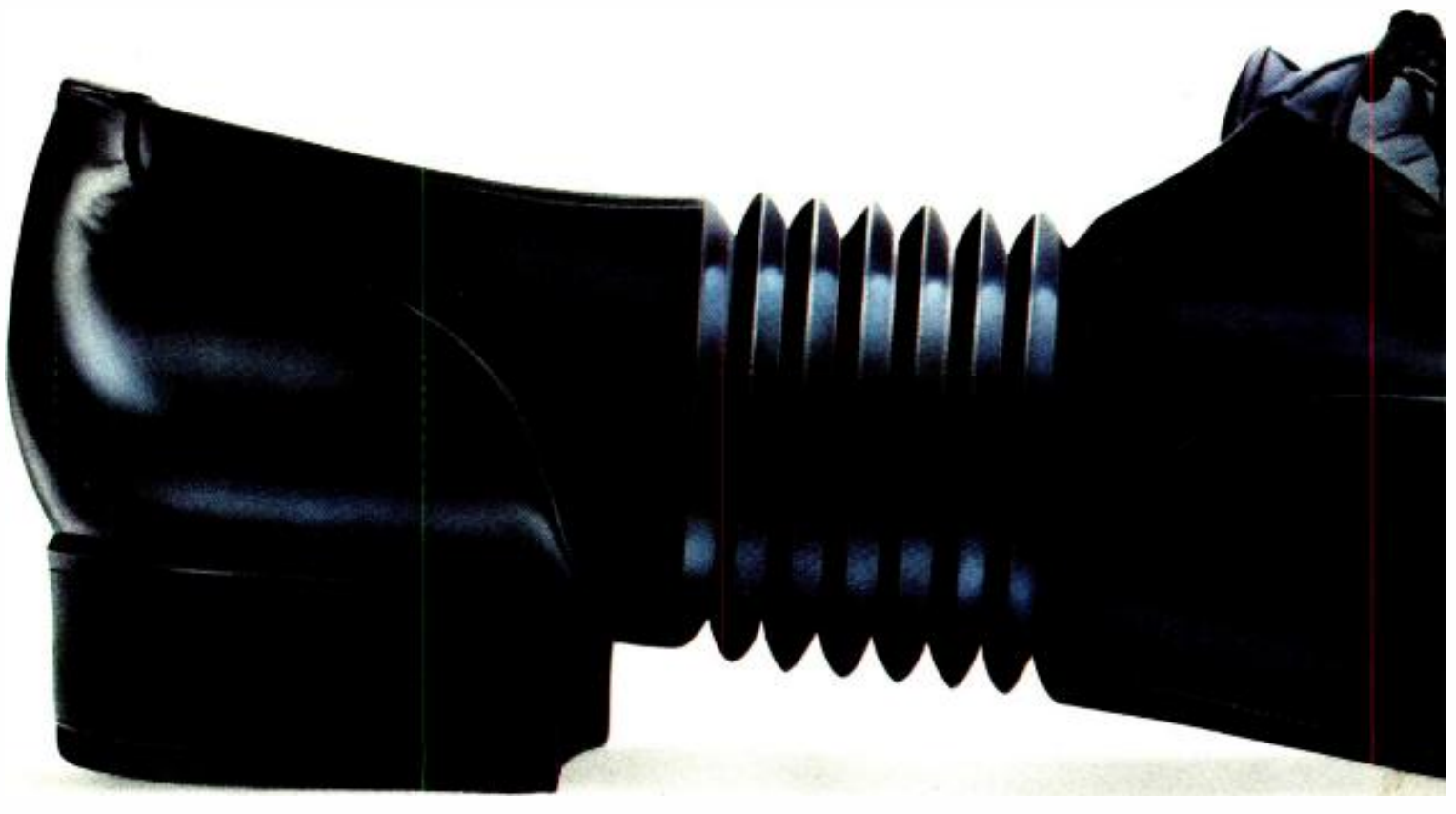

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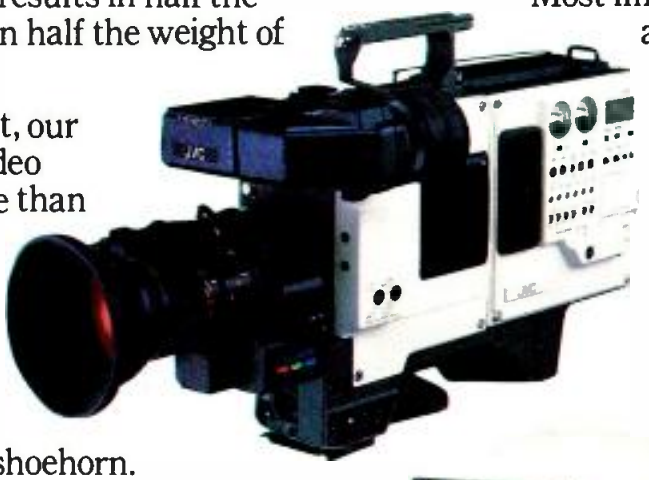

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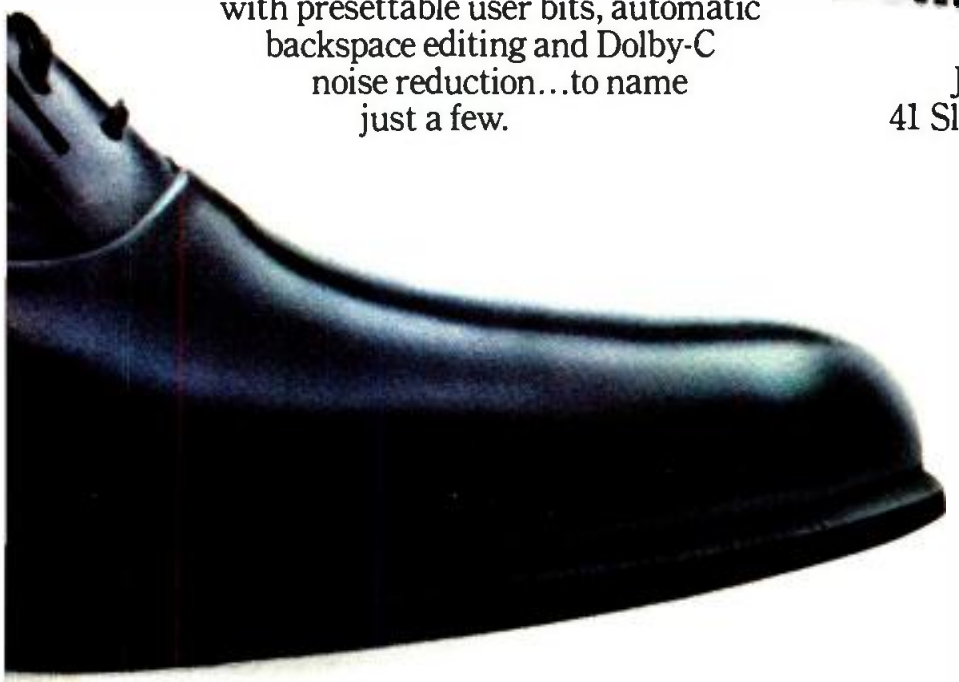

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A Letter to Our Readers:

This issue is the first time that *BM/E* has been published under the new ownership of Act III Publishing.

Act III Communications recently acquired the Broadband group of magazines, including *Broadcast Management/Engineering (BM/E)*, *World Broadcast News (WBN)* and *Educational & Industrial Television (E-ITV)*. This brings to five the number of media- and communications-related magazines now published by Act III, a Los Angeles-based media and entertainment company owned by Norman Lear.

Act III acquired *Channels* magazine, which covers the television industry, in April 1985, and *Marketing & Media Decisions*, serving marketing and media professionals, in October 1986.

Kevin J. Condon has been named executive vice president and group publisher for the Broadband publications and senior vice president for technical publishing for Act III Publishing. Kevin, who recently was the publisher of *Millimeter*, will be responsible for day-to-day publishing operations, including advertising, marketing, and editorial strategies. We at Act III are very excited about Kevin joining the company, and we plan to use his experience to help Act III continue its growth in the technical trade publishing area. Charles Lenz will remain as the president of the Broadband group.

Act III Communications, our parent company, in addition to its publishing operations, owns television stations, motion picture theaters and is involved in the production of television shows and movies. Last year, Act III produced the movie *Stand By Me*, directed by Rob Reiner. This fall it released, to critical acclaim, *The Princess Bride*, also directed by Rob Reiner, and distributed by Twentieth Century Fox.

Over the next few months we will be developing *BM/E* into the leading magazine for technical and engineering management professionals. In doing this, we welcome your help, your ideas, your feedback and your criticism. With your guidance we will be the best magazine in the field for both readers and advertisers.

The coming year looks to be vitally important for the broadcast business, and it will certainly be an important one for *BM/E*. We look forward to working with you and serving your needs.

Sincerely,

Paul David Schaeffer
President, Act III Publishing

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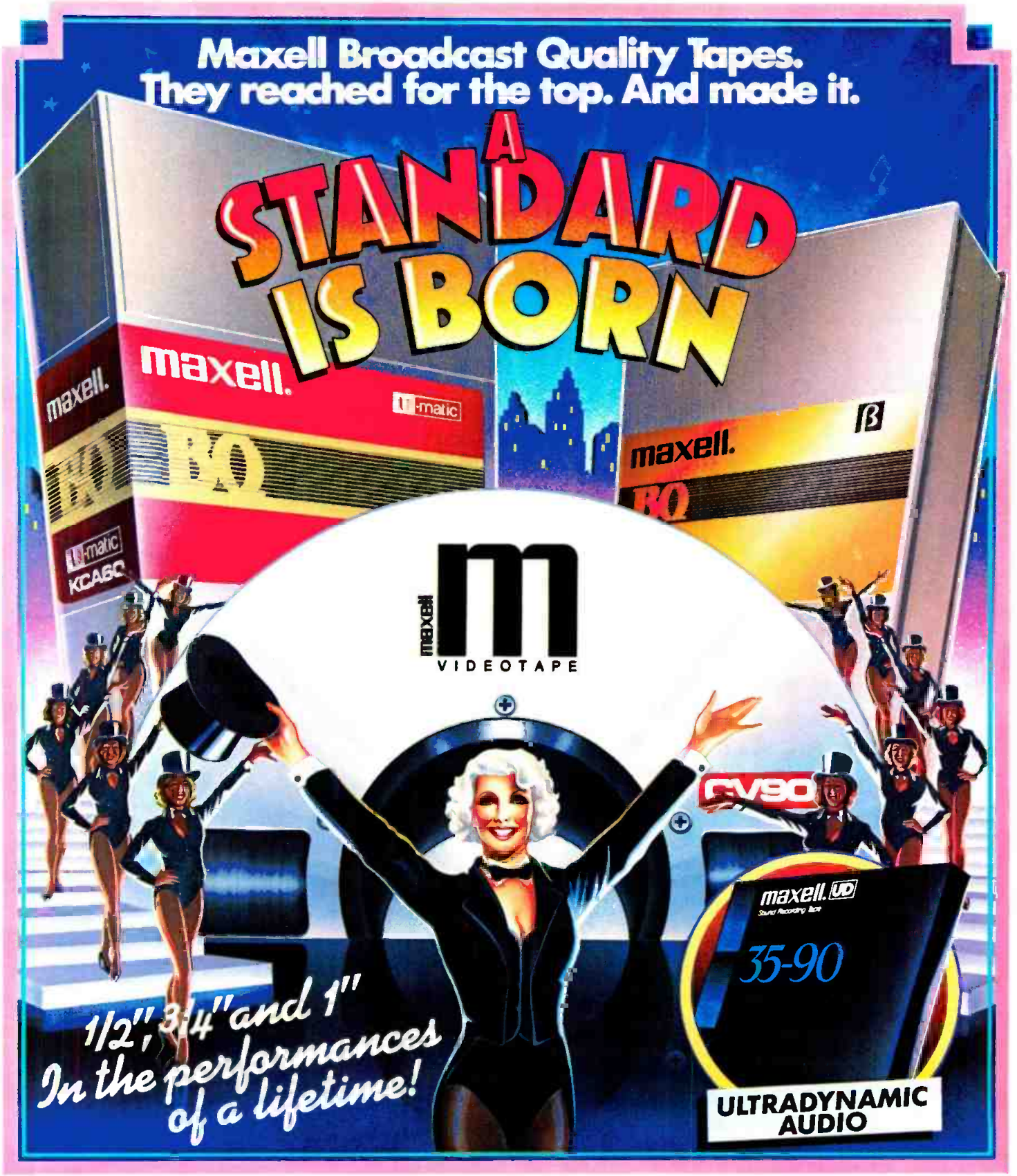

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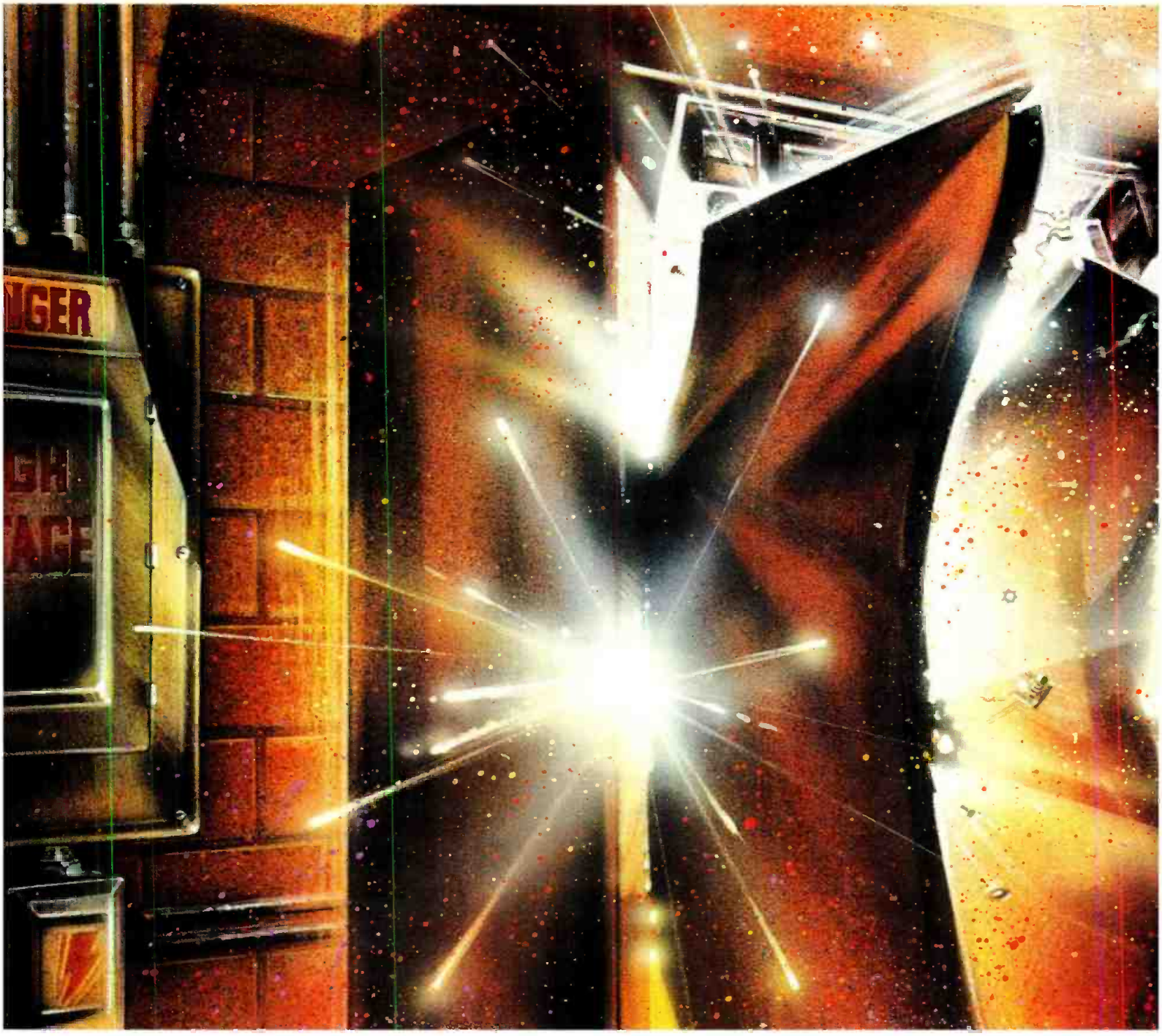

Chattanooga. January 26, 1987. WTVC's transmitter — from a Harris competitor — exploded. Doors blew away. Quarter-inch-thick sheet steel melted. And Channel 9 went off the air.

Working through the night in subzero weather, Director of Engineering and Broadcast Operations Manager Dennis Brown and his staff would bring the station to half power in 18 hours. But less power

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BLEW UP, EVERYTHING EXPENSES"

F. Lewis Robertson
Vice President/General Manager,
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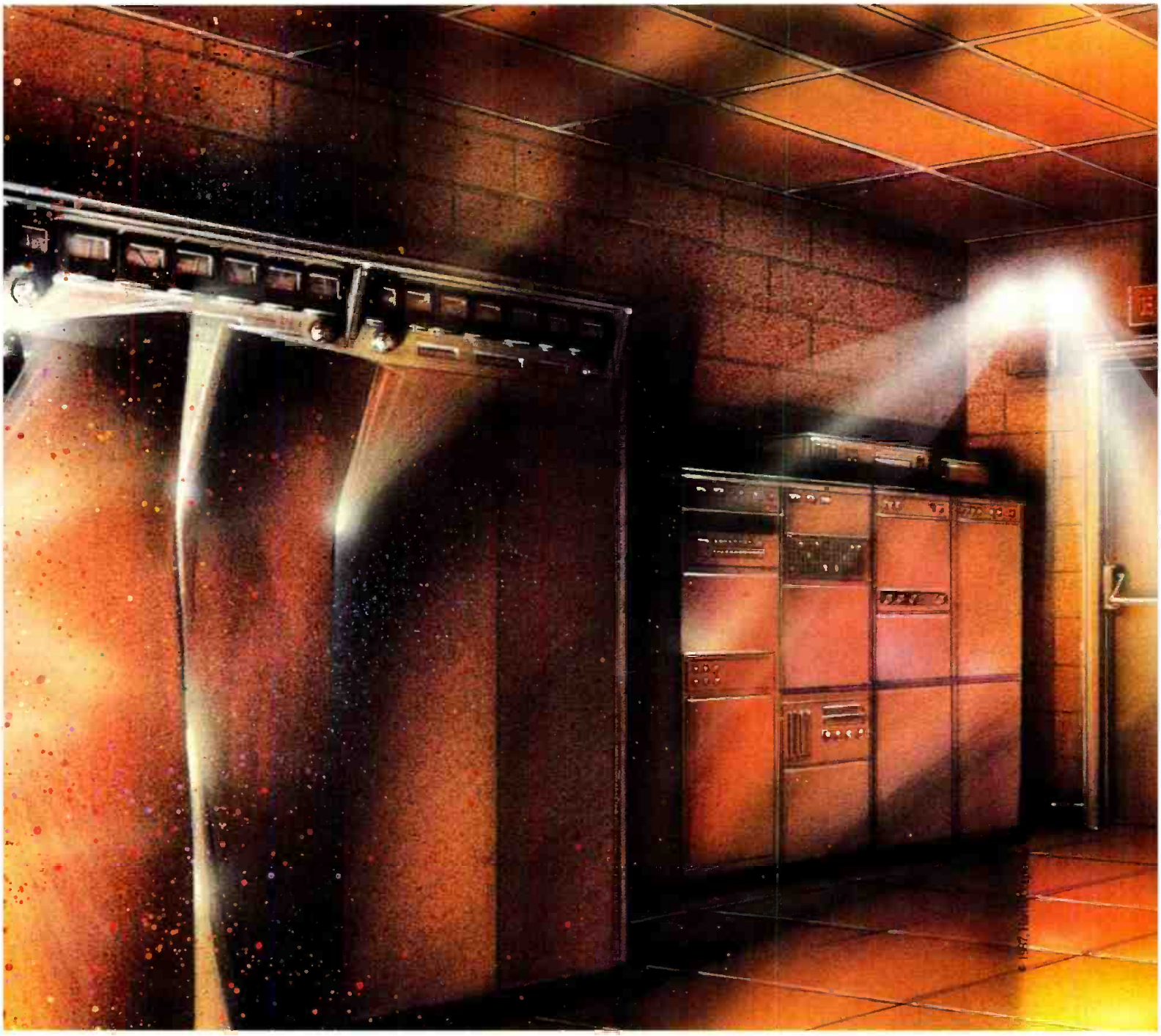

still meant less revenue. They needed a replacement fast . . . in 30 days rather than 30 weeks. Says Brown with a smile, "We knew if anyone could, Harris could."

The day after the accident, a Harris rep was on site. Assessing damage. Identifying needs. Rolling up the shirtsleeves to pitch in. And once Lewis Robertson gave the go-ahead, a new Harris transmitter was in place and operating just 30 days after the order. Channel 9 was back on the air at full power . . . with a picture viewers felt was better than ever!

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NBC News Goes to China

From September 25 to October 2, American audiences got a rare glimpse of life on the other side of the globe when NBC News broadcast its *Nightly News, The Today Show,* and *Sunday Today* programs from China.

The complex communications and transmission requirements for the broadcasts, which originated from Beijing and Shanghai—as well as such historical Chinese landmarks as the Great Wall and Tian an Men Square—were handled by the Los Angeles-based IDB Communications Group.

IDB began preparations for the project nearly a month ahead of time, when four of the company's engineers arrived in Beijing on September 1 with 13,000 pounds of transmission equipment. The engineers set up fixed earth stations at production locations in Beijing and Shanghai (a portable earth station was also used at the Great Wall and Mao's tomb at Tian an Men Square) and established circuits for data and digital voice traffic using Intelsat's Pacific Ocean Spare satellite operating back to IDB's Pacific region international station at the Los Angeles International Teleport.

The data and voice circuits used by IDB provided 20 lines between New York and each of the remote locations in China. This provided NBC personnel in China with New York dial tones, thus calling an NBC office in New York was as simple as dialing an extension. Furthermore, all of the remote locations were tied in to NBC's computer network, which enabled NBC personnel to transfer scripts, stories, and information back and forth between the two continents.

Along with the voice and data communications, video was simultaneously transmitted to Intelsat's Pacific Ocean Spare and a U.S. domestic satellite, which relayed the signal to The Teleport in New York and, from there, to NBC studios.

According to Gilbert Kuang, IDB's senior director of facilities and planning and project coordinator in China, the assignment went very smoothly. "I must say that the Chinese were very eager to work and help," he said. "Both Central China Television and the Chinese Ministry of Telecommunications were on hand to assist the operation. They were very inquisitive and excited by what we were doing."

History and high-tech come together for NBC News broadcasts from China. The earth station shown here outside of Beijing's ancient Forbidden City was one of two uplinking facilities supplied by IDB Communications for the transmissions. (See accompanying story, "NBC News Goes to China.")

RF Spectrum Situation Worsens

Broadcasters are being forced to reexamine the national spectrum situation in a much colder light. Many areas are affected including HDTV, mobile phones, and various distribution channels. Heading into the 1988 election year, the industry is looking at a harsh reality: total absence of spectrum availability in certain places.

Those places, of course, are the sites of the political conventions where, along with little workspace and no hotel availability, broadcasters can expect no RF spectrum availability. That is, unless they have already been assigned a frequency. One gets assigned a frequency by contacting the 1988 Political Convention RF Coordinating Committee, an organization of networks, station groups, independent broadcasters, and local stations that keeps a database of all frequencies expected to be operating in conjunction with the conventions. The committee will be working with the FCC and local coordinators to assign frequencies for two-way radios, wirless mics, and remote pickup microwaves operating in and around both convention sites. It will also compile frequencies used by the political parties, print press, common carriers, and satellite uplinks to provide interference-free communications during the conventions and to ease any conflicts that may arise.

According to information released by the RF Committee, the last convention year, 1984, saw over 3200 radio and television personnel working the conventions for 152 different news organizations, numbers that are expected to increase in 1988. The committee will coordinate broadcast-band RF frequencies in both Atlanta, the site of the Democratic bash, and New Orleans, the Republican convention host city. The committee took 1023 requests for frequency assignments from 85 news organizations at the 1984 political meetings.

Since the bulk of satellite transmission is uplinking there is typi-

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cally little difficulty in that area. The major difficulties fall in the frequencies most commonly used by IFB, wireless intercom, and RF microphones, as well as microwave hops throughout the area. The standard 30-day rule, wherein visiting broadcasters are supposed to notify the host RF committee of intent to use spectrum space, has been suspended for both conventions and all spectrum allocations are being handled by the host city frequency coordinating committees in cooperation with the Political Convention RF Coordinating Committee.

All organizations planning to use RF equipment at the conventions are urged to contact the committee as soon as possible to obtain frequency application forms and operational guidelines. Those interested should contact Martin Meaney, Chairman, 1988 Political Convention RF Coordinating Committee, C/O NBC Engineering, Room 1600 W, 30 Rockefeller Center, New York, NY 10112.

HDTV Reenters the Picture

HDTV is back in the spotlight. It received its new impetus from two related developments: the third international HDTV conference held in Ottawa in early October and the announcement by NBC that, in conjunction with Sarnoff Research Institute (SRI), it had developed an NTSC compatible extended definition system. (See HDTV feature "Advanced, Enhanced, Expanded, Compatible: The Search for Higher-Definition Television," p. 55 in this issue.)

There are two critical issues at hand. The one that appears to be the most immediate is lack of spectrum, especially for NHK's MUSE system, which requires double the normal 6 MHz bandwidth of NTSC causing a crunch in spectrum allotments. No less important, however, is the issue of money. According to some in the industry, a widely accepted figure is that NTSC now represents, in North America alone, a business of over $100 billion.

It is unlikely that an incompatible system could obsolete a market that large in a few short years. The answer, it seems, is some sort of NTSC-compatible extended definition technology. NBC has developed such a technology, though it has only been shown in computer simulation and not on a recorded or transmitted medium.

Money, therefore, is still the issue as NBC and SRI are asking for companions to invest millions on top of the $41 million it has already cost to develop its system, called ACTV for Advanced Compatible Television. Likewise, Daniel Gold, NAB TV board member and member of the NAB High Definition TV Task Force has called for and allotted moneys for research and development of HDTV, which he sees as the "next great technological change to reach consumers in the video marketplace."

Gold, also president and CEO, Knight-Ridder Broadcasting, made this statement while testifying at a hearing on HDTV issues before the Telecommunications Subcommittee. To overcome the spectrum and standardization problems in HDTV developments, Gold said that within the next five years over $10 million per year will be spent bringing the technology to fruition. These dollars will be supplied by the corporate and association members of the Advanced Television Systems Committee (ATSC).

Gold also mentioned the NAB's commitment was evident in the recent formation of the Broadcast Technology Center, which will aid in the development and support of HDTV for terrestrial broadcast purposes. Whether the industry and consumers follow one of the compatible extended-definition systems or go with the more thoroughly field-tested NHK system remains to be seen. What is clear, however, is that HDTV is back in the spotlight, money is being spent, sides are being taken, and many new developments can be expected within the next year.

CPB Board Elects Chairman

For the first time in its 20-year history the Corporation for Public Broadcasting has elected as chairman a public broadcasting representative. The pioneer public broadcaster, Howard Gutin, has experience in the Texas public broadcasting system and as acting chairman of CPB.

Upon his election as board chairman, Gutin emphasized the need "to stabilize and increase funding sources." As acting chairman, Gutin testified before the U.S. House of Representatives Appropriations Subcommittee seeking increased federal funding of public broadcasting.

A San Antonio, TX, resident, Gutin joined the CPB board in September 1984, was elected vice chairman in November 1986, and has served as acting chairman since March 1987 when former chairman William Lee Hanley's first term expired. Gutin's term will expire in March 1989.

Currently a broadcasting communications consultant, Gutin was president and general manager of Texas public television stations KLRN, San Antonio, and KLRU, Austin. Under his leadership, the stations won 12 program awards and produced series for national public television, including *Austin City Limits*, *Newscasts from the Past*, *The Adventures of Sherlock Jones*, and the upcoming *Timeline*.

In a related development, William Lee Hanley was elected vice chairman of the board of directors. Hanley is chairman of the board and CEO of Hanley Company, Inc., an oil exploration and merchant banking firm in New York with holdings in Texas. He is also chairman of the board of Anthony Potter Productions, an independent full service video production company in New York City and a partner with the Washington, DC, political consulting firm of Black, Manafort, Stone, & Atwater, Inc.

A resident of Greenwich, CT, Hanley joined the CPB Board in February 1984. He served as chairman from November 1986 until his first term expired in March 1987. He was previously chairman of the board's Audit Committee.

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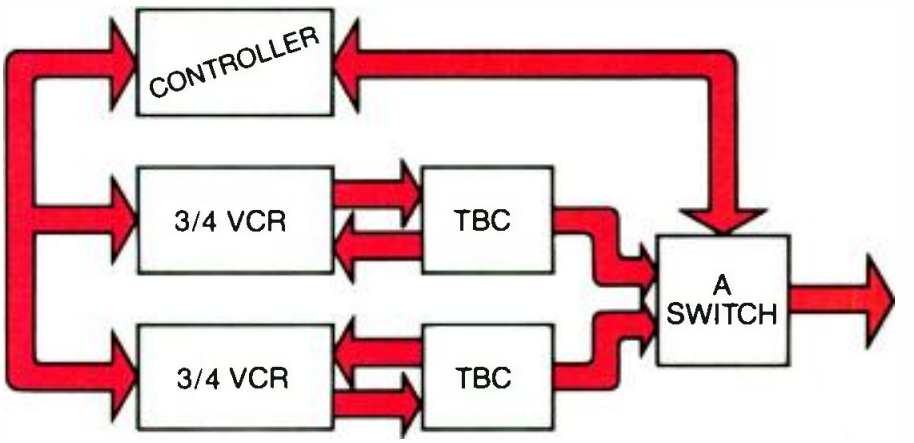

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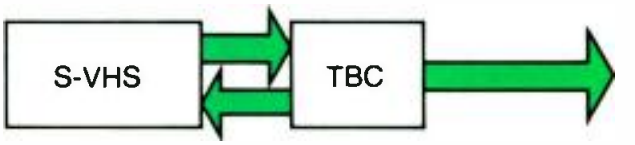

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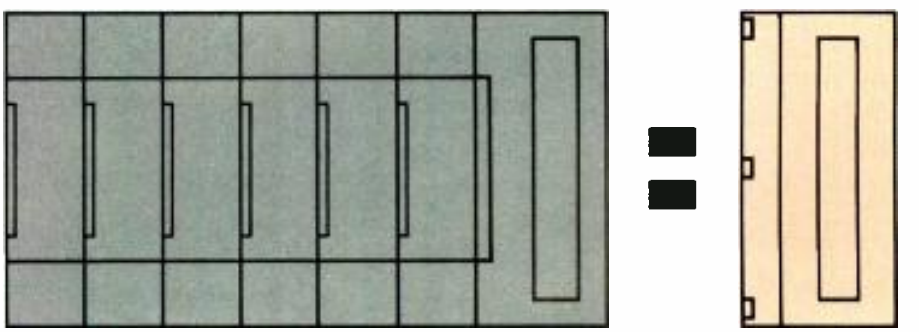

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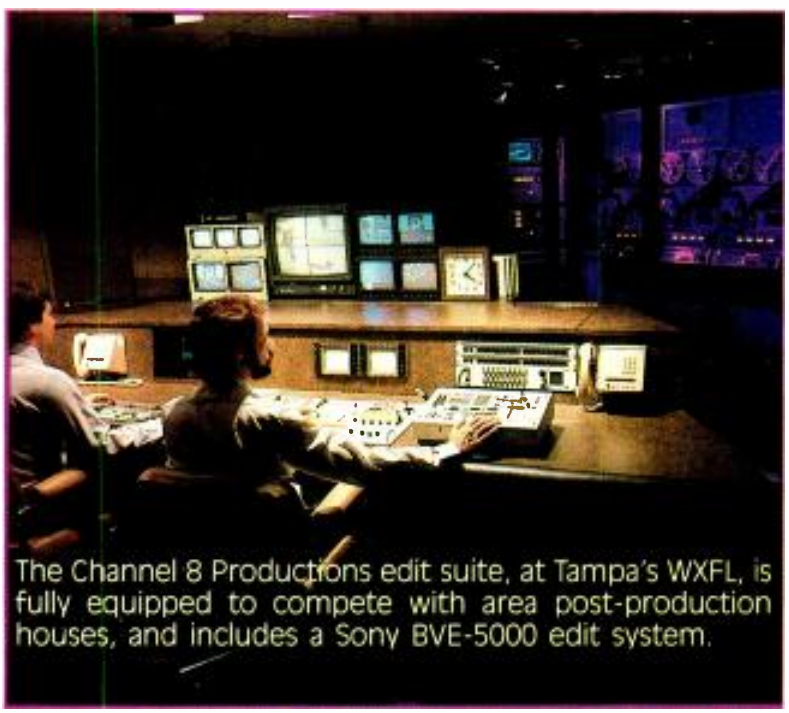
TELEVISION POST-PRODUCTION

To a greater or lesser degree, practically every video production involves some kind of post-production work. For a straightforward news story on a tight schedule it may mean basic cuts-only editing, a term with countless variants (hamburger, punch-and-crunch, and on-the-fly editing being just a few). At the opposite end of the spectrum, post-production of a national television commercial will involve not only computerized on-line editing, but can also include film-to-tape transfer, creation of 3D computer graphics, digital video effects, audio sweetening, color correction, and even duplication services.

Between—and including—these two extremes is a wide range of activity that is encompassed under the heading of post-production, and how much of it any given television station performs can depend on many factors. These factors include the size of the station, the health of its market, and how much video production a station tackles.

Inexpensively produced local ads have been a part of the business practically since commercial television began, and are often accomplished with basic switcher or digital effects and simple edit controllers. News departments have, in recent years, emphasized feature stories, which require more post than news presentation traditionally has. Many stations have even formed separate teleproduction departments to compete for a share of the local video production business. Having the proper equipment is important in each case, but local market conditions can sometimes be the determining factor in how much post goes on at a station.



The Channel 8 Productions edit suite, at Tampa's WXFL, is fully equipped to compete with area post-production houses, and includes a Sony BVE-5000 edit system.

How much and what kind of video post-production work a station undertakes depends on many factors. There are internal station needs, outside client concerns, and competition from post houses, but if you're in the game you've got to have the right equipment.

By Brian McKernan

Markets and machines

At WFAA, in Dallas, a slowed Texas economy and the opening of the Dallas Communication Complex's Studios at Los Colinas prompted station management to scale back their post-production work for outside clients. Instead, the station concentrates on in-house post work on news promos and features.

"We've had to cut manpower and come to grips with what's needed to operate a standard TV type of operation," explains Bob Robinson, production manager. "Heavy outside post-production just wasn't profitable enough anymore."

The station broadcasts three and a half hours of live, local news five days a week. Early each afternoon, the production department begins creating graphics and packaging stories, using an Ampex ACE editor, ADO, and Grass Valley Group 300 switcher with two channels of effects. Cuts-only editing is employed for the most part, and the work can actually be said to be more in the realm of preproduction than post. Most news promos are done in ten-second versions, with heavy use of the ADO.

Another television station that has recently changed course in terms of its post-production work is Tampa's WXFL. New management determined that outside commercial work was less important than the station's own in-house needs. Senior editor Paul

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Berkowitz explains:

"Channel Eight Productions had gotten a good reputation as a post house, but we've retrenched, especially on industrials, which are very time-consuming to do for the money they bring in. Instead we concentrate on servicing commercial accounts that are buying air time, such as the Public Supermarket chain. There are also the news specials, but the biggest area of post-production now is in promos. This includes work on the program *For Kid's Sake*, which involves both creation of promos and a lot of tagging and production of local vignettes."

"We do a little of everything," says production manager John iting, whether it's two hours of location footage for a 30-second commercial or half-hour news special. Graphics for news opens, movie opens, and of course the promos. For that we use our ArtStar 3D, which we got about a month ago. We're still experimenting with it, but love it already. It's a new tool that's opening minds."

WFXL's news department relies heavily on U-matic; Channel 8 Productions shoots most of its promos on Betacam, and also operates three Sony BVH 1100A one-inch machines. To accomplish the interformat editing necessary in this environment, the station chose a Sony BVE-5000 editing system.

"I haven't worked with CMX or any of the other popular editors," Berkowitz explains, "but I do like the 5000. It's an easy system to use no matter how deeply you get into long-format editing, where careful and extensive list management is essential. I'm still finding new functions on it.

"Sony is also very good about improving their software. Right now we're using Version 2.27. It's updated enough that so that you can slave roll machines off other machines. I can roll everything in the room and keep track of its time code, which the 5000 generates. Previously, you could really only control three machines, and you could roll five or six. But you had no idea of where you were or where you ended up, and you had to manually compute that. Now it's part of the software, and it will do that for you."

Channel 8 Productions's BVE-5000 includes four GPIs, one each for an NEC Optiflex and E-flex, another for an Ampex ATR, and a fourth that's open for future expansion. "When they first came up with the GPIs in the software, we had the impression that they wouldn't be frame-accurate," Berkowitz recalls. "But they have proved to be. It's just like any other source now, reliable and repeatable."

The BVE 5000 also interfaces with the suite's Grass Valley Group 300-2B switcher, but Berkowitz finds that extensive preprogramming and control of switcher effects through the editing system is sometimes less preferable to manual operation.

"It looks fancy when you can program things to have the whole room lighting up, putting supers in, taking them out, throwing a switch for some effect, or what have you. But in some instances it might take an hour to preset all of that, whereas you may also be able to achieve what you want in five steps, and do it all in ten minutes. But don't get me wrong, the fact that the editor addresses the switcher is important, and there would be no way you could operate without that type of accuracy." He goes on to say that added flexibility and features in any equipment are always desirable, and that no matter how much any facility has, you always feel that you're one short of something.

Universal among people in post-production is the conviction that the greater the number of peripherals that can be controlled by the edit system, the easier and more efficient that system becomes. Many manufacturers have introduced products in recent years to widen the number of devices that can be interfaced in edit systems, and video isn't the only area of concern. Devices such as the Evertz Emulator permit integration of audio tape transports into the video edit environment. Still, there is progress to be made in the edit suite.

The Betacam edit suite at KIRO-TV's Third Avenue Productions, in Seattle, processes all signals in composite form for reasons of economy.

"An ultimate dream would be an edit controller that not only sends out commands, but also tells you the switcher setup, right down to the clipping levels, which isn't so blue sky at all," observes Peter Rudoy, vice president and general manager of Broadway Video, one of the nation's leading video post-production houses, located in New York. "It boils down to manufacturers being willing enough to shake hands and exchange protocols."

One area where edit people often disagree strongly is on the design of the user interface of specific edit systems. Editors will praise systems they've grown accustomed to, often deriding systems with a different design philosophy. System modularity for

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future upgrading, and type of keyboard used are two such areas of contention.

Post for news

The growth in popularity of news features in recent years has resulted in more post-production in news, but not necessarily at the level found in commercial and promo work. "Post-production for our news specials is generally just final assembly of package pieces," Berkowitz explains. "Reporters will already have off-lined their stories on ¾-inch, and then we'll add graphics with our ArtStar, special effects if any are desired, and mix the music. We're really not seeing much more post for news, unless it's a special program that will run two or three times a year. With the deadlines news has and their limited number of producers, news don't always have as much time as they'd like to spend on stories."

Effects for extended news stories can also be undesirable in some cases. Mary Mapes, segment producer for special reports, investigations, and series at KIRO-TV, in Seattle, recently shared a national UPI award for her work on *Until Proved Innocent,* a news special about a man who may have been wrongly convicted of a crime.

"There are stories where it's inappropriate to have too many effects," Mapes asserts. "Well-placed technical effects are much more worthwhile and effective than just throwing everything at a story. That can be very distracting when someone on camera is saying something emotional and important.

"But I do try to have at least one really good, not gratuitous, meaningful effect in every piece I do. I like having a visual effect that will jar the audience a little bit, and make them think. For a documentary I did on the Green River serial murders I had post-production create a grid of photos of the victims' faces. Faces were inserted one by one as the history of the murders was described. My use of post-production is usually limited to doing transitions in the form of cubes and dissolves in order to suggest the passage of time. *Until Proved Innocent* runs a half hour, and there are about 30 dissolves, cubes, and wipes in it."

Mapes A/Bs her stories in one of KIRO's eight off-line suites equipped with Sony BVU 800s, and then has transitions, graphics, and what effects she does use added during final assembly in the news production studio. Short and long versions of each story are recorded on one-inch tape, the shorter version to be played as part of the nightly newscast.

A custom logo and separate entrance at Third Avenue Productions serve to give the post-production facility an identity of its own, apart from parent organization KIRO-TV.

Big productions

Far more extensive than the post-production performed by KIRO's news department, however, is that which is done for commercials and industrials by the station's affiliated organization, Third Avenue Productions. As with many stations that have spun off separate teleproduction facilities, Third Avenue Productions is an entity unto itself, and is fully equipped to compete with other production houses.

"Sixty percent of our work is in commercials," says Keith Cook, post-production editor. "We do everything from the $100 car ad that the client expects to look like a million, to $100,000 national accounts. The rest of our work involves the corporate and industrial market here in Seattle."

To handle the load, Third Avenue Productions operates both a one-inch interformat suite and a Betacam edit suite. "What is happening in our area is that people who used to shoot in ¾-inch are now going to Betacam for quality, resolution, and the one-inch look without the cost. There are still a lot of people who like to integrate Betacam with one-inch and then edit to one-inch, and you'll find the clients who are still bringing in library material on ¾-inch and mixing that with what they're now shooting on Betacam," Cook explains.

For reasons of economy, Third Avenue's Betacam signals are processed in composite form, and not component. "In a total component situation, whenever you start dealing with composite signals you then must have transcoders for every component input, and this drives up expense," Cook says. For the most part, we're doing one or two generations on our Betacam, and we really don't feel we're losing that much quality with the composite signal. We dub in component, but that's it."

Third Avenue's Betacam suite is equipped with three Ampex CVR 15s with Dynamic Tracking, a Grass Valley Group 100 switcher, Abekas A53, Chyron RGU 2, Graham-Patten 608 automated audio console, and—tying it all together—a Calaway Engineering S-CED editing system.

"The Calaway operates off an IBM PC, of which KIRO has many," Cook explains, "and the system includes extensive file manipulation ability. In addition to the programs that come with the edit system, Comprehensive Video offers a number of very useful list-management systems that are meant for the IBM PC, and we use those programs with our edit system as well.

"Calaway provides software," Cook continues, "two plug-in cards for the PC, and a keyboard that is similar to an IBM PC keyboard except that it has different key caps on it, and a shuttle control knob. You run your cables out to your machines, plug directly to them, put in DOS, boot the software, and there you have it. The advantage to the system is cost. You basically get a CMX-format type of editing system for a third

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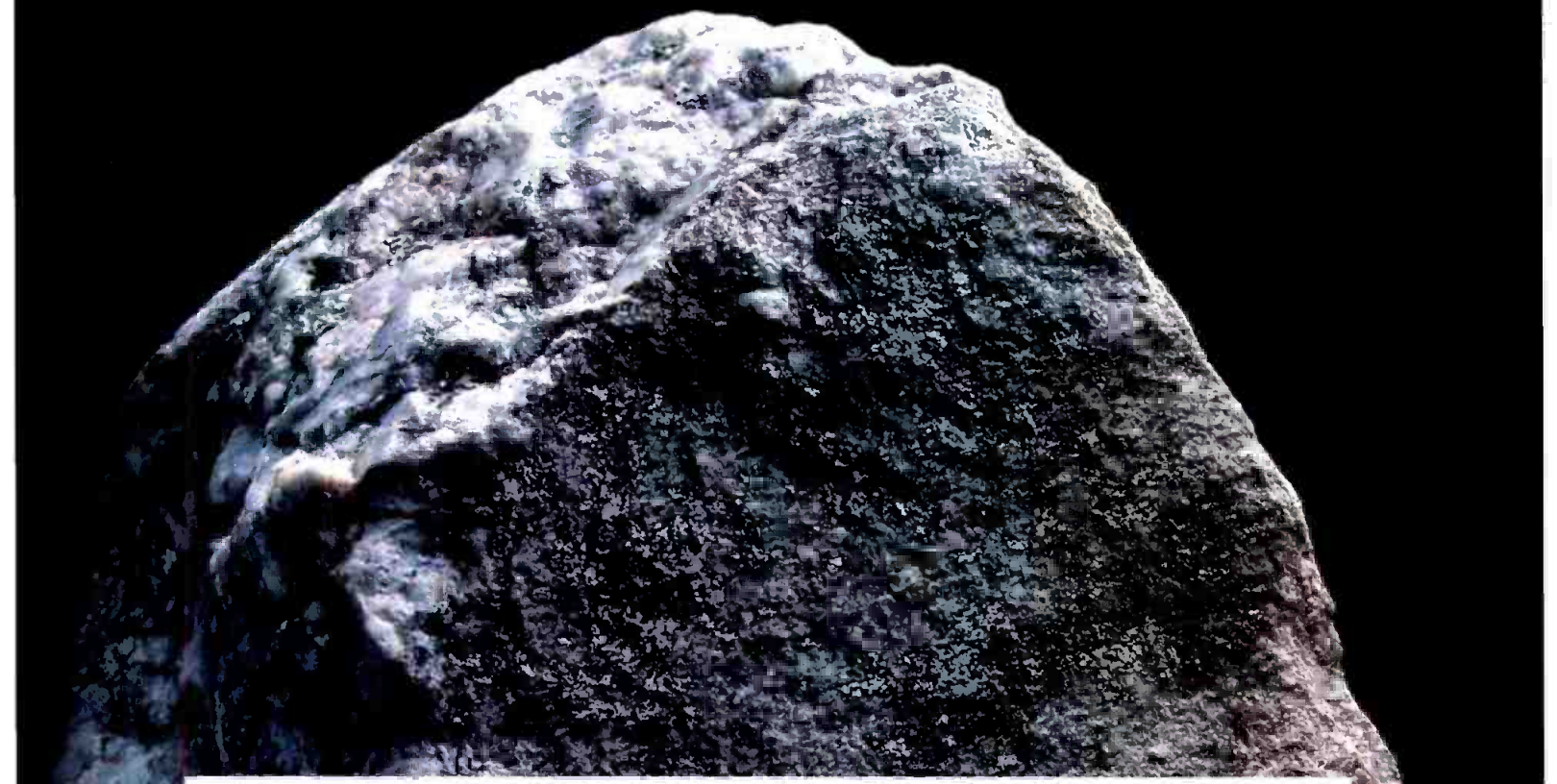

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of the price, and for us it handles quite well the size of the room that we've put it in.

"The Calaway will generate an edit list in its own format, or the Grass Valley Group format, or CMX's. There's also an optional disk drive available, allowing the Calaway to generate an edit list and write it on a CMX disk. This added flexibility interests us because we have a CMX 3400 in our one-inch suite across the hall."

Third Avenue's Calaway S-CED communicates directly, without interfaces, to VCRs, switcher, and audio board. The editor executes switcher transitions, and can also automatically direct the audio board to track the video source, matching preset dissolve rates or performing a different transition rate than that of the video dissolve. The Abekas A-53 is also triggered from the editor.

"It offers virtually hands-free operation," says Cook, "and the nice thing about it is the ability to address so much from the keyboard. Our Betacam suite is a one-man operation, but you're able to do practically everything without worrying about having to dissolve the audio faders back and forth, or set up the switcher, or trigger the Abekas."

The right tools

Third Avenue Productions' one-inch interformat suite, meanwhile, is outfitted with four Ampex VPR3 one-inch VTRs, Sony BVU 800, BVW 15, 5000 ATR, Grass Valley Group 1600 7H switcher, ADO 3000, Chyron IV, ADM Technology audio console, and the CMX 3400 editing system. Like the Calaway, the CMX provides hands-free operation with such features as audio-follow-video, but the larger CMX system offers wider control of peripheral devices and greater list management.

Having the necessary technology to stay competitive is essential for any post-production house, Cook believes, and this applies not only to video equipment, but to audio as well. He cites the Sony 5000 ¼-inch ATR with center-track time code as an example. Center-track time code prevents crosstalk between audio channels, and enables a producer to take an out-of-house tape, and put time code on it without disturbing the main audio tracks.

"Most of the audio sweetening houses in the area are using center-track time code now. Our clients can go out of house, do their sweetening, come back with their master tape, and just put it on our machine and do a direct layback right onto the one-inch video master, without any generational loss."

Valuable time

The use of time code is, of course, widespread today in higher-order editing systems because of the speed and accuracy it affords. One avid proponent of time code for editing and other post-production uses is Dick Stewart, technical consultant to WCCO-TV's Production 4 Studios, in Minneapolis. Production 4 Studios, or P4S as Stewart and station personnel refer to it, is a department of WCCO that offers extensive teleproduction and post-production services.

Stewart formed Electronic Interiors, a facility design firm, after setting up P4S. The company is currently developing a time-code-based PC/AT news archiving system for WCCO. Because all edit controllers at the station employ time code—including those for news—rapid access to any desired library footage will be made possible.

"Contrary to popular belief," Stewart says, "time code is an unbelievably cheap proposition. There are those CEs who aren't familiar with it, who resist installing it in a station, saying that it has to be put through the master router, which will cost a great deal because every machine has to have it.

"Well, in fact you can get into time code generation for as little as $850, and any old rotten audio DA you've got around will distribute it all over your building. It's one of the cheapest coding sources you can possibly use, and it's extremely handy. Longitudinal time code is, after all, essentially an audio signal.

"All the P4S producers, all producers in WCCO promotion, the directors, even the news photographers and reporters all log their tapes with time code, either as burned-in windows or LED displays." P4S uses Telcom Research SMPTE time code inserters and readers, and Cipher Digital (BTX) generators.

"Time code is only half as effective unless you use it creatively," Stewart asserts. "By that I mean things like reel one starts at 1 hour, reel 2 starts at 2 hours, and that way you don't have to keep track of your reels, you just punch in your time code number, and the machine will either keep track of it for you, or if you get completely lost and you forgot to write your reel number down, you just look at whatever the first digit is, and you've got it. This is a big help in major editing projects."

In with the new

Work done at Production 4 Studios includes industrial videos for many of the Minneapolis area's major corporations (Honeywell, Pillsbury, General Mills), investigative reports and dramatic presentations for the WCCO public affairs department, commercials for regional and national clients, and sales presentations for the portable VHS-C machines carried by WCCO account executives. P4S has its own 88- by 55-foot studio, and two edit rooms, one of them an on-line/off-line Beta and ¾-inch suite, the other a large interformat suite known as edit one.

"It's true that one-inch delivers a better picture," Stewart admits, "but the cost-performance ratio advantages of Beta SP make it very attractive. We have a Betacart system for much of our on-air playback, and so frequently our one-inch material has to be dubbed down to Beta anyway. We've set up a backup network so that edit masters, particularly local programming, are all recorded on Beta and aired directly into the Betacart, first generation. I'd hon-

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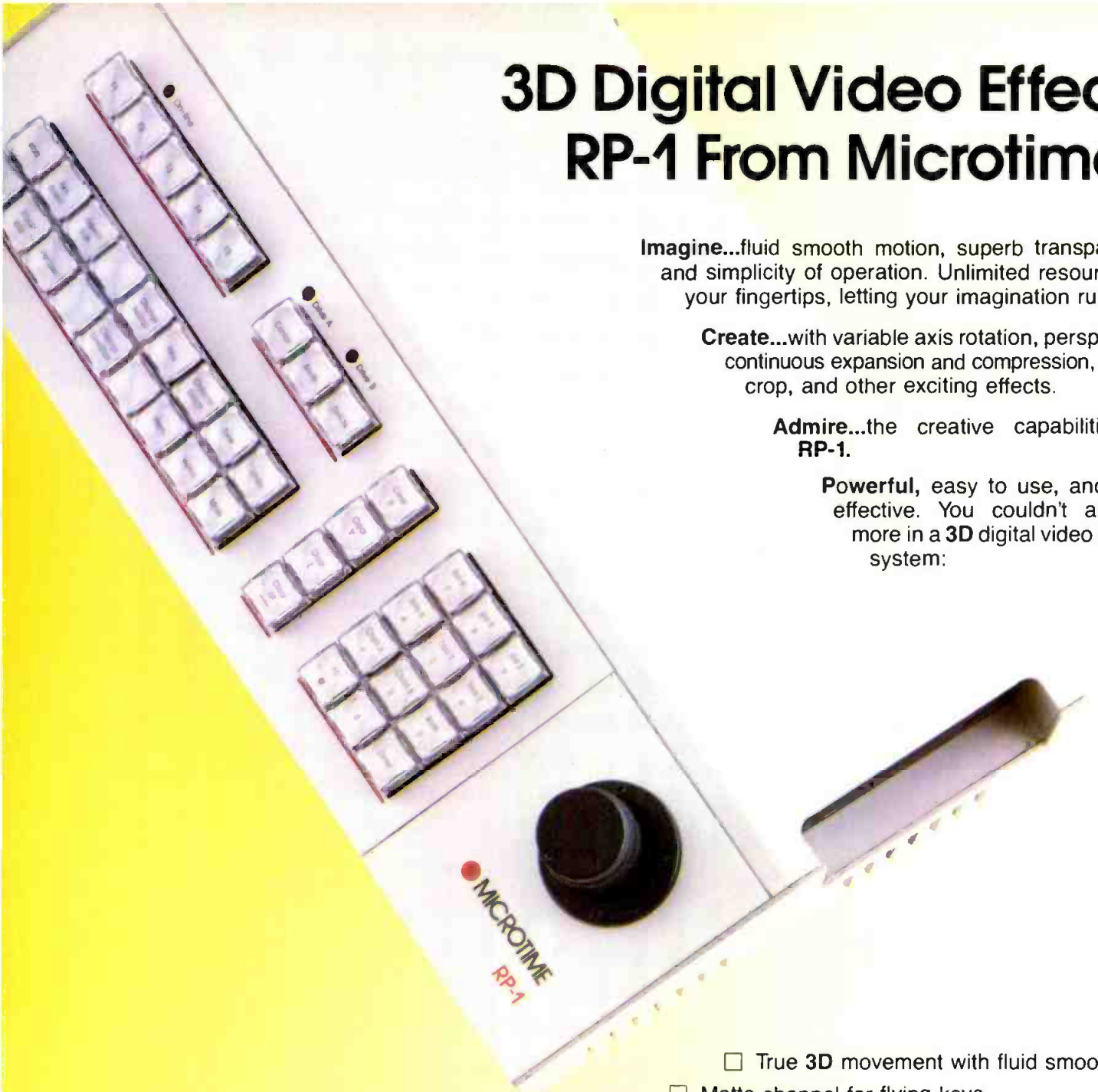

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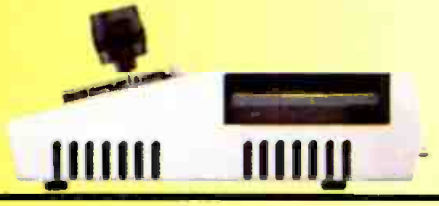

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estly stack first-generation Beta SP on the air up against a second- or third-generation one-inch tape any day."

Like many stations and facilities converting to the new high-performance half-inch formats of Beta SP and MII, WCCO and P4S plan to take advantage of the longer tape lengths now possible. Stewart explains that Beta SP is well suited to automatic recording of long satellite feeds, and that it will also reduce man-hours previously needed for interformat dubbing between one-inch and Beta. Beta SP's improved image capabilities will ease demands on P4S's one-inch equipment, previously the only high-quality format available at the facility. P4S currently has five BVW 75 Beta SP VCRs on order. "When the 75s are installed our BVW 40s, which have a shorter tape length, will be moved to EFP editing suites since they're compatible with small-cassette style of shooting," Stewart says. "There are 12 active editing suites in the building; six for news and six for general production, including the two that P4S uses."

One of those two P4S suites is edit one, the largest in the complex. It is equipped with a CMX 3400 editing system, which will interface with a total of 12 VTRs when all BVW 75s are delivered. Currently it is connected to three one-inch VTRs, two BVU 800s, and one BVW 40. A Grass Valley Group 200 switcher interfaces with the CMX, which can up- and download the switcher's E-MEM to the EDL disk. Other equipment in the suite includes a dual-channel ADO 3000, an Adda still store, a dedicated Chyron IV, and keyboard for access to the graphics department's Vidifont Viditext II. Graphics also has a Quantel Paintbox. Edit one audio equipment includes a Studer audio console, Otari 16-track ATR, CD player, cart machine, and two audio cassette decks.

A 20x20 Utah Scientific routing system is also part of edit one, and it is a complete, standalone frame from the main house router. "It eliminates the need for utility DAs everywhere," Stewart explains. "In a modern-day editing suite you find yourself in all kinds of bizarre situations, such as recording a matte onto one VTR while you're recording an output of the switcher on another VTR. The editor has all control panel right next to him, he just reaches over and punches up the router, hits the take button, and the rout is done."

Post policies

Being well equipped is essential for any television station that's gotten into post-production, Stewart says, especially in light of the competition that exists today. But equipment is only part of the story.

"Stations have to realize who they're competing with," Stewart insists. "They're kidding themselves if they think they're competing with other television stations, because they're not. Stations are competing with post houses staffed by young, creative, hungry people.

"This is why you must have completely separate facilities, you can't have news borrowing equipment and pulling time away from a client in the middle of his session. If you're going to be in the business of taking care of clients, you have to do exactly that. You've got to have a secretary who will bring in and take out ribs. You can't have tours, with kids pressing their noses against the glass, post houses don't have tours.

"You also have to strike a balance between the power of the sales department and the power of the production department," Stewart states. "Sales may be inclined to promise the client that the station will do the ad for free, but if you give away your services, clients will perceive them to be worthless. For that matter, if the ad cost $1.50 to produce it's going to look it, too."

Stewart believes that the management of any station thinking about getting involved in post-production for outside clients should first ask around and see if there's equipment that's not being used.

"You have to recognize that the post-production business is somewhat of a roller coaster, because once you get into it you have to tool up your editing suite or studio very heavily if you're going to compete with a serious rate card. You might have to spend some money to do this, you need state of the art, redundant equipment, and you must set some priorities; if a machine goes down who gets the backup, news or the client? All of these are questions that must be answered before the first customer walks through your door." **BM/E**

It's not often that the chairs are empty at edit one, the interformat suite at Production 4 Studios. This post-production facility handles everything from major industrial presentations to 30-second commercials.

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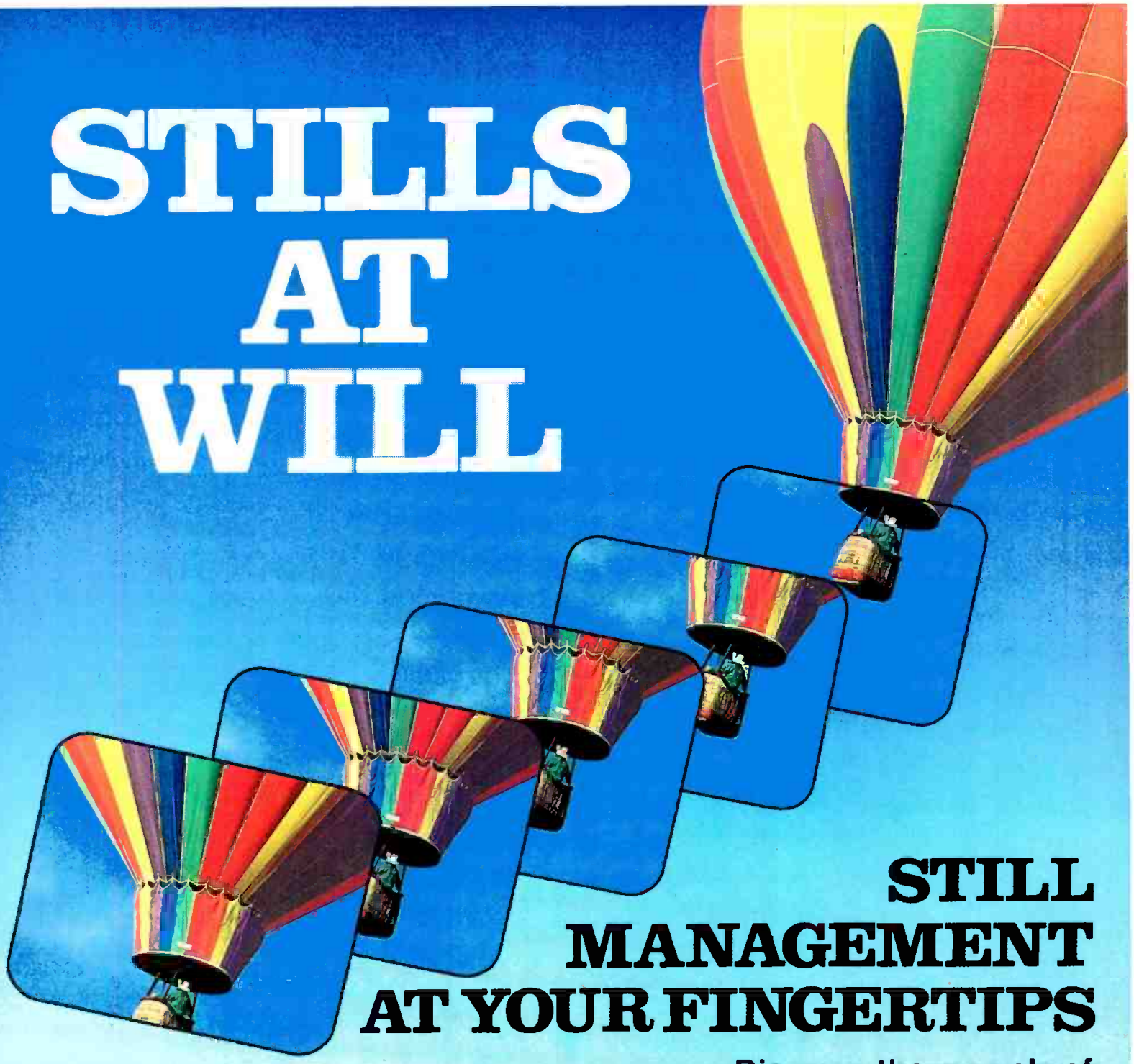

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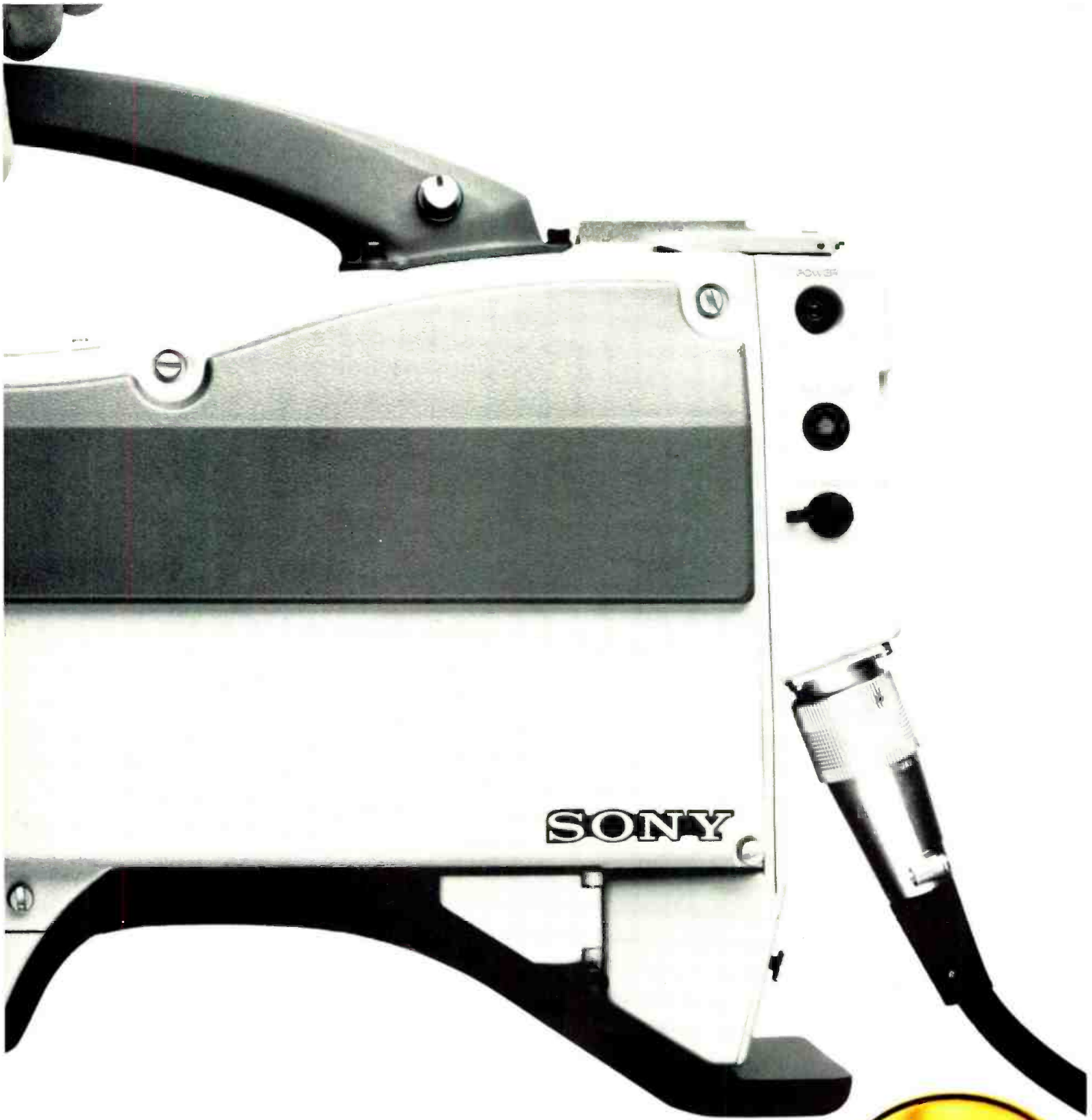

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EDITING ON THE CUTTING EDGE

The Post Group's film unit director Kenneth Yas sits at the console of the facility's CMX 6000.

As new technologies jostle traditional tools and techniques, high-end editing stands at a turning point.

By Eva J. Blinder

The sudden reemergence of the random-access editor as a viable technology has startled some factions of the post-production industry into new action—while at the same time leaving other segments relatively unmoved. But while observers differ widely in their opinions of the significance of the new technology, all agree that its impact will be far-ranging.

In fact, the new random-access systems so far have targeted a market new to video editing—film editors and producers. Despite heavy praise and promotion by video mavens, the traditional computer-style video editors have, by and large, been spurned by the film community as heavy on technology and short on creativity.

The makers of random-access

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Grass Valley Group's IPS-100 Integrated Production System combines a switcher, audio mixer, edit controller, sync generator, and character generator in a single unit.

editing systems aim to address that issue directly, patterning the machines after traditional flatbed film editors, eschewing time code numbers in favor of graphic and pictorial displays, and adopting the language of film editors. So far, the approach seems to be working, although data is limited by the systems' newness.

But the more traditional end of the video post-production industry, while intrigued by the promise of random-access, shows no signs of embracing random-access technology *en masse*.

"Videotape editing is not going to go away," asserts Dan Hair, communications manager at Paltex, whose Eddi disk-based editor is helping spearhead the random-access movement.

"It will not be replaced by laserdisk editing because the industry is too large at this point for a new takeover," Hair continues. Like the growing plethora of videotape recording formats, he maintains, the competing technologies will coexist, each finding its own niche in the industry.

His viewpoint is seconded by most editing system manufacturers. Rome Chelsi, product marketing manager, editing systems, for Grass Valley Group, comments, "While we acknowledge the existence of disk-based systems, we currently have several projects planned that are more along the line of conventional editing technology, focusing on systems integration and looking at ways of better defining peripheral pieces of equipment."

He adds, "We feel that although they [random-access editing systems] do serve a useful purpose, there is still a problem with disk mastering . . . For years people have been used to conventional editing technology. We think random-access has got its place, but we still feel that the total job can be done as efficiently with conventional tape technology as it can using two different technologies." He points out that conventional editing systems offer the advantage of a workprint at the end of the off-line process in addition to the edit decision list. But as for the issue of random access itself, "We think that's a pretty neat feature." He notes, "Disk systems are for a very narrow market segment. The primary method of editing is still with a conventional type of editing system."

New territory

The niche into which random-access editing is attempting to insinuate itself — with some success — is the world of commercials and episodic television, still shot on 35 mm film and traditionally edited and conformed on film as well. While the film industry has not abandoned its flatbed editors yet, increasing numbers of editors are intrigued enough by the new systems' speed and potential to make the switch.

Random access's spread "is really going to be based on word of mouth," comments CMX's Christin Hardman. Film editors, she maintains, are "going to see someone working on it who they respect and say, hey, if it works for so-and-so, it'll work for me."

She adds, "Film editing is not like video, where if someone gets the latest million-dollar gadget everyone has to have it."

Even within that narrow niche, Hardman notes, needs vary from area to area, and product development for the new CMX 6000 random-access editor has had to take that into account.

"We've responded to the needs of our users during the past couple of months," she says. "We want the system to be ready not only from the standpoint of its basic architecture, but also from the perspective of users' basic needs. We really tried to be responsive to putting in special features that people requested, or modifying features that were already there. . . . God knows that Optimus, which is all commercial film production, and people in New York have different needs than people in Los Angeles who do episodic television.

"We're trying to make it work for film editors," she asserts, "not just commercial film editors or

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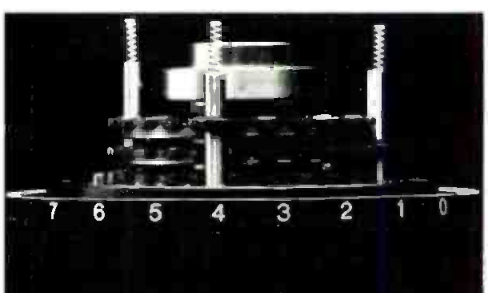

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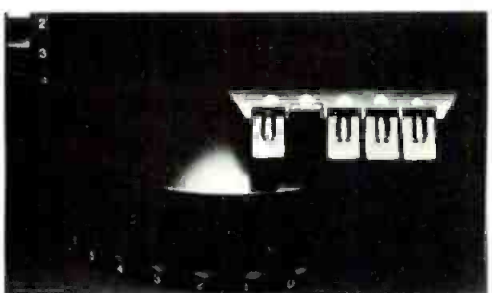

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episodic film editors. To develop something like this, you have to be in it for the long run, not just for this week's profit-and-loss statement." According to Hardman, CMX's commitment to the 6000 stems from the company's belief that in most cases, random-access editing will eventually replace conventional flatbed film editors, "at least for commercials and episodic television."

The CMX 6000 has just achieved "product" status after extensive testing in facilities such as Optimus in Chicago and The Post Group in Los Angeles. Hardman expects the system to gain more acceptance in traditional video editing applications as well as film editing.

"Because we already have a firm foothold in the video industry, our thrust is to target new markets, like film. But there will be a multicamera option in the future for the 6000 that will be good for video people. I think we're really targeting both markets in the big picture, but our initial thrust would be film editing because it's a new market for us and we believe it's a big market." In addition, she notes that the system need not be limited to off-line applications:

"Right now the only reason it's an off-line system is the quality of videodiscs in general. They're not what's generally termed broadcast-quality. But there are a number of manufacturers that are making inroads in coming up with a broadcast-quality videodisc with super-good audio. The architecture of the 6000 isn't limited to a certain type of player or recorder."

Lean hardware

While the Paltex Eddi remains farther away from true product status than the CMX 6000, Paltex is no less bullish on the system's future and no less committed to the film marketplace. According to Hair, the system's appeal for film editors is, in part, "that it eliminates time code hurdles for film editors to cross over to a new technology. They don't have to be mathematicians, they can still think in their frame-sequence orientation where they're pulling scenes together by frames or by pictures. There's no real down time for a film editor to cross over into laserdisk editing — the only hurdle would be to learn the system. If that person is basically oriented toward using a personal computer, that downtime would be very minimal."

Hair contrasts the Paltex and CMX approaches to random-access editors by saying, "We are hardware lean and software strong. We are predominantly software-based in our Eddi system, which gives us a lot of power, growth potential and flexibility." Paltex plans to develop Eddi into a complete product line with models optimized for various applications, although details remain confidential.

"At this point I can't say more, but I can tell you that the on-line/off-line issue for laser editing will not be a future problem," Hair states. "Already we can put out a VHS test print, and we can take the edit decision list from an off-line session and carry it directly over to on-line, and then bring the modified on-line version back to the Eddi for cleanup." Eddi will output an EDL in "interchange" or Paltex formats.

The actual shipping date of the product, now in a handful of test sites, rests in part upon the unresolved question of disk availability. Hair terms further development of laserdisk recording technology "essential. We are poising ourselves from a developmental standpoint on the progress of those companies," including the Optical Disk Corporation.

Laser questions

The specter of laserdisk availability and cost has haunted random-access editing from the start, as its detractors are quick to point out. Another drawback to the disks is their inability to be erased and rerecorded. In fact, not all random-access editing systems use videodiscs at all; the Montage (just now attempting a resurgence) and the successful, rental-only Ediflex both simulate random-access operation with banks of identically programmed VCRs.

"I think you can still break editing down into random-access and linear editing," comments Gary Schultz, who heads Ampex's editing group. Recalling Ampex's technology showing of a random-access editing system at NAB '86, Schultz remarks, "We gained a lot of insight from that demonstration and are still keenly inter-

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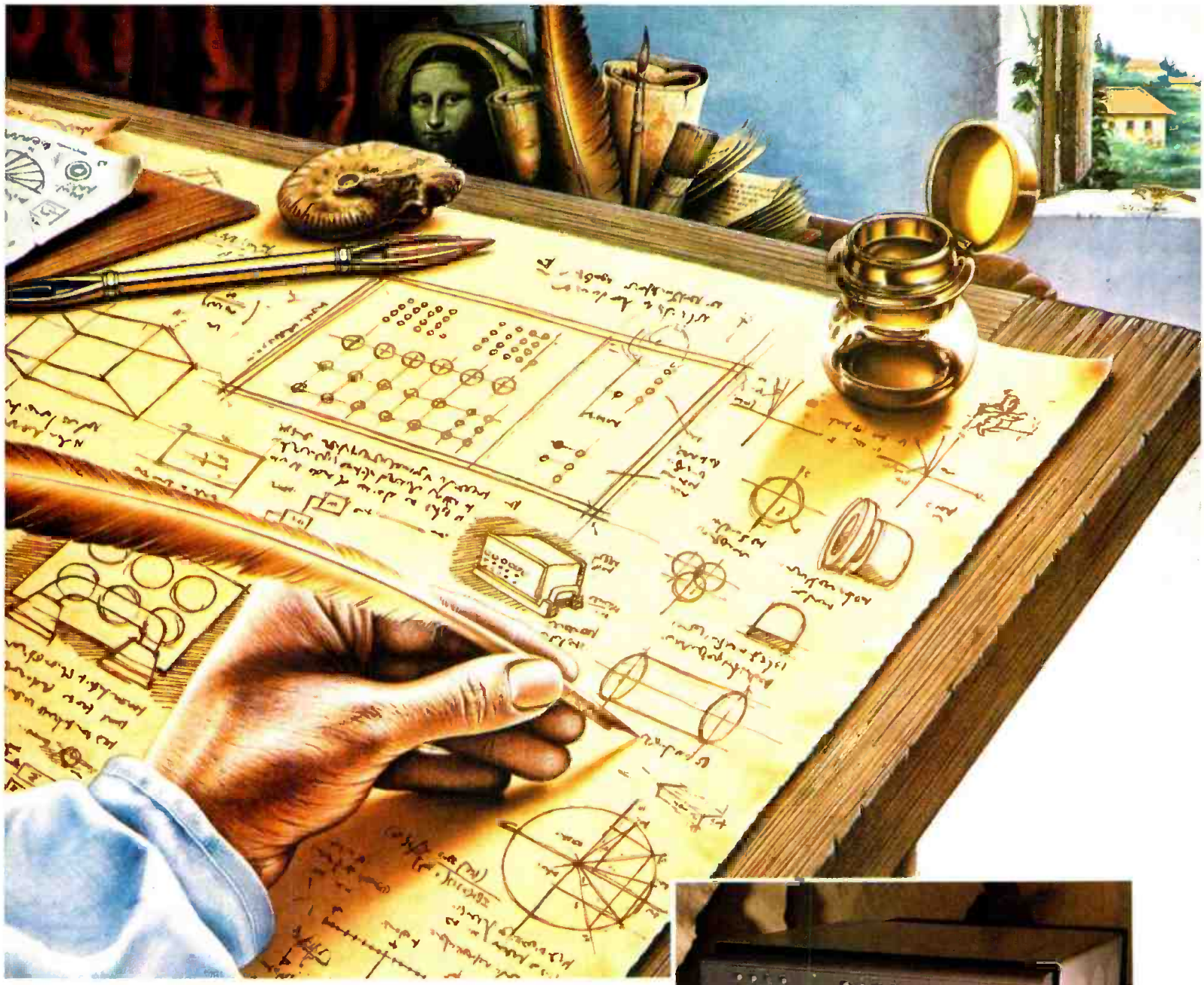

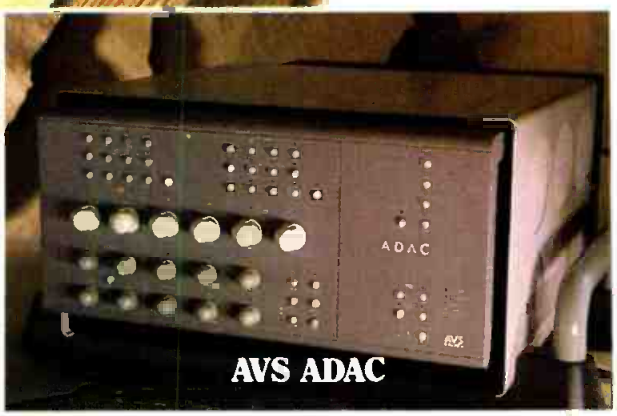

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ested in that [random-access] approach. But it has some hangups right now, most in the area of economics . . . The cost of the disk is one of the big stumbling blocks at this point, as is the quality of the disk. Another problem is the delay time involved in duplicating the disks. Those are some of the big stumbling blocks that stand in the way of random access really gaining wide acceptance."

Chelsi comments, "We're patiently waiting for the technology to come in where you're going to have disk recorders that have rewrite capability."

On the other hand, CMX feels that the problems of laserdisks have been exaggerated.

According to Hardman, making a disk "is not really a mastering process. What it really is is a dubbing process, making a dub onto videodisc for off-line just like you'd make a dub on ¾-inch tape. With the optical disk recorder from ODC, the operator just pushes a button and it happens in real time. It's not really as complex as everyone thinks."

As far as cost is concerned, that is dropping rapidly, Hardman asserts. She notes that The Post Group, with its own ODC laserdisk recorder, is charging $75 per disk, a far cry from the $300 cost of a couple of years ago.

"And the time a person will save just from the search time alone is incredible," she adds. "That time can be used either as a cost savings or as time gained for creative things."

CMX has directly addressed some of the disk-related problems with the introduction of a "scratch module" that allows the quick dubbing of late-arriving material. According to 6000 product manager David Orr, the scratch module is based on the Panasonic OMVR, a DRAW-standard read-once, write-many disk recorder with a capacity of 13.5 minutes. The OMVR can also be used as a "video buffer" for the 6000.

Orr explains, "In the LaserVision system or any system of that nature it takes a certain period of time for the head to travel from the outer to the inner edge of the disk. We put two players in the 6000, so the maximum access time is cut from 1.5 seconds to .9 seconds [25 frames]. But there are times when you can have several back-to-back 10-frame shots, and with a maximum access time of 25 frames you can't play from one disk, play from the next, and get back to the first in time." The OMVR can function essentially as a third video source in such situations, eliminating any delay time.

Linear trends

Despite its advantages, random-access editing remains confined to a small slice of the post-production market at this time. It's influence is growing, however, due in part to the move among video people to more comprehensive off-lining.

"As far as trends in linear editing, I see several things happening," comments Schultz. "For one thing, more prime-time programming is originating on film and then getting conformed on tape. The conforming process often boils down to how fast the editing system can do the checkerboard auto assembly. This is where the ACE 200 is a very attractive alternative because it is so quick in conforming. We see that market growing because people are making major story line decisions off-line and coming into the on-line room reasonably well-equipped to finish that spot. You can save 25 to 50 percent that way."

He notes that that kind of off-line work is what the random-access systems are designed for, but suggests they have limitations at present.

"Theoretically that's true," he says, "but what's happened is that people don't want to use a random-access system under the conditions they now have to. Maybe they don't have all the material when the disk-pressing machine is available. Having all the material there and front loading it is a problem now. So some people would rather go to a smaller format tape and go to a place where the costs are not so high. That's why linear off-lining has continued to thrive."

Because hardware costs are relatively low for such a system, facility owners have options they might not with an expensive random-access system, Schultz suggests.

"If we sell someone a small system like an ACE Micro for under $100K and they let someone bang out an EDL at off-line rates, it's a good way to bring in new clients that don't have the budget right now for the big on-line room," he states. "The off-line room can also be used as a low-cost on-line room, so a single-purpose off-line room is not always the best investment. If you have an off-line room that is totally and completely dedicated to off-line, then you've lost that flexibility.

"To have a person who can run 15 different kinds of keyboards or control panels is not always possible," he says. "I see a move toward the integration of these functions. Whether it turns out to be linear or random-access is just part of the formula."

Whereas Ampex's Creative Command Center is a studio-based system, Grass Valley is looking at system integration as an option for field operations. The company's IPS-100 Integrated Production System, first shown at RTNDA, combines a video switcher, four-channel automated audio mixer, edit controller, sync generator, and character generator into a single electronics frame. According to Chelsi, it would cost approximately $110,000 to $120,000 to put together a comparable system with individual parts; the IPS-100 will sell for $60,000 to $65,000 complete when it becomes available next year.

The edit system included in the IPS will feature a new hardware architecture Grass Valley is now introducing, which replaces the older multi-Q-bus setup with a single-board layout that combines processor, display electronics, I/Os, and memory on a single card. New standalone editors introduced by Grass Valley will also feature this architecture, which Chelsi says will result in a more compact and economical unit. **BM/E**

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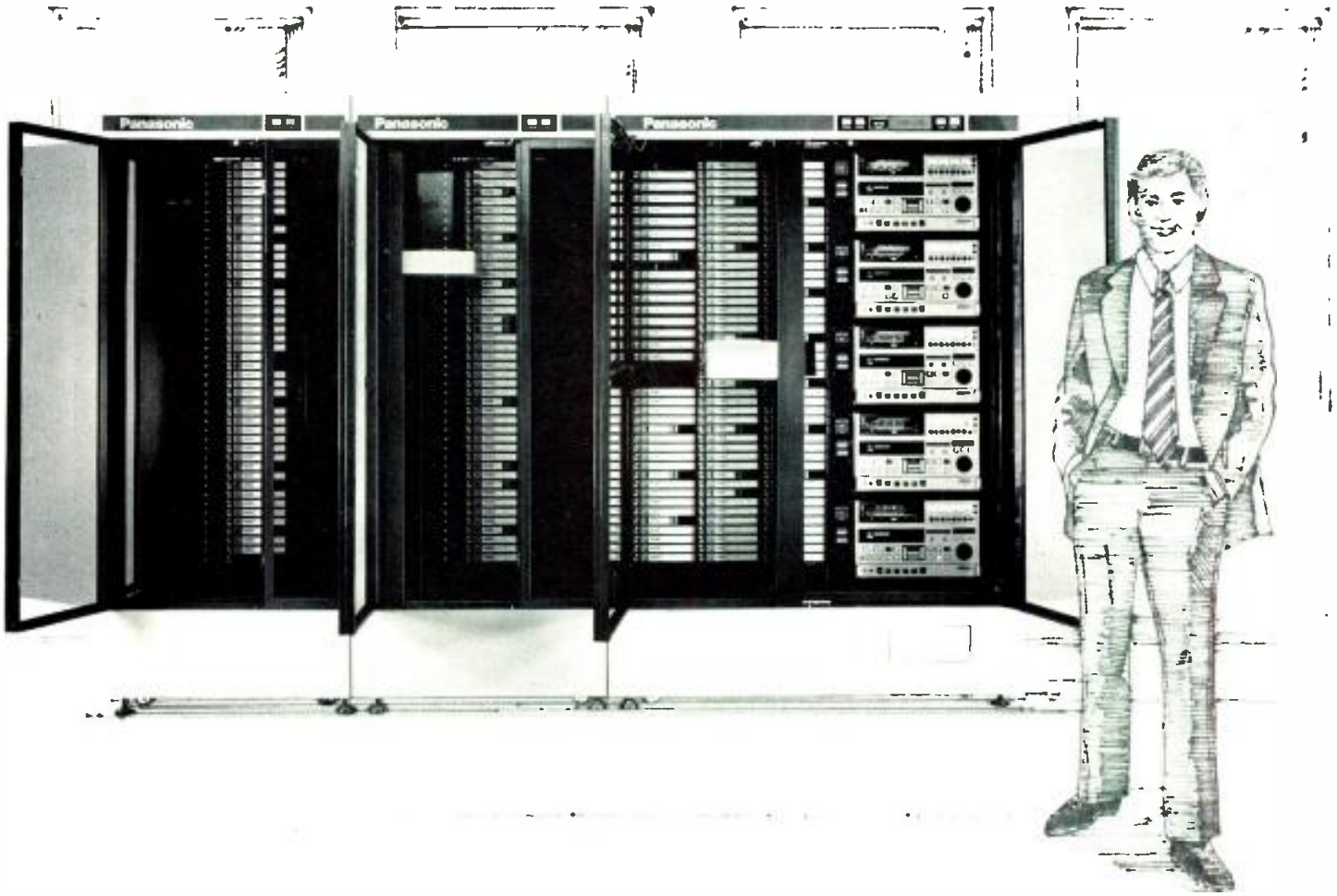

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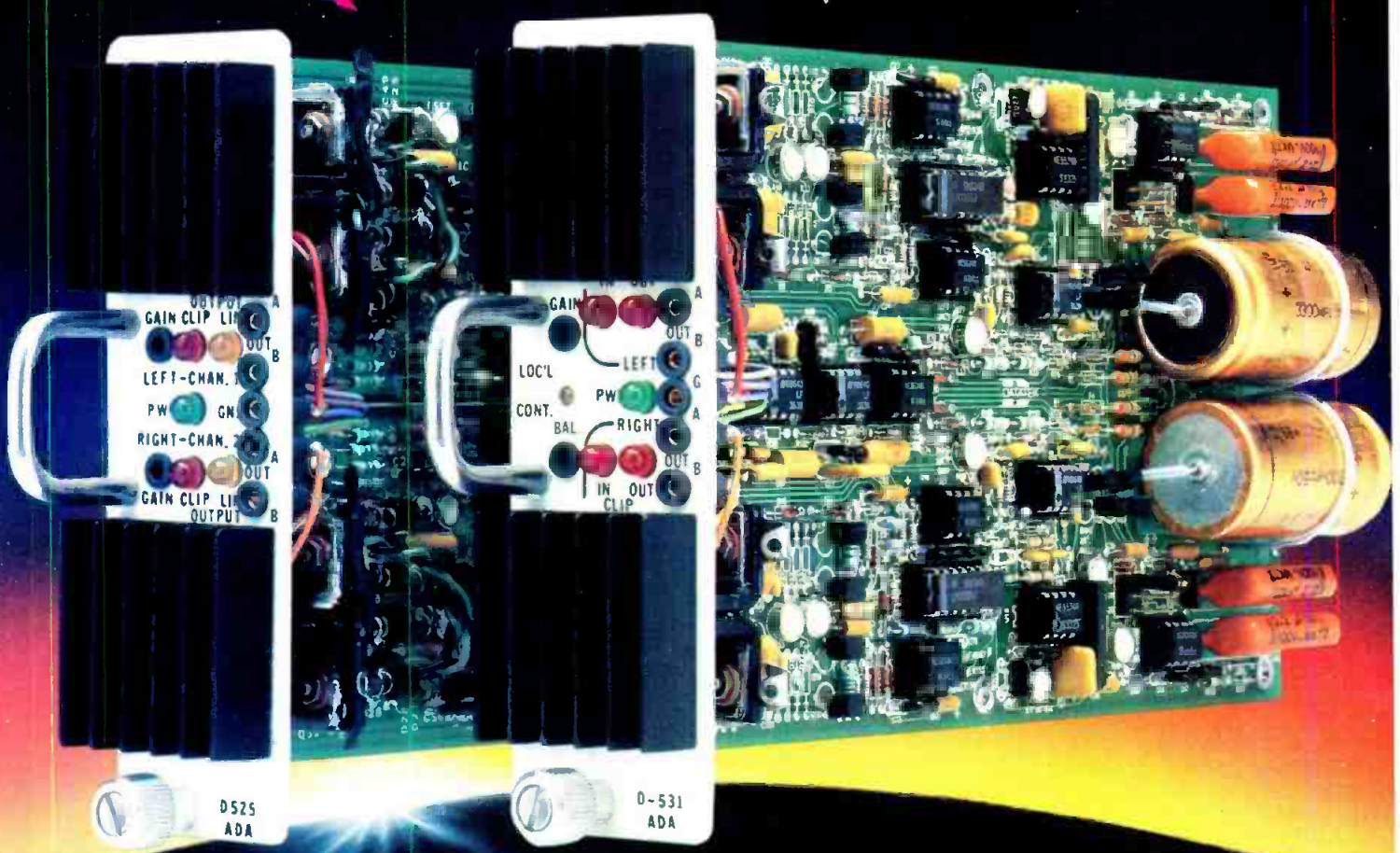

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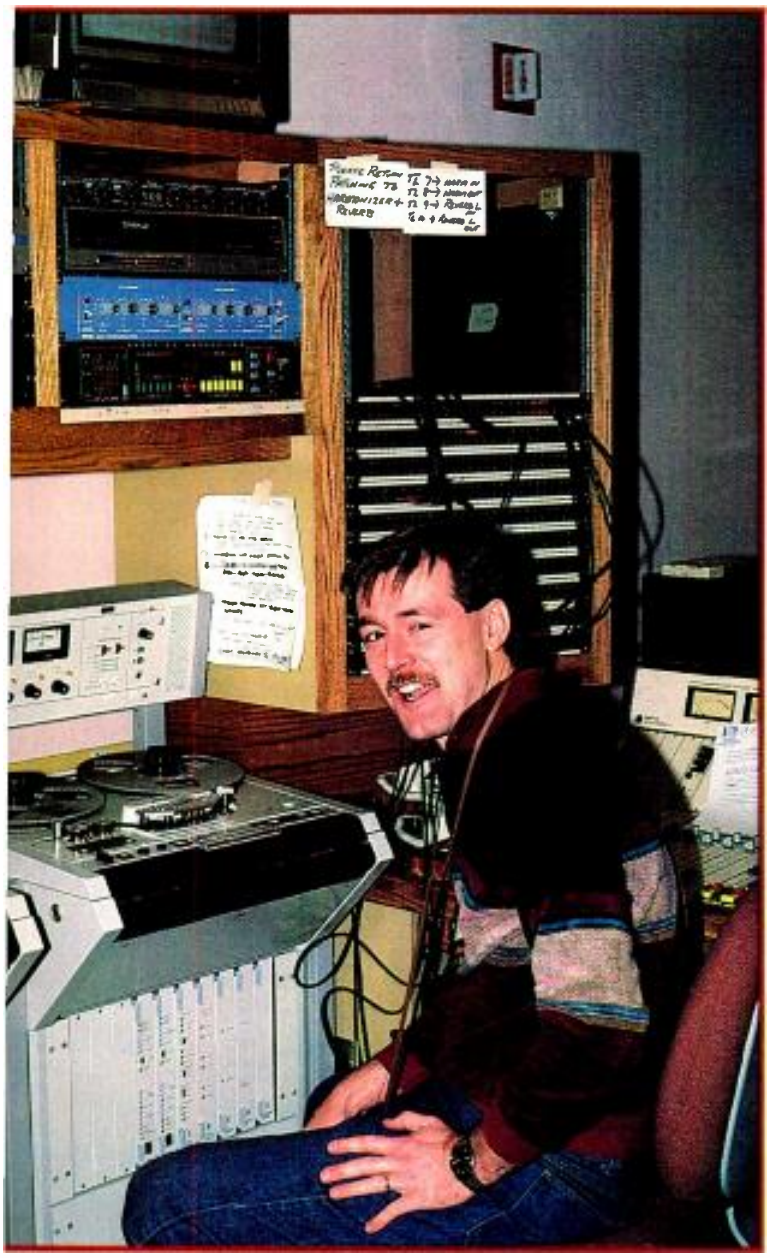

Making Tracks in Radio Production

By Steven Schwartz

Today's production studios are technological crossroads where analog and digital hardware meet in myriad audio applications.

Jeff Beck, production director at New York's WXRK-FM, caught between song parody edits in the station's production suite.

Although razor blades and splicing tape are commonly found in all radio production suites, it may only be a matter of time before these analog editing essentials go the way of vacuum tubes and carbon microphones. Of course, this is looking down the road a bit, but the digital signposts are there. Consider the impact of the compact disk, which, in the four years following its debut in the U.S., has set new quality standards.

While the analog tape recorder, or ATR, is still a mainstay in radio production (and is likely to remain as such for years to come), there has been a noticeable trend in recent months toward greater sophistication in the production process. Thus, an ever-growing number of FM stations have shelved their collections of sound effects and music libraries on analog LPs in favor of new CD releases that offer considerably better signal-to-noise ratios as well as nondegradable digital sound quality and random access cueing. At the same time, industry spokesmen, such as Otari's marketing manager John Carey, have noted that more radio studios are upgrading their recording facilities from the traditional quarter-inch four-track ATR to half-inch—and even one-inch—eight-track decks.

"It's become a more discriminating market," says Carey. "One of the reasons for that is the emphasis on low-noise sources, especially the CD, in broadcast studios now. Many station managers are taking note of the success of the CD and want to expand that level of quality to other areas. The eight-track recorder, in both configurations, has emerged as a viable alternative in production for improved sound quality and performance."

While he concedes that another alternative, open-reel digital recording, is still priced way out of most stations' budgets, Carey be-

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WFMT's assistant production manager Larry Rock (right) with American composer Raymond Wilding-White in the station's Control Room C, which is used to broadcast two live concerts each week.

lieves that the R-DAT (rotary digital audio tape) digital cassette format has a bright future in broadcast production work—providing for a positive outcome in the ongoing legislative battles on Capitol Hill. In fact, he reveals that Otari is presently considering the prospects of manufacturing a professional R-DAT deck and CD player for introduction some time within the next two years.

Despite the observation by Carey and others that the number of eight-track radio studios is on the rise, it should be noted that broadcast production encompasses a wide range of studio and on-location applications—running the gamut from producing station IDs and promos to syndicated programming, concerts, and commercial spots for local advertisers. In most cases, the choice of hardware is usually dictated by the type of assignments handled by the facility.

On the spot

Coming up with creative promotional spots is one of the more challenging aspects of the job for many in-house production departments. Often times, a station's programming can supply some inspiration. At New York's WXRK-FM (K-Rock), for instance, production director Jeff Beck draws on the station's classic rock format for a good portion of promotional song parodies.

Beck begins by laying down a music bed from the original stereo version of the song *sans* vocals. This is usually accomplished by feeding the output of the turntable or cassette deck into a device aptly known as a vocal eliminator; in this case, it is the Thompson VE-2.

The vocal eliminator uses equalization to shift the phase on the performance, which, in turn, masks the vocals. Switching the phase on a turntable's tone arm is also said to effectively eliminate vocals. The advantage of the vocal eliminator, however, is that it offers three adjustable EQ levels that provide better tone control in the edited version. Nevertheless, there is one catch to both methods.

"It only works with songs where the vocal is dead center," Beck notes. "So, that cancels out a pretty good chunk of material. Very often, I'll have a song parody in mind, but the song won't cooperate. Then I'm left to listening to the song and trying to find enough instrumental passages that will let me build a verse and a chorus from what's there. Sometimes, depending on the song, I'll use both techniques to get myself a bed."

Although he points out that no two parodies are constructed exactly the same way, the majority of Beck's song parodies are combinations of vocal elimination and blade work (usually to edit the piece down to the desired length). All editing on the music beds is done on one of the studio's two Otari MTR-10 two-track ATRs. Afterwards, the bed is dubbed on to an MCI JH-110C four-track recorder using dbx noise reduction.

The mixing chores are handled on a 22-input Pacific Recorders & Engineering AMX-22 console with A/B input selectors on each channel and built-in equalization that allows Beck to sweeten the material as he's working on it. "Instead of mixing everything down and trying to EQ the whole thing, I can EQ each different channel, each piece of music, each voice," he says. "It also comes in useful when I use the vocal eliminator because that really screws up the EQ on the song. Basically, it lets me beef up the material however I want before I put my music bed on to the four-track."

Once the bed is transferred to the MCI deck, Beck is ready to lay down his new vocal tracks. A Neumann U87 microphone is primarily used for the lead vocals (it is also the mic of choice in the station's on-air studio), while a Shure SM7 is employed for the harmonies. The studio also contains the expected selection of outboard processing gear, including an Eventide 969 Harmonizer and a Dual Reverb unit from Orban. While he prefers to take a straightforward approach in his productions, Beck admits that the Harmonizer's pitch control occasionally comes in helpful for songs that may be a little out of his range. At the same time, he points out that "reverb is always useful."

"I don't believe it takes a ton of stuff to make good productions," he adds. "As long as you have the basics, you should be able to create an image without too much difficulty."

Interestingly, Beck is not the

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only talent at K-Rock making song parodies. The station's well-known morning man, Howard Stern, also has a penchant for doing an occasional musical send-up on topical subjects. "Howard has his own band and they record a lot of song parodies for him," he notes. "That can be real effective, too. But if you're going for a 60-second spot—especially with our kind of format—you usually want to use the original cut to make sure you get the point across."

On the average, Beck turns out about three song parodies per month. He is also responsible for producing all of the station's ID's and sweepers—as well as commercial spots for local advertisers, which are basically straight voiceovers on prerecorded music beds. Like many of his contemporaries, he now uses production music and sound effects libraries on compact disk for commercial beds and promo spots. The studio is presently equipped with a Technics SL-P115 CD player, however, Beck soon hopes to purchase a new unit with a cueing dial.

As for the future possibility of upgrading his studio to an eight-track room, he maintains: "An eight-track recorder would make some things easier, but I don't feel hindered by using a four-track. Technically, you can make the four-track act like an eight-track with overdubbing and mixing down two tracks and such. The four-track really suits my needs pretty well. It's not like I'm making David Bowie albums."

The remote approach

One of the interesting aspects of radio production is that important studio considerations, such as the number of recordable tracks, are not always as crucial in the field. Rather, sound quality, portability, and product dependability are usually the main priorities. Thus, finding the right combination of equipment for on-location production has often resulted in some innovative (and some surprising) solutions—including truly portable digital recording.

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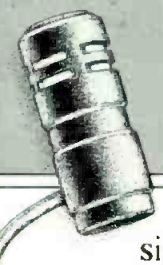

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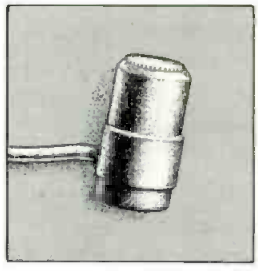

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advantage of pulse code modulation (PCM) adaptors that attached to standard half-inch VCRs allowing users to record digital audio soundtracks on videotape. Ironically, these devices, such as Sony's popular PCM-F1, were originally introduced in the early 1980s as consumer products, but were quickly discovered by audio professionals as an alternative means for two-track digital recording at a fraction of the cost of comparable pro decks. Furthermore, when the F1 was used with its Beta companion, the now defunct SL-2000 VCR, it created a convenient, totally portable digital recorder.

Although Sony has reportedly ceased production of the F1 (presumably in favor of future R-DAT introductions), many remain in use today. In fact, Chicago's renowned classical station, WFMT-FM, has been steadily using the F1/SL-2000 combination for several years to record its series of syndicated concerts. Larry Rock, the station's assistant production manager, explains that the system is typically used in the field to record entire performances, replete with room ambience and tunings. Those tapes are then brought back to the studio where they are transferred to a two-track analog recorder at 15 ips with Dolby A noise reduction.

"You can make the analog tape sound the way you want it to," Rock says. "You don't have to do any processing to the analog copy, which could, inherently, bring out the deficiencies—subtle as they might be—of the analog tape. So, say you needed to brighten the signal a little, it's better to do it off of the quiet digital master than bringing up the highs on the analog tape, because you would also be bringing up the noise. These are just little things that make a big difference down the line. It's the old weakest link theory; if you do something at one step, you may affect it later on. By the same token, if you're careful at every step, the final product—even if it's a non-Dolby tape that you've dubbed to send to a station—is going to be a little better."

The material is then usually edited by mixing the signals from two additional ATRs, one containing the room ambience and one with narration, and splicing these segments around the music on the 15 ips master. A major concern here is making sure that the levels and the Dolby noise reduction tones are identical on all the machines involved. Another approach requires mixing the output from all three ATRs (music, ambience, and narration) back onto the F1.

"The only thing there is that you can't afford to make any mistakes because then you have to go back and start over from a point where you can do some sort of digital pause," Rock says. "You can't do that at too many places; you can do it between movements, over quiet passages, and so on—but you certainly can't do it in the middle of a movement."

He further notes that while 15 ips analog with Dolby A is one way of assuring a consistently high level of audio quality, it is unwieldy to use as a transmission medium for satellite delivery (which the station employs for much of its syndicated programming). Thus, the station normally uses the F1 to directly uplink programming to the satellite. At the same time, it cannot be assumed that stations receiving the programs in reel form will be equipped with Dolby A racks or tape decks capable of playing at 15 ips. So, yet another procedure involves mixing the voice, ambience and music onto the F1, while simultaneously running an analog copy at 7-½ ips, which will serve as the non-Dolby master for copies that go to subscribers that are not satellite-equipped.

"There aren't too many stations left in that boat," Rock adds, "Still, this is one area where digital or R-DAT copies would be very useful. Digital formats tend to have standards that don't vary much from machine to machine, while everybody has a different way of setting up an analog machine."

Although he is interested in R-DAT for future applications, Rock is somewhat cautious about committing himself to using it before the actual products arrive. "I have two provisos," he says. "One, that they don't destroy it or seriously jeopardize its useability by putting on some filter for copy-guarding that would actually cut out some of the information. The second factor is the type of editing facilities they come out with. That's a major consideration be-

Digital in the Amazon: ZBS president Tom Lopez (far right), his guide (in black shirt), and local villagers look on while interpreter Caesar listens to a recording off the F-1 during initial production on "Dreams of Rio."

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cause the lack of electronic editing capabilities has always been a major shortcoming with PCM."

Classical treatment

In mixing his productions, Rock strives to take full advantage of the medium, whether it's analog or digital, so that the loudest musical passages will go as far as the machines will allow without distorting. At the same time, the announcer's voice should peak below the loudest music levels so that listeners won't have to keep adjusting the volume levels on their receivers.

Obviously, a good reference listening level and careful metering are essential here. "Let's say you have a VU meter with a zero on it and that's about as loud as you want to get on an average level," he explains. "Now, the peaks will be considerably over that; depending on what you're doing, they might be a good 10 dB over that. So, assuming that's your ceiling, the announcements should peak at around -7 on the VU meter. That's a pretty good ratio—about 7 or 8 dB below the program material. You always want to keep the voice underneath the music. It makes both the announcements more pleasant and the music more exciting."

In WFMT's post-production studios, Rock works on Neotek Series 1 and Series 3 consoles. The analog recorders are all Studer two-tracks, primarily B67's, although the facility is also equipped with a few older A80 models, which Rock favors for editing chores. "We're very fond of the Studer analog gear," he says. "Among other things, they make very good heads. We use the so-called butterfly heads that have a wider track width. This is the standard European head format which uses approximately twice the tape area of the American half-track standard."

For field work, Rock uses 16-channel Neotek and Soundcraft consoles, both of which feature transformerless input designs. A wide selection of microphones is also typically employed, although Bruel & Kjaer's 4006 is used on

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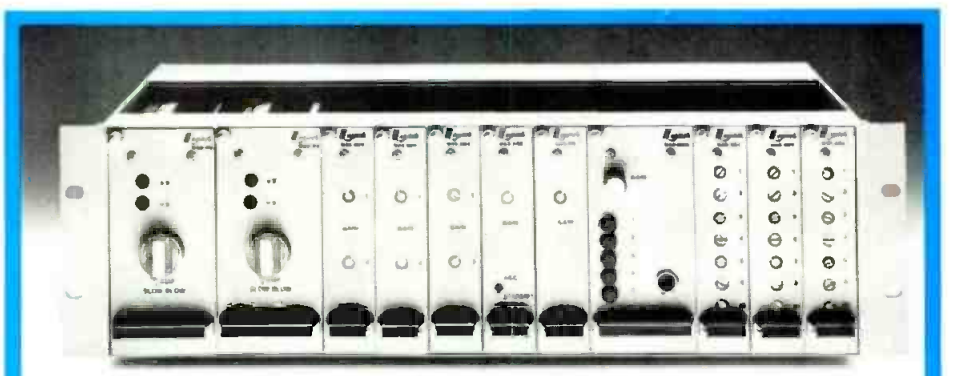

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almost every project. Other frequently used mics include the Neumann KM84, Shure SM81, AKG 414, and various Sennheiser cardioid models. "All of these mics are small in diameter and fairly discrete to hang in halls," Rock notes. "We try to keep things as visually clean as possible."

Digital dreams at ZBS

Inconspicuous miking techniques were also used by Tom Lopez, president of ZBS Foundation, while he was in Brazil recording ambient sounds for the company's latest radio drama series "Dreams of Rio," an audio adventure fantasy which he also wrote, directed, and produced. Lopez used Tram TR-50 lavalier mics attached to a backpack (containing an F1 and a Sony SL-2000 VCR) that he and ZBS staff composer Tim Clark carried with them in their month-long travels around the country—from the rain forests along the Rio Negro to the towns of Salvador, Manaus, and Belem to the samba clubs of Rio.

"They're about the size of your fingernail, but they work quite well," Lopez says of the Tram mics. "They made it very easy to record in all locations—as compared to a trip we made to India a few years ago where we only used shotgun mics and everybody followed us around thinking they were going to be on TV." He adds that Sennheiser 416 "mini-shotgun" mics were used on the Brazil trip as well.

A not-for-profit organization, the Fort Edward, NY-based ZBS Foundation has been involved in producing radio adventures for 15 years. Its programs are distributed primarily to National Public Radio affiliates and college radio stations in the U.S., as well as to broadcasting companies in nine foreign countries. The company has a history of experimentation in sound technology and, like WFMT, has been using the F1 for several years—dating back to its "Cabinet of Doctor Fritz" series, which also featured 3D Kunstkopf binaural sound using Neumann's KU-81 "dummy head" recording system.

The portability of the F1 system is one of its major attractions for ZBS. On the Brazilian trek, Lopez and Clark took turns carrying the backpack, which weighed about 24 pounds with the F1, VCR, and a couple of nicad batteries. "It was a little heavier than a Nagra using 12 'D' cell batteries," Lopez recalls. "Of course, you don't have the convenience of the Nagra where it's hanging off your shoulder and you just have to look down to check your meters. But we were pretty good at it. One of the nice things about recording digitally is that you can set your levels pretty low and, assuming that your microphones are okay, not get a lot of hiss. Another benefit of the F1 in particular is that the tape is so cheap—five dollars for two hours."

Upon returning to New York, Lopez assembled his cast and production for "Dreams of Rio" got under way. The first order of business was recording the voice tracks, which were done on two-track ATRs at various studios in New York City. Lopez notes that the series, which consists of 13 half-hour episodes, was produced very much like a soap opera, with two or three episodes recorded in each session and new chapters written between recording dates.

"I usually write so that there aren't more than two or three characters in the scene at one time," Lopez explains. "I also like to close mic the voices—essentially, one on the right one on the left—so that I can play around with them any way that I need to later on."

After a session, Lopez returns to ZBS and transfers the voice tracks onto two tracks of the studio's one-inch Otari MX-7800 eight-track recorder using dbx noise reduction. He then adds the ambient sounds and does a rough mix back onto the F1 to bring up to Clark in Toronto for the additional soundtrack. Clark, who has worked as a composer-in-residence at Canada's Strasenburgh and McLaughlin Planetariums, used the McLaughlin's Synclavier to compose the music for "Dreams."

Clark also has a one-inch Ampex eight-track recorder with dbx, so the reference copy from the F1 is dumped on to the ATR, leaving six tracks for the music. "Tim likes to compose while listening to everything that's there—voices and sounds," says Lopez. "This allows him to put the music down hot, but to still stay out of that voice midrange where it would muddy things up. Generally, he would just EQ the music out of there or simply compose around it. That way, if the music really needs to come up at some point, you can do it without having to vary the voice at all."

After Clark composes the soundtrack, it is once again mixed down to digital two-track on the F1, while the reference material (i.e., the voices and ambience) is stored in mono on the standard audio portion of the videotape. Lopez brings this back to the ZBS and uses the varispeed control on the Otari to sync the soundtrack to the existing voices and ambience tracks.

He explains: "Of the eight tracks here, I usually have six for voices and ambience, leaving two tracks open. Essentially, I bring everything up in mono on the board and crank it over to the left, while I listen back to the reference copy on the right. I cue up both machines to the same spot in the dialogue and then start them, using the varispeed controller to keep it in sync. At the same time, I'll be transferring the music from the digital portion of the F1 on to the two remaining tracks on the eight-track.

"So, when it's rolling, you're hearing the reference on the right side and the eight-track on the left. When they're perfectly in sync, they'll come right into the center and then you can keep them in sync by gauging if the sound starts to drift. If it drifts to the left, it means the eight-track is going a little too fast so you've got to back it down a bit. If it drifts to the right, then you speed up the eight-track because it's running a little slow. This is all very, very subtle. It's so subtle that even though you're recording the music at the same time, you won't hear

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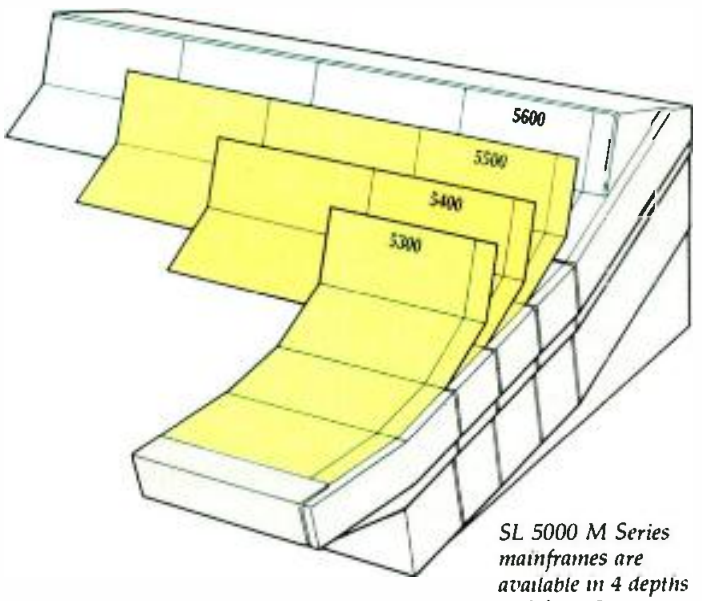

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any difference in terms of any tone or frequency shifts. And, when you don't have SMPTE timecode, it's a good way of keeping everything together—especially since we're dealing with rhythms that have to hit at exactly the right points."

In the mix

In addition to the Otari deck, ZBS studios is equipped with a 24-channel Soundcraft Series 600 console with eight outputs as well as several Ampex 440B two-tracks recorders. A new addition in the studio is a Lexicon PCM-70 digital reverb, which Lopez used to create different room ambience settings, as well as to match some of the ambience he had recorded.

"I had this one tape that we recorded in a church where you were able to faintly hear the traffic outside," he recalls. "It was just such a great sound that I wrote a scene that takes place inside a church. And the Lexicon allowed me to match the ambience on the voices so closely that you would swear they were recorded inside that church."

This raises the question as to which comes first, the ambience or the script? "These days I've been writing for the ambience," he says. "I've done that on the last couple of projects and it works very well. Very often, I'll come up with a great sound and just write it in to the story. I went to India a couple of years ago to do some adaptations of Asian short stories. And, in that case, I recorded in the actual areas where the stories took place. That was fine, except I came back with all these sounds that didn't have anything to do with the stories—in addition to the ones I needed. It was frustrating to have this assortment of sounds I couldn't use. So, I decided that it was far better to write for the sounds. When I went to Brazil, I only had a vague idea for the story; it really only took shape as we travelled around."

Although he collects a wide assortment of sounds in his travels, Lopez occasionally finds himself in the curious position of having to create a needed sound for a story. For instance, the last two episodes of "Dreams" take place during Rio's Carnivale celebration, but Lopez and Clark left before the festival. So, using the resources available to him, Lopez combined various authentic sounds of music, drums, and crowd noises to build his own Carnivale on tape. "In the program, you hear the festival going on in the streets and reflecting off the buildings. It turned out so wonderful that both Tim and I both were amazed with the results when we listened to it back. We couldn't believe that we really weren't there."

"Dreams of Rio" made its debut September 17 on the National Public Radio Network, which, by the way, uplinked the program to the satellite directly off the F1.

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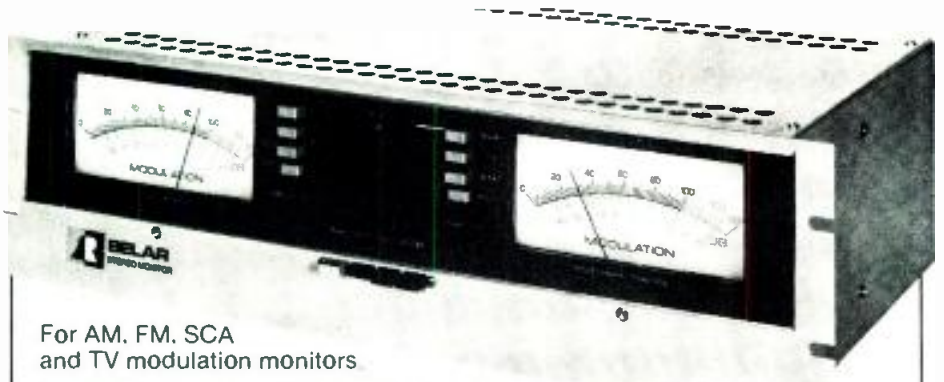

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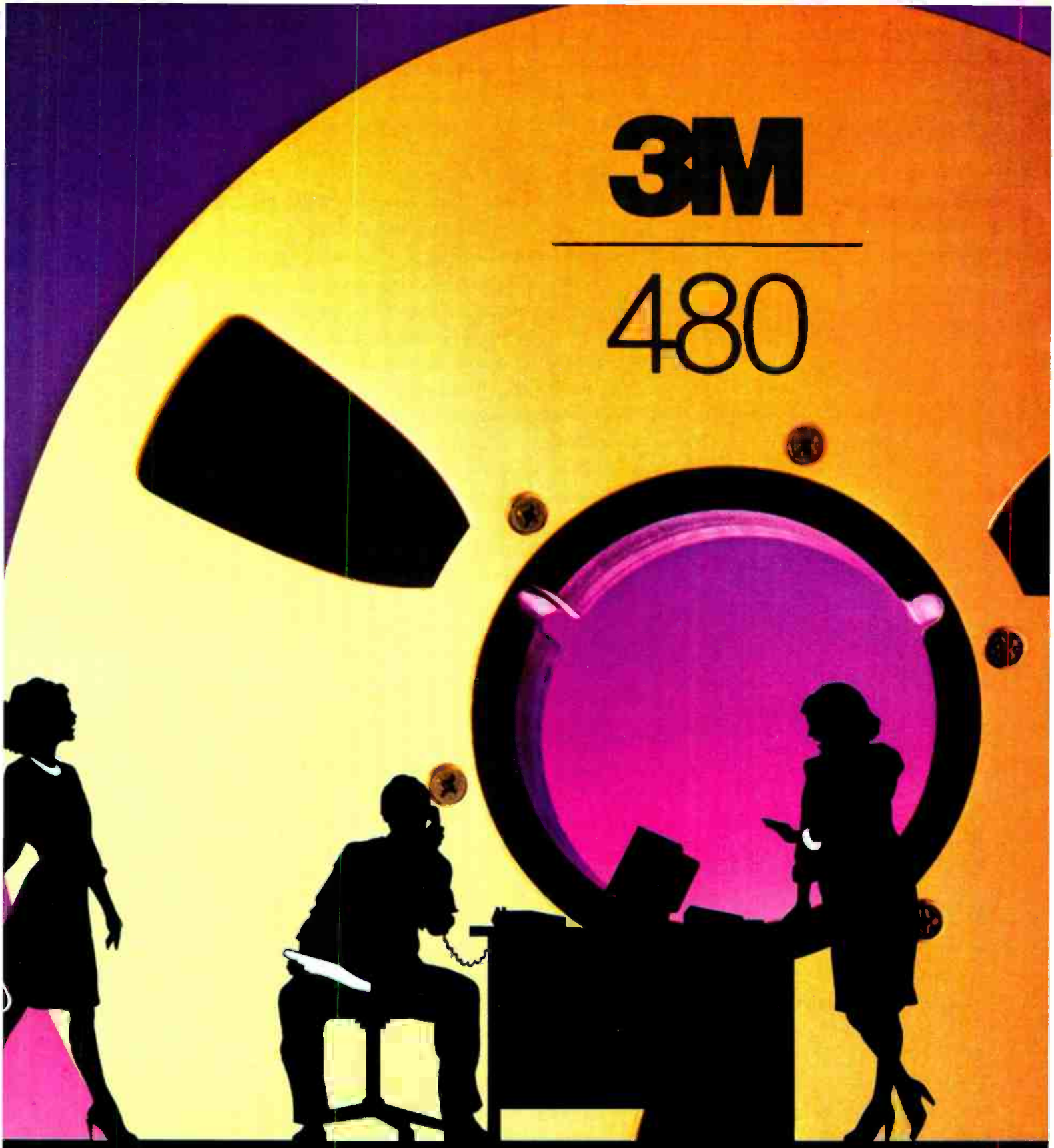

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Advanced, Enhanced, Expanded, Compatible: The Search for Higher-Definition Television

By Robert Rivlin

The advent of NTSC-compatible HDTV delivery systems has sparked the interest of broadcasters in a technology that may hold the key to television's future.

"It's the most important breakthrough in television transmission since the advent of NTSC-compatible color," said NBC's president of operations and technical services Michael Sherlock at the early-October colloquium on HDTV in Ottawa, Canada.

Sherlock was referring to a computer simulation of Advanced Compatible Television (ACTV), a new system developed jointly by NBC, the David Sarnoff Research Center (formerly RCA Labs), and General Electric/RCA Consumer Electronics. Though it has yet to be proven with actual transmissions, ACTV promises to allow enhanced-definition television pictures to be broadcast using a single conventional-bandwidth NTSC channel allocation. Those with existing television receivers will continue to receive ordinary pictures (with a slight degradation from NTSC, said to be unnoticeable to viewers), while those with still-to-be-developed ACTV sets will be able to see the enhanced images.

With definition not quite as high as 1125-line systems, ACTV does offer a wide-screen format with a 5:3 (or 16:8) aspect ratio. It delivers 1050 lines with a scanning rate of 29.9 frames per second. Luminance bandwidth required is 12.4 MHz, while chrominance bandwidth in the Y,I,Q system is 3.75 MHz for I and 1.25 MHz for Q. The extra bandwidth beyond NTSC's 6 MHz is accomplished by time-compressing two "side panels" of the wide-screen display and multiplexing them with the ordinary NTSC signal. Decoders in the set expand the signal again and provide extra horizontal and vertical resolution.

The full-resolution, wide-screen ACTV signal consists of four components. The first is the main NTSC signal, which contains the center panel of the original wide-screen image plus the side panels' low frequencies that are compressed into one microsecond on each side of the active picture. The second component is the time-expanded side-panel high frequencies. The third component is the extra horizontal detail.

These three components are digitally processed and combined onto one NTSC-compatible baseband signal, while extra vertical detail is multiplexed with the three baseband components on the RF carrier. The resulting signal can then be decoded by either a conventional receiver or an ACTV-compatible set.

It is the fourth component—that can only be added at the time of transmission—that is the most controversial element of ACTV. Despite the NBC and Sarnoff claims that "ACTV will be easy for standard broadcast stations to implement, and can be phased in gradually at minimal cost and

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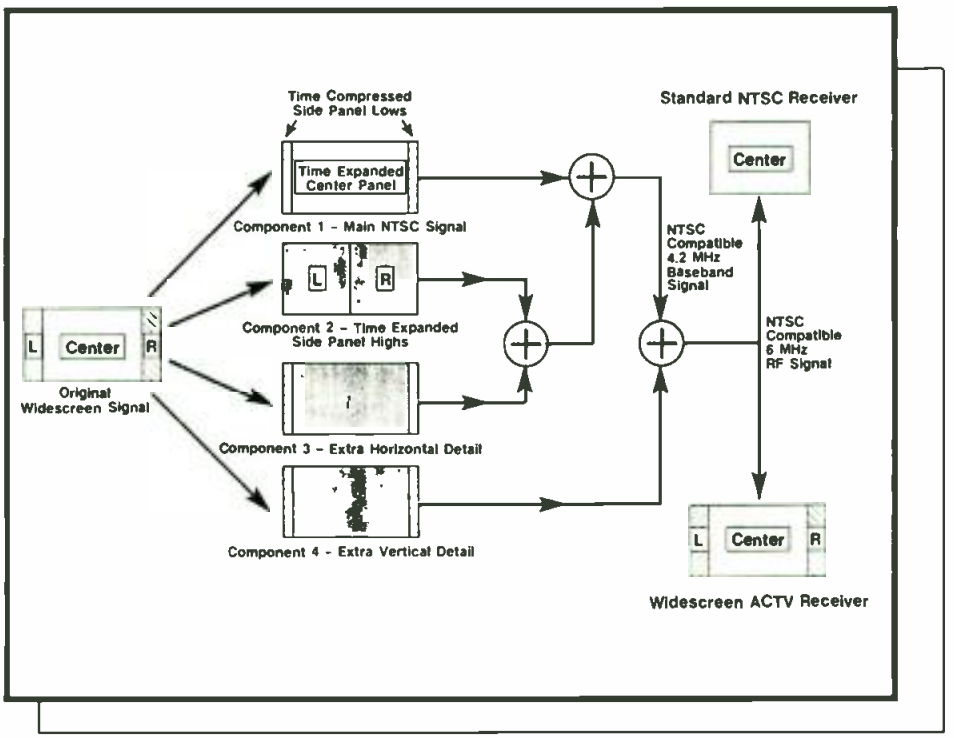

ACTV: Single-channel NTSC-compatible widescreen EDTV system.

with no disruption in services," this turns out to be only half the truth. For while the three components that comprise the widescreen image can be recorded, processed, and transmitted in a current TV plant, the fourth component requires a complete plant modernization.

Growing demand

The ACTV announcement comes during a period of intense activity among American broadcasters to devise an advanced television (ATV) system for terrestrial broadcasting. Once little more than an engineering curiosity that had little chance of becoming a widely-used technology, recent advances have brought it into the consciousness of many commercial broadcasters.

The debate on HDTV centers around whether to go "all the way" with a full-scale high-definition (HDTV) system capable of delivering not only a wide-screen image, but one composed of more than 1100 scan lines and capable of CD-quality audio, or whether some form of enhanced NTSC signal compatible with existing receivers will be sufficient. The questions being raised are economic (both for the broadcaster as well as the consumer) and political (involving the allocation and use of spectrum), and at this point no one, including NBC, appears to have all the answers.

Lined up on the side of "going all the way" are a number of large manufacturers—primarily Japanese, although also including Scientific-Atlanta and Media General—that are supporting MUSE. This 8.1 MHz HDTV transmission system, originally developed by NHK to support the 1125-line HDTV production system that was also developed there, was originally designed to be sent via DBS satellite directly to homes. It will begin service as such in Japan in 1990.

Though some in the U.S. originally thought that DBS transmissions on the 12 GHz bandwidth carrying HDTV programming would soon become a possibility (among the most vocal was Joe Flaherty of CBS who strongly urged that the FCC allocate enough bandwidth in its DBS allocations to allow for an HDTV signal), the focus of MUSE investigation here began to center around the needs of terrestrial broadcasters. Rather than going through a DBS pathway, it was proposed that currently unused UHF spectrum could be allocated for HDTV delivery, with two channels required to transmit the full-bandwidth signal.

This was the technology demonstrated in January 1987 when NAB and the Association of Maximum Service Telecasters (MST) demonstrated MUSE for the Congress, the FCC, and the public in Washington DC. Using UHF channels 58 and 59, transmitted from WUSA-TV, the demonstration brought home the unmistakable message: "HDTV is here."

Spectrum allocation

The problem raised by the MUSE system's requirement of two UHF channels is no small obstacle. It brings terrestrial broadcasters into direct conflict with land mobile broadcasters once again.

This conflict goes back a number of years to the days when a large chunk of spectrum was allocated for UHF use. Other services, particularly land mobile, have been eyeing it hungrily ever since. And the FCC has listened to claims by land mobile that it will shortly run out of space. A proposed rulemaking by the Commission would allow increased sharing of the UHF spectrum by land mobile, thus blocking forever the possibility of using the frequencies for HDTV transmission.

To gather data on MUSE, the Advanced Television Systems Committee (ATSC), the all-industry group made up of members of organizations such as SMPTE, NAB, EIA, NTIA, and so forth, and charged with the responsibility of investigating both enhanced-NTSC and HDTV systems, has established a technical testing program.

Partially funded by a grant from NAB, the T3S4 (the task force from ATSC on the topic) has set up a study program to experiment with transmissions over both the 12 GHz and UHF bands, with proposed test sites including both Washington as well as other major TV centers. The work began this summer and is expected to last for two years. The study group may also investigate the possibility of using the 225 to 420 MHz frequency, the space be-

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tween VHF and UHF, for HDTV.

Need for compatibility

The other area being investigated by the T3S4 group are several proposed higher-definition systems that, unlike MUSE, would be compatible with NTSC. Like NBC's ACTV they produce a signal that can be received by a standard TV set at the same time as providing a HDTV signal for wide-screen, higher-resolution receivers. Unlike ACTV, however, these systems do require additional bandwidth beyond the standard 6 MHz NTSC signal.

"All we want is a single system that's going to be compatible with NTSC, that has a wide aspect ratio, and has a good quality picture," said Hal Protter, VP and general manager of WVTV/Gaylord Broadcasting, member of NAB's High Definition Television Task Force and organizer of a group of group broadcasters who have made a substantial financial commitment to developing an NTSC-compatible HDTV system. "We don't care who comes out with it. We just want it to work."

Protter, whose group now comprises seven active major group broadcasters, says that one of their options is the ACTV system. His general concern is one shared by many of those who attended the group's early-August meeting and who each contributed to a fund that will sponsor HDTV research:

"We definitely think of cable as a threat to over-the-air broadcasters, particularly since many stations program with movies. We expect HBO will have an HDTV cable service by 1989. It may be in cable's best interest to see that we have a second-class picture," Protter explains.

Itself fearing that it will lose more audience to the home-videocassette market, which could potentially begin distributing movies and other forms of programming in an HDTV format almost immediately (Super-VHS is just one example of such a scheme), the cable industry has already stepped up its efforts on the higher-definition front. The National Cable Television Association (NCTA) began tests of a MUSE system in Alexandria, VA, in mid-October. Using an HDTV signal provided from the Ottawa Colloquium for a two-week period, it experimented with cablecasts using a combination of unused channels to come up with the 8.1 MHz bandwidth required by the MUSE signal. Supervised by NCTA VP of science and technology Wendell Bailey, the tests appear to have convinced cable executives that their plan to deliver "the highest-possible-quality images to the American public" can become a reality.

"If cable and terrestrial broadcasters could agree on a common system," says Gaylord's Protter, "then we could probably standardize on the Sarnoff system, particularly because it is upwardly compatible and would leave room for

HDTV Chronology

May 1983: Advanced Television Systems Committee (ATSC) forms with all-industry support from member groups to study enhanced and high-definition TV.

May 1986: NTIA and Commerce Department sponsored a proposal for international HDTV standard based on 60 Hz, 1125-line scanning system rejected by CCIR because of opposition from 50 Hz countries.

January 1987: NAB and MST (Association of Maximum Service Telecasters) demonstrates a 1125-line NHK MUSE system for FCC and Congress and urges that the FCC preserve spectrum space to allow broadcasters to deliver HDTV signals requiring more frequency allocation.

March 1987: NAB appoints HDTV Task Force to evaluate technical development of HDTV, guide the NAB in making regulatory or funding proposals, and make recommendations to ensure a compatible system of high-definition terrestrial broadcasting in this country.

May 1987: Pressure mounts on FCC to freeze new TV allocations in top-10 markets to preserve potential for HDTV service. At the same time, NAB urges FCC to freeze UHF reallocation to land mobile service.

July 1987: NAB allocates $700,000 for two-year testing program on high definition—principally to fuel effort by ATSC T3S4 group testing feasibility of using UHF and/or 12 GHz spectrum allocations for HDTV transmission.

July 1987: Responding to petitions from NAB, MST and 58 other groups, FCC issues Notice of Inquiry on advanced television systems, including HDTV, with 90-day time limit (comments are due by November 18 and replies by January 19, 1988). At same time, Commission freezes applications for new TV stations in 30 of top 34 markets but refuses to delay rulemaking giving land mobile interests increased use of UHF spectrum.

September 1987: NAB announces formation of Technology Center with two-year, $4 million budget proposal to develop HDTV system.

October 1987: NBC demonstrates ACTV at Ottawa Colloquium on HDTV.

October 1987: FCC holds off on ruling that would permit sharing of UHF spectrum.

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NAB HDTV Task Force

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President/General Manager, KOLN-TV

Warren P. Williamson, III
President, WKBN-TV

Joseph A. Flaherty
Vice President, Engineering and Development, CBS Broadcast Group

Tom E. Paro
President, Association of Maximum Service Telecasters

Otis Freeman
Director of Engineering, Tribune Broadcasting Co., WPIX

growth in the future. But cable seems bent on delivering a non-compatible signal, and broadcasters must therefore examine their own options very carefully."

HDTV competitors

As noted, T3S4 is studying several HDTV systems in addition to MUSE, all of them compatible with current NTSC and all delivering a true high-definition (as opposed to enhanced or advanced) TV signal. Though he openly congratulates NBC on the ACTV development, NAB's Ben Crutchfield, NAB's HDTV project director and an instrumental member of the T3S4 group, notes that ACTV is an evolutionary, not revolutionary stage. NAB maintains that a HDTV system must be developed that will serve the industry and the public for decades to come, and that it would be short-sighted for the industry to standardize on a system such as ACTV without also establishing a truly high-definition transmission system as well.

More than simply supporting efforts such as T3S4 testing, NAB will become an active player in the development of HDTV systems and standards. At a late-September meeting on HDTV hosted by MST in Washington, NAB president Ed Fritts revealed that the organization's Technology Center, the group responsible for developing FMX, will begin working on HDTV developments under the leadership of Tom Keller and Crutchfield. Broadcast groups (not individuals) can become limited partners in the two-year, $4 million development program. Protter indicates his group may become one of the partners.

If any system is developed by NAB, it will join two other NTSC-compatible HDTV systems that have already been demonstrated (although neither has been broadcast yet). Both the system developed by Dr. William Glenn of the New York Institute of Technology and the system by N.A. Philips use one conventional broadcast channel for a standard NTSC picture plus a second channel, either UHF or 12 GHz, for a second channel that provides for the wider-screen format, more lines of resolution, and better sound.

> *"All we want is a single system that's going to be compatible with NTSC, that has a wide aspect ratio, and has a good quality picture."*—
> **Hal Protter, WVTV/Gaylord Broadcasting**

The question about which system to adopt may be resolved as early as the middle of next year. Responding to pressure from the NAB, MTS, and over 50 other groups, the FCC opened an inquiry on advanced systems in the middle of the summer. The short, 90-day filing period has some in the industry concerned that the FCC may be on the brink of making a rash decision (plainly none of the two-year testing or development programs will have yielded any results). Nonetheless, original filings are due by the end of November, with replies due by the middle of January 1988.

In mid-October, the FCC also changed its mind on the proposed ruling that would have allowed land mobile to share more of the UHF spectrum. This, together with the FCC's decision to freeze new TV applications in 30 of the top 34 markets pending the outcome of the inquiry, is seen as a positive indication of the Commission's open-mindedness on UHF-band HDTV transmissions.

The ACTV system will be presented to the FCC, along with at least one of the other compatible systems, and—probably—MUSE. Though the 90-day period may appear "unrealistic" to some, it presents a clear sign that the FCC is willing to listen to an industry geared up to remaining competitive with cable. **BM/E**

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FM Allocation: Headaches and Opportunities

If the major proposed technical changes take place, the headaches and opportunities may occur sometime in the 1990s

By Harry Cole, Bechtel & Cole, FCC Counsel

Just in case you thought that the process for allocating FM channels had already gone through just about all the changes it could handle for a while, you may wish to think again. There are clear indications that major changes are in the works for the technical end of the FM service, changes that could lead to significant opportunities, and possibly significant headaches, for FM licensees. The end result—and if it occurs, it would be a long-term result not likely to be realized until the 1990s, at the earliest—could be the almost wholesale abandonment of the 24-year-old system of FM channel allocation, and the adoption of a method of allocation similar to that presently utilized in the AM service.

To understand the overridingly fundamental nature of the possible changes in store for FM, it is useful to understand the present system and how we got there. In the beginning, of course (and here we are talking the beginning of the commercial radio industry, *i.e.*, the first quarter of the twentieth century), the only radio technology generally available for commercial broadcast use was AM. AM stations were established free of virtually any governmental regulation. However, that unregulated form of allocation led to serious interference problems as self-interested operators set themselves up without particular regard for the effect that their signals might have on other stations. The result was a move to impose some regulation on the broadcast industry in order to assure the best, most consistent service possible—a move which led to the establishment of the Federal Radio Commission in 1927 and its replacement, the FCC, in 1934.

The allocation troubles facing the regulators at the start were two-fold. First, the nature of AM wave propagation (*i.e.*, the way that AM signals are created and travel outward from the transmitting antenna) is tricky. It can be affected by soil conductivity, atmospheric conditions, and even nightfall. Thus, in defining standards to govern the allocation of AM stations, the Commission had to factor in a wide variety of considerations. Secondly, by the time the regulators started to worry about allocation standards, there was already a substantial AM broadcast industry in place, since stations had been popping up all over for a decade or two already. Thus, any new standards had to take into account the existing placement of stations.

The result was, of course, one of the more com-

Editor's Note:
Due to the unusually heavy activity in Congress and at the FCC in the early stages of this new political term, we have decided to provide additional information beyond our normal FCC column regarding changes in Washington.

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plex sets of technical criteria the FCC has yet to come up with. The basic approach taken was a "contour overlap" methodology, which assured existing stations of certain levels of protection for certain of their signal contours. This meant that a new station could be authorized—or "dropped in"—as long as the applicant could demonstrate that its proposal would not cause any prohibited interference to any station. This determination required detailed study of the contours of all possibly affected stations, and detailed study of the predicted contours of the proposed station and all other proposed stations which might be affected.

The birth of FM

As the FCC coped with its AM monster, what should loom on the horizon in the 1940s and 1950s but a whole new potential radio service—FM. Because of the overall public acceptance of AM radio up to that point, and the limited availability of FM technology, few if any FM stations had been attempted, and there was no great pressure to establish an FM service to compete with the well-entrenched AM service. Nevertheless, the Commission perceived that an additional radio broadcast service might be advantageous, especially one with the excellent reception characteristics of FM. But the Commission did not want to have to devise yet another complex of rules akin to the AM allocation criteria. Confronted with this conundrum, the FCC first took steps to minimize its problems by refusing to authorize FM service until new allocation standards could be adopted.

"In other words, the Commission seems to be looking to begin to move away from a pure separation approach to a contour-protection approach in the allocation of FM service."

Next, the Commission established certain priorities for the distribution of FM service, and then engaged in a massive allocation effort aimed at satisfying those priorities as much as possible. The result, unveiled in 1963, was the FM Table of Allotments. Having established three classes of commercial FM station, the Commission had then distributed all the available 80 channels among as many communities as possible according to the service priorities the FCC had established. The idea was to assure that adequate FM service would be available to as many people as possible, and that, ideally, each community could have at least one, and maybe more, local FM stations.

The FM allocation approach differed from the AM system primarily in that the FM approach is based on minimum mileage separation between cochannel and adjacent-channel stations, while the AM system is based on contour protection.

The idea, obviously, was to reduce the allocation process largely to a single question—does the channel "fit" in terms of minimum mileage spacings. If it does, then it can be allocated and properly-spaced applications can be filed. If the channel itself does not fit into the existing scheme of stations and channels, then that would put an end to the discussion.

The FM separation system of channel allocation was somewhat more cumbersome than the AM contour-based "drop-in" approach in that the FM system requires two steps: first, the channel has to be assigned to a particular community (through the FCC's rule making process) and, second, an applicant has to file an application proposing use of the allotted channel. But since the central allocation analysis involves the streamlined question of whether any particular channel, or application, will satisfy the minimum mileage separations, even the two-step process is less complex than the analysis required for AM drop-ins. Also, consistent with the "go/no-go" concept underlying the separation approach, the Commission has generally refused to consider factors such as directional antennas in FM allocations and applications. Directionalization, in particular, is suited to a contour-protection allocation scheme in that it permits one station to assure that its signal will not interfere with one or more other station signals. In fact, directionalizing is one of the tried and true ways by which AM stations are "dropped in," or shoe-horned in, to the existing pattern of stations.

Although this history of the allocation process may seem over-extended, it is useful to an understanding of the significance of current developments likely to affect FM service in the 1990s and beyond.

Class distinctions

In recent years the Commission has recognized that the process has accomplished many if not most of its purposes and, thus, that some of the more restrictive elements of the process can now be eliminated. For example, the Commission historically maintained a very clear distinction between Class A channels, on the one hand, and Class B and C channels on the other in order to keep the mileage separation analysis as simple as

"Another possible downside will be the administrative headaches that might accompany directionalization."

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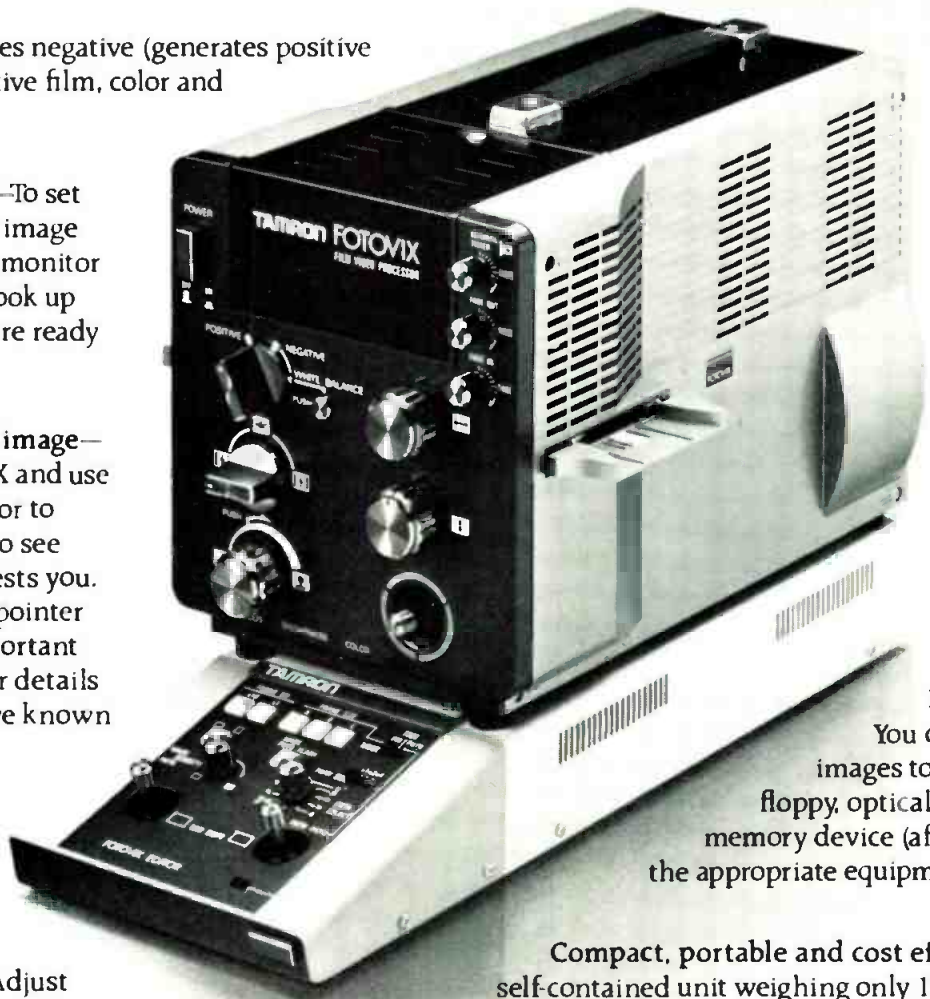

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possible. Within the last year, however, the FCC has announced that channels previously reserved for Class B or C use could now be used for Class A stations. That means that channels that could not have been used in particular areas because of mileage considerations may now be activated there (since separation requirements for lower-powered Class A stations are less than for the other classes and, therefore, it is theoretically easier to "drop-in" Class A channels). Additionally, the Commission has also proposed to let Class A channels be utilized for Class B or C stations, if they will "fit" the separation standards.

The most significant breakthrough that could occur, however, was the subject of a Notice of Inquiry released by the Commission in May. There the Commission has indicated that it is considering the possibility of "authorizing directional antenna systems for the express purpose of reducing the distance separations between an FM station's transmitter site and adjacent and co-channel stations and allotments." In other words, the Commission seems to be looking to begin to move away from a pure separation approach to a contour-protection approach in the allocation of FM service. And that, in turn, could be seen as an effort by the Commission to move toward a "drop-in" approach to FM allocations similar to that already in place in the AM service.

Before we get into the possible effects all this could have on FM service as we know it, let us hasten to point out that the question of possible directionalization is not on the fast track at this time. The Commission has issued only a Notice of Inquiry, which means that, even once it has reviewed all the comments and replies submitted in response to the Notice, it will not be able to adopt any new rules. That means that it is extremely unlikely that FM directionalization could be authorized prior to early- or mid-1989, at the very earliest.

"The result was a move to impose some regulation on the broadcast industry in order to assure the best, most consistent service possible."

Nevertheless, it is still advisable to give some thought to a future of directionalization. Gone would be the comfort of knowing that even your fringe signal is pretty much inviolate. With directionalization, the signals of cochannel and adjacent channels stations would theoretically be permitted to advance much closer to other stations' actual signal contours than is normally the case now. Because of that, there would appear to be a greater likelihood of potential interference, especially in the signal's outer reaches. To the extent that interference is perceived and is to be corrected, the interfered-with licensee would have to take steps to identify the source of the interference and then seek to remedy it either privately or otherwise.

Traffic jams

The likelihood of interference is particularly acute in and around major metropolitan areas. Already, stations acting in response to the Commission's various deregulatory moves of the last five years have begun their inexorable march toward the cities, creating the potential for congestion. That potential can only be increased if stations are permitted to adjust their signal patterns through directionalization.

Another possible downside will be the administrative headaches that might accompany directionalization. As you probably recognize, the area of radio broadcasting to which deregulation has been the slowest to arrive has been the directional AM service. Since the determinations of signal strength are so crucial to the acceptable performance of directional operations, they have been required to maintain records (*e.g.*, monitor point readings) while their nondirectional counterparts have been largely freed from such mundane tasks. Which is not to say that such records will not prove helpful to the directional licensee: if a claim is ever made that the directionalized station is interfering with someone else, such records could demonstrate that it is not the directional station's fault.

Directionalization will also complicate the process of applying for FM authorizations. Consulting engineers will probably find that a directionalized "contour-protection" system gives rise to more headaches than the separation allocation system.

But notwithstanding all these potential drawbacks, the possibility of directionalization can be viewed as a triumph for the Commission. Having suffered through the major problems with the AM allocation process, the FCC addressed those problems in 1963 and came up with an alternative method which has, over the last 24 years, allowed the Commission to distribute FM service equitably across the country. Now that that goal has been achieved in great measure, the Commission can well afford to loosen the restrictions somewhat, to permit some greater variation in the allocation gridwork. While the problems with directionalization will probably always be there, they will not interfere with the primary goal of allocating channels nationwide, because that goal has already been substantially accomplished. For this the Commission is to be congratulated. **BM/E**

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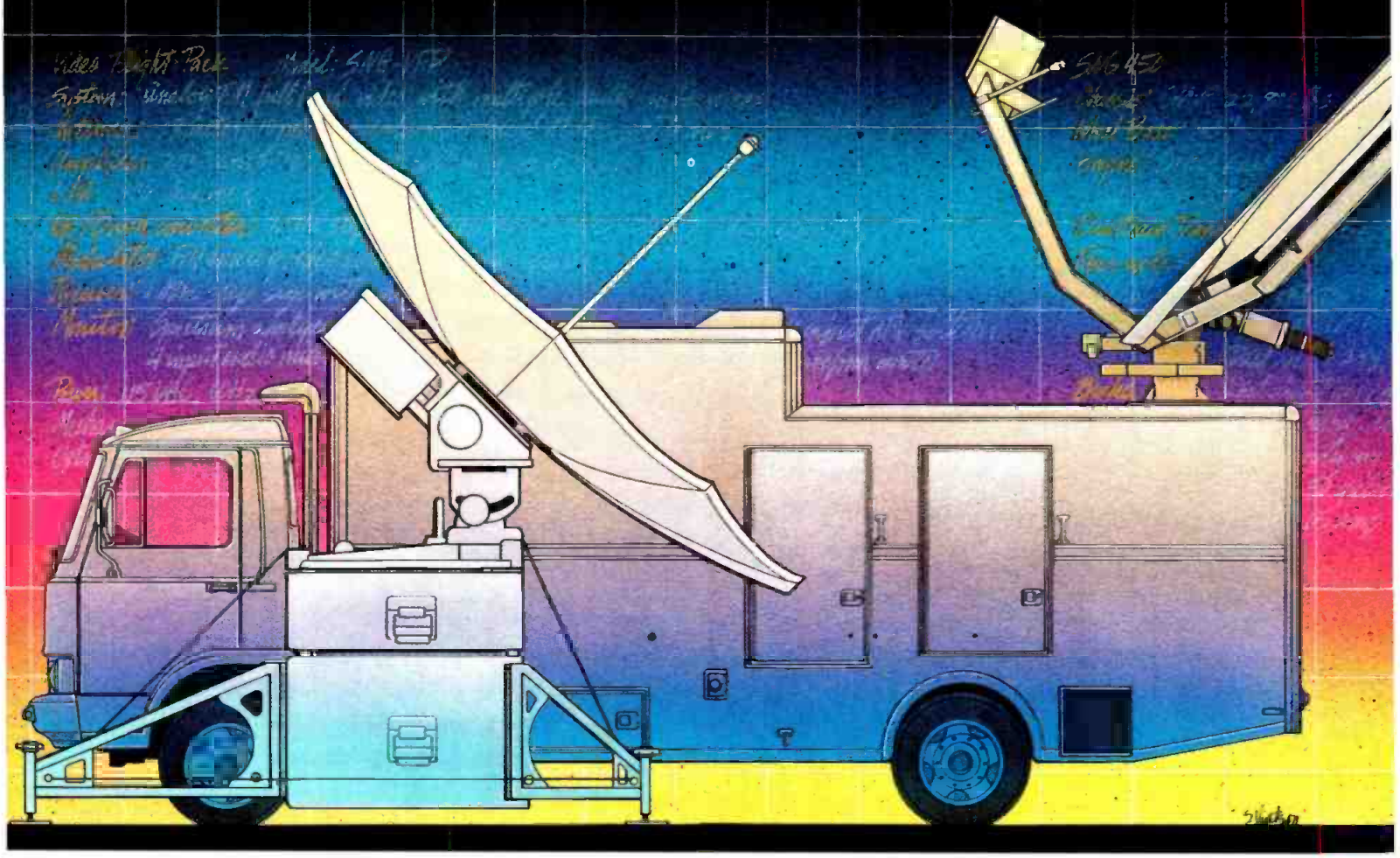

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NBC's distribution antennas poised on the rooftop at Rockefeller Center, midtown Manhattan.

The NBC Satellite Experience

By O.S. Paganuzzi

In early 1982 all television networks distributed their programming terrestrially, supplemented by occasional satellite use. Driven by progressive affiliates and a changing industry climate, NBC embarked on a complete satellite distribution campaign.

In the early 1980s, network programming was distributed by terrestrial connections. Lots of them. They were expensive. Everybody wanted to get out from under the clutches of the phone company but nobody seemed able to make the right moves. Then, in 1982, NBC was 8prompted by its affiliates and by the changing broadcast environment to investigate alternative methods of distribution.

Two years later, the NBC Network began the final changeover from terrestrial to satellite. Complete cutover to the new structure was accomplished in a matter of weeks. Things haven't been the same since.

System review

To understand the complexity of committing to a complete, satellite-delivered network, many elements have to be considered. Several unknown quantities existed when converting to satellite was being considered, thus making it difficult to move conclusively in a specific direction. The variables included affiliate station needs, new system specifications, impact of the pending Telco divestiture, financial tradeoffs, Ku- versus C-band issues, and anticipated re-

Editor's Note: This article is the first of a two-part series detailing the evolution of a benchmark satellite facility, the NBC Skypath distribution system. Part Two will appear in BM/E's *December issue.*

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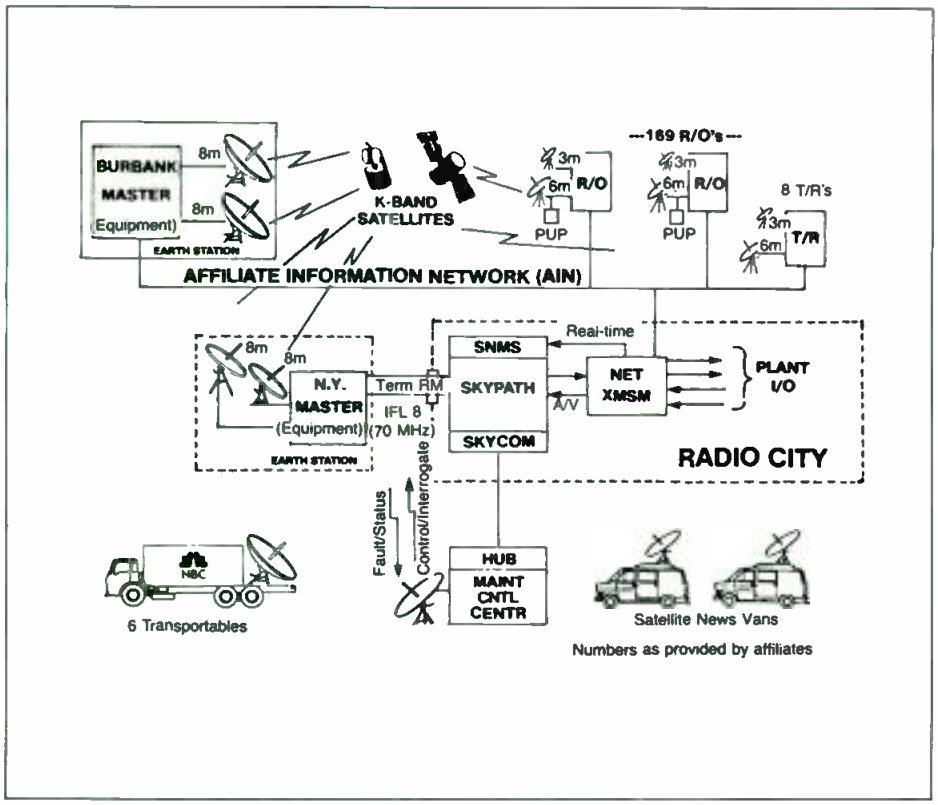

NBC satellite network simplified block diagram.

search and development. These were only some of the unknowns at the time the project was considered.

Fortunately, the investigations involved in such a project were assigned to a select task force attached to NBC Broadcast Operations, yet considerably removed from the usual organizational bureaucracy. Though small at the outset, the four-person task force increased in size as the project gained momentum. The original team was well-qualified, collectively representing over 100 years of broadcast experience.

After considerable research had been accomplished, a practical, cost-effective system was finally detailed on paper, but the firm commitment to satellite distribution only came about in 1983 as the result of two prime factors. The first difficulty was finding a suitable vendor with experience in the satellite business and who was innovative. The company also needed qualified personnel and equipment, as well as a desire to be part of the experiment while offering an attractive contract price. Also important was that the vendor would have to have access to Ku-band transponders. Comsat General was settled on as the most logical choice.

The second factor supporting the commitment was increasing pressure from the affiliates to enter this new dimension as quickly as possible. It was believed by all that there were many benefits if the new system could be implemented.

After agreement on the vendor and the commitment of three transponders in 1983, the study began. The initial feasibility system was to be comprised of 21 RO (receive only) affiliate stations, three T/R (transmit/receive) affiliate stations, three transportable units, and a master station in New York.

From its inception, the Network Satellite Project was planned as a unified system, with a complete system approach employed in every decision. Each element was carefully evaluated as to its present and future fit into the system and analyzed in regard to all other system pieces.

By maintaining such a disciplined approach, the system was ready to accept computer control. The initial system was, in fact, to be controlled by a rudimentary Satellite Network Management System (SNMS) embodied within the New York control location that we designated as Skypath Control.

System skeleton

Though much groundwork had preceded the contractual agreement reached with the vendors, few specifics had been formulated. As a result, with almost no exacting specifications and no existing applicable design criteria, the task force assumed the job of establishing an operating television network distribution system within eight months! The project was to be operational by early 1984.

Recognizing that the initial system, if successful, would be established as an interim system on which to build, all design efforts were directed toward an open-ended model capable of expansion within our established operating parameters. Because of the short turnaround time, the principle of using only off-the-shelf items was adopted, except when new designs were required for uncharted areas. Therefore, only equipment and systems were selected with which the team had some familiarity.

Much of NBC's existing switching central software was adapted for the SNMS operation and, where possible, only hardware with practical, in-plant experience was put to use. Even so, much of the time was consumed in anticipating problems.

Harris Satellite Communications was selected as the manufacturing and implementation arm, to work together with NBC and Comsat General. Many standard Harris products were employed. Nevertheless, modifications were necessary to adjust to the new Ku-band benefits and constraints. It was also necessary to gain the support of staff consultants (purchasing, finance, legal, etc.).

The scheduling pattern determined that constructing the interim Skypath Control Room was important to meeting deadlines. Such a schedule would allow for manual coordination and test at the outset and would also provide

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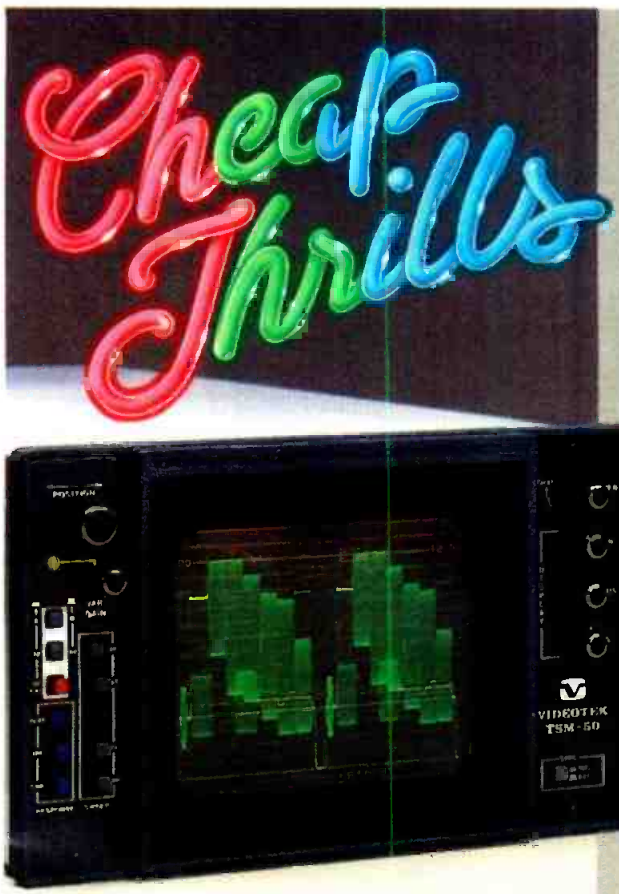

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NBC Skypath Master Control is located at the network's New York-based Television Operations Center.

a method for the gradual overlay of the SNMS software. Immediate installation of the interim Skypath control became the primary concern.

Placement of the site required finding a sufficiently large area capable of immediate occupancy with proximity to related plant equipment and personnel. This was no small task. It was not without much thoughtful consideration that the Broadcast Operations conference room was sacrificed to Skypath. Three months after the decision, the first version of Skypath became a reality.

Simultaneously, work was proceeding in the field as Harris equipped the affiliate stations and, in New York, Comsat was involved with the design and construction of the master station. NBC was, of course, highly visible and involved in both areas of design, especially in those instances requiring knowledge of operational procedures. Through all of this, the early on-air date loomed with New York master control still to be constructed.

As a solution, the same transportable units that outsiders said would never work were moved to NBC's Brooklyn studio lot and satellite operations began in Jan-

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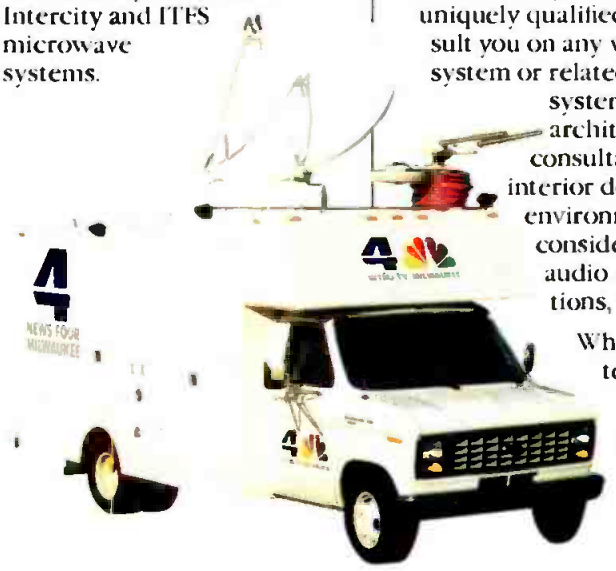

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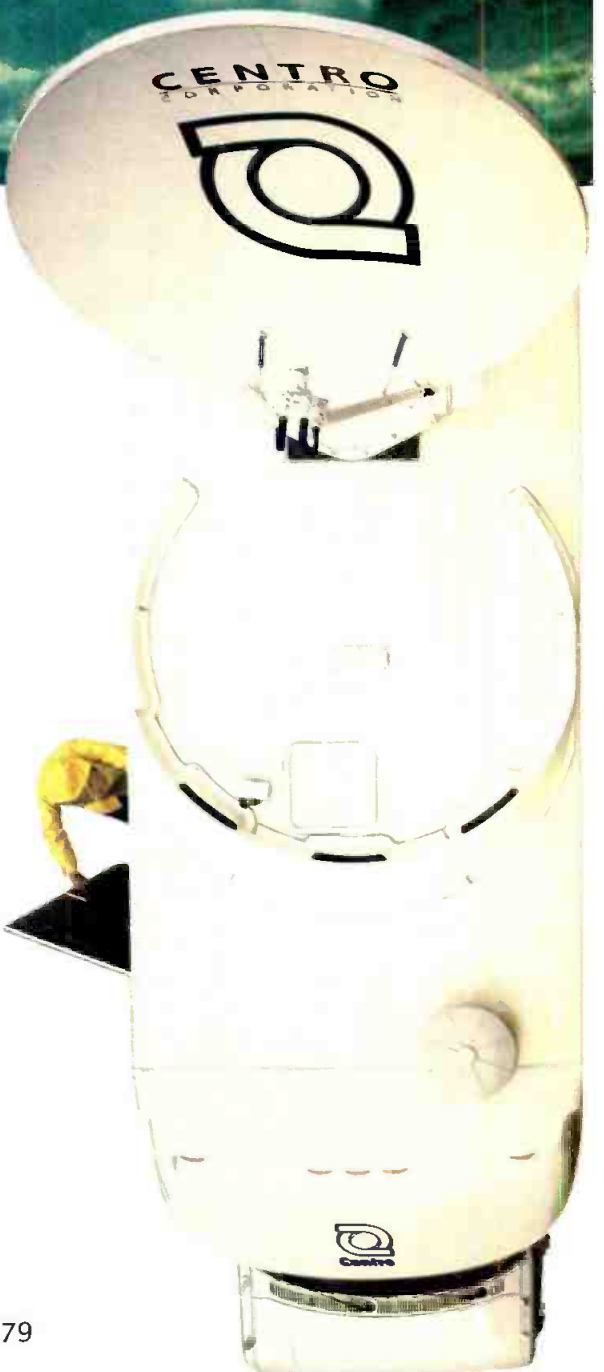

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uary 1984, and satellite distribution of the network has continued uninterrupted since that time.

Phase two

In October 1984, four fully equipped earth station equipment shelters, each weighing approximately 10 tons, were lifted up the side of a Rockefeller Center building and by March 1985 the finished New York master control was interconnected to the Radio City complex and began operations.

After almost three years of successful operation, the interim system has grown to include 177 affiliate stations, while six full-time and six part-time transponders provide services for network distribution and affiliate news organizations. Also part of the system are production services rendered by six transportable earth stations. In addition, the Portable Uplink Packages (PUPs) allow the system to make any RO location a functioning T/R.

As part of the evolution of the system design, the Burbank T/R, originally conceived for that function only, was converted into a full master in order to protect the network from a possibly catastrophic failure, this in keeping with our redundancy requirements. The Burbank ground-based earth station was planned as an exact replica of the roof-mounted New York station. In fact, the station equipment originally slated for New York was rerouted to Burbank, thus allowing us to complete Burbank before New York.

To support the master, Burbank had to construct a Skypath control duplicating the interim room in New York. Since Burbank's Television Central project was under construction at the plant, Pacific Skypath (as it was called) was integrated into the larger complex. Such integration, it was decided, would facilitate communications time between departments.

For standardization, the reconstruction of New York Skypath (changing it from the interim facility) was to have followed the Burbank guidelines, integrating New York master into a larger television complex. Due to other corporate planning efforts dictating a possible move from Radio City, the expenditure of large budgets for a rebuilt New York Television Central became highly implausible.

Expressed in a broad sense, those Skypath requirements were: improve the space-form factor, locate adjacent to present switching central, provide space for the program traffic department, provide solutions to known operational problems, and provide for all future projected facilities. Not to mention that the cost must not be excessive. New designs for Skypath were anticipated early when it was realized the interim facility would not completely serve the purposes of the new system, once complete, though the interim facility did serve as an invaluable aid in our learning experience. In late 1985 specifications were determined for the new construction of the permanent facility.

Detailed operations plans were completed at the beginning of 1986 and the total package was turned over to NBC engineering for its implementation. Actual construction began in July of 1986 and two months later the new Skypath was on line. The finished product is highly representative of the submitted specification and, with this system, the project is virtually complete. There are, of course, a number of new facilities and features "on the drawing board," but their eventual installation has been planned within the model provided. **BM/E**

About the author:
Mr. Paganuzzi recently retired from NBC as engineering manager, satellite network. He received his MBA from Iona in 1970 and an AB in physics from Columbia University in 1949. He joined NBC in 1951 as maintenance engineer and moved to facilities design, setting many new standards for the industry.

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Petition to Deny

By Harry Cole, Bechtel & Cole, FCC Counsel

Never let it be said that the present FCC is lacking in its determination to help the broadcast industry fend off the slings and arrows of outrageous (or is that outraged?) members of the public. Of course, Congress has, in the Communications Act, instructed the Commission to accord the public a clear voice in the regulatory process. Further, the Commission has itself justified much of its deregulatory juggernaut of this decade on the basis of the availability of public participation in that process. But despite these factors, the Commission—even in its most liberal days—has usually given pretty short shrift to members of the public who attempt to raise questions about incumbent licensees. Now the present Commission, which ranks among the most industry-oriented of Commissions in recent memory, is seeking to adopt a number of new rules that could further discourage public participation in broadcast regulation.

In September the FCC released a notice of proposed rulemaking in which it proposed new limitations both on the petition-to-deny process and also on the channel allotment process. Before describing the new proposals, let's make sure we understand how the present system works.

As the petition-to-deny process now stands, any interested member of the public is statutorily entitled to file a petition to deny in which it tries to raise questions concerning the qualifications of one or more applicants. If the petition succeeds in raising a "substantial and material" question concerning an applicant's qualifications, the FCC must hold a hearing on that question before it can grant the application. If the petition fails in that regard, the Commission can deny the petition and grant the application. As a practical matter, petitions to deny rarely result in a hearing. That is, the Commission almost always concludes that no substantial or material question of fact has been raised. Nevertheless, licensees tend to fear any kind of petition because petitions, even if unsuccessful, almost invariably delay the processing of the application against which they are filed.

This preference gives potential petitioners some leverage against applicants. The Commission suspects that, recognizing this understandable fact of life, some members of the public have chosen to file petitions in order to take advantage of the applicants' vulnerable position. As the Commission sees it, some petitioners may file their petitions solely or primarily for the purpose of approaching the applicant and offering to withdraw the petition for a price. The price, obviously, exceeds what the petitioner had laid out to get the petition on file. The FCC suspects (but has not yet been able to document) that, in such situations, the applicant/licensee is likely to pay the price in order to assure that its application encounters no delay.

As the FCC sees it, this system is ripe for abuse. Since applicants must secure Commission approval of their applications (whether for new construction permits, license renewals, changes in facilities, assignment of license, etc.), applicants must file applications with the FCC. They thus become sitting ducks for potential petitioners who can (in the FCC's view) accost the innocent and unsuspecting applicant and, in effect, extort cash from it.

Looming profit motive

It doesn't take a Rhodes scholar to see where the potential for abuse pops up here. A licensee filing an upgrade proposal has an obvious profit motive for getting the upgrade granted. Thus, if someone files a counter-proposal that might jeopardize the grantability of the upgrade, it is in the licensee's best interest to convince the counter-proponent to withdraw its proposal. And, of course, the most effective way of convincing somebody along those lines tends to be cash payments.

In an effort to reduce, if not eliminate, the potential for abuse, the Commission has proposed new rules requiring that petitioners who seek to withdraw their petitions be limited to recouping only their out-of-pocket costs. When the request to withdraw the petition is filed, the petitioner would have to provide an itemized accounting of its expenses and would have to obtain FCC approval before it could receive any payment for the withdrawal. Similarly, the Commission would also prohibit parties from threatening to file petitions and from receiving payments in excess of legitimate and reasonable out-of-pocket expenses for agreeing not to make good on such threats.

With respect to channel allocations, the Commission has a somewhat harder time. The FCC's initial proposal would limit reimbursement for withdrawal of alternate conflicting drop-in proposals to the proponent's legitimate and reasonable out-of-pocket expenses. But the Commission is not altogether comfortable with this approach. The difference between the channel allocation pro-

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cess and the petition-to-deny process in this regard is the profit motive that may legitimately underlie channel drop-in proposals. That is, a petition to deny normally would not generate any profitable result if the petition is granted; rather, all that would be accomplished would be the designation of an application for hearing, which would not, in and of itself, give rise to any opportunities for the petitioner.

The Commission's proposals are not by any means unreasonable. Any licensee who has been on the wrong end of a spurious petition to deny—and there have been many filed—knows the aggravation of having to decide whether to bear the risks and the costs of fighting through the FCC, or whether instead to cut a deal with the petitioner. Thus, the proposals under consideration are clearly directed to a legitimate concern. The troublesome aspect here is the tone underlying the proposals: the Commission seems at times to suggest that petitions to deny tend to be motivated by private profit considerations, and that seldom if ever are they legitimately based on public interest concerns.

The difficulty with this is that it suggests an unrealistic, and possibly unfair, tilt in favor of the broadcaster and against the petitioner. The proposal, after all, is aimed not so much at abuses of the petition-to-deny process itself. Rather, it is aimed at abusive *petitioners*. Thus, for example, no mention is made of situations in which a guilty broadcaster might offer to make a substantial payment for the withdrawal of a valid and legitimate petition to deny. The problem, then is one of appearance more than anything else. If the Commission really does intend to rely on members of the public to bring violations to its attention, the FCC may wish to appear to be a little more open-minded toward petitioners. This is *not* to say that abusive petitioners should be tolerated.

SCA monitoring update

Some time ago we noted in this column that the Commission's rules and policies still require licensees to be able to monitor the content of material transmitted on their subsidiary communications authorizations (SCAs), unless the SCA user is providing a common carrier service. Such monitoring is not difficult when the SCA service involves normal voice and/or video display transmissions. It is much more difficult when the SCA is being used for data transmission, since such use involves staggering amounts of information, most of it coded so that it is virtually indecipherable without elaborate additional hardware and software, much of which may not even be available. While the practical problems inherent in SCA data monitoring have been raised from time to time for the FCC's informal consideration, the Commission has not yet provided any definitive ruling aimed at resolving those problems.

However, we have learned that in June, 1987, former Mass Media bureau chief James McKinney did have occasion to advise one SCA data user that FM licensees "need not monitor the content" of certain nonbroadcast subcarrier communications. The communications described in McKinney's letter involve a "form of electronic mail . . . enabl(ing) users (such as department store chains) to dispatch a variety of messages such as price changes, inventory updates, promotional pieces, and so forth."

According to the McKinney letter, while licensees "of course remain responsible for not allowing their radio facilities to be knowingly used for an unlawful purpose," alternatives exist that permit a broadcaster to "demonstrate that it has acted reponsibly." Those alternatives include the requirement of advance notification from the SCA user of its business customers and their lines of business; definition of the general category of business communications to be carried; prohibiting use of the SCA for any unlawful purpose; and providing for the station's right to terminate the agreement if the SCA is used for an unlawful purpose.

On the one hand this may facilitate SCA lease negotiations, as it appears to resolve the difficult practical question of how to provide for monitoring of SCA data transmission. However, it is not at all clear how much McKinney's letter really does help the situation. The suggested alternatives he offers are all pretty much obvious provisions that one would expect to include in *any* SCA lease. The tough question—which McKinney does not address—is how the FM licensee is supposed to enforce those provisions. The SCA user may be willing to say anything and sign anything in order to acquire access to the SCA. But once the data transmission actually begins, how can the FM licensee be sure that the SCA user is in fact living up to the representations made in the agreement?

The problem is that McKinney's letter appears to say that, if an FM licensee has included appropriate provisions in its SCA agreement, the licensee is shielded from any penalty if the SCA user does not comply with those provisions. But without a way to determine whether the SCA user is in fact complying, the FM licensee can never effectively invoke those provisions. In a way, those provisions thus become meaningless. If the Commission does expect FM licensees to be responsible for the content of their non-common carrier SCA transmissions, it does not make sense for there to be no monitoring capability.

Sense or no sense, though, the McKinney letter is out there and, presumably, FM licensees providing their SCA's for that kind of data service may wish to rely on it, even if it is apparently inconsistent with the FCC's approach to the monitoring of conventional SCA uses. **BM/E**

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Audio DA from BTS

Broadcast Television Systems (BTS) has announced the BAA-350 audio distribution amplifier. Designed to yield high performance specs in a totally transformerless unit, the DA features a differential input buffer to balance input for interface to either a balanced or unbalanced source and to provide common mode rejection greater than 70 dB, up to 1 kHz.

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The Professional Librarian, a new software package from Leonardo, is designed specifically for audio facilities that use CD music and sound effects libraries. In addition, the IBM-compatible program features the ability to interface with and control the Sony CDK-006 multidisc CD player.

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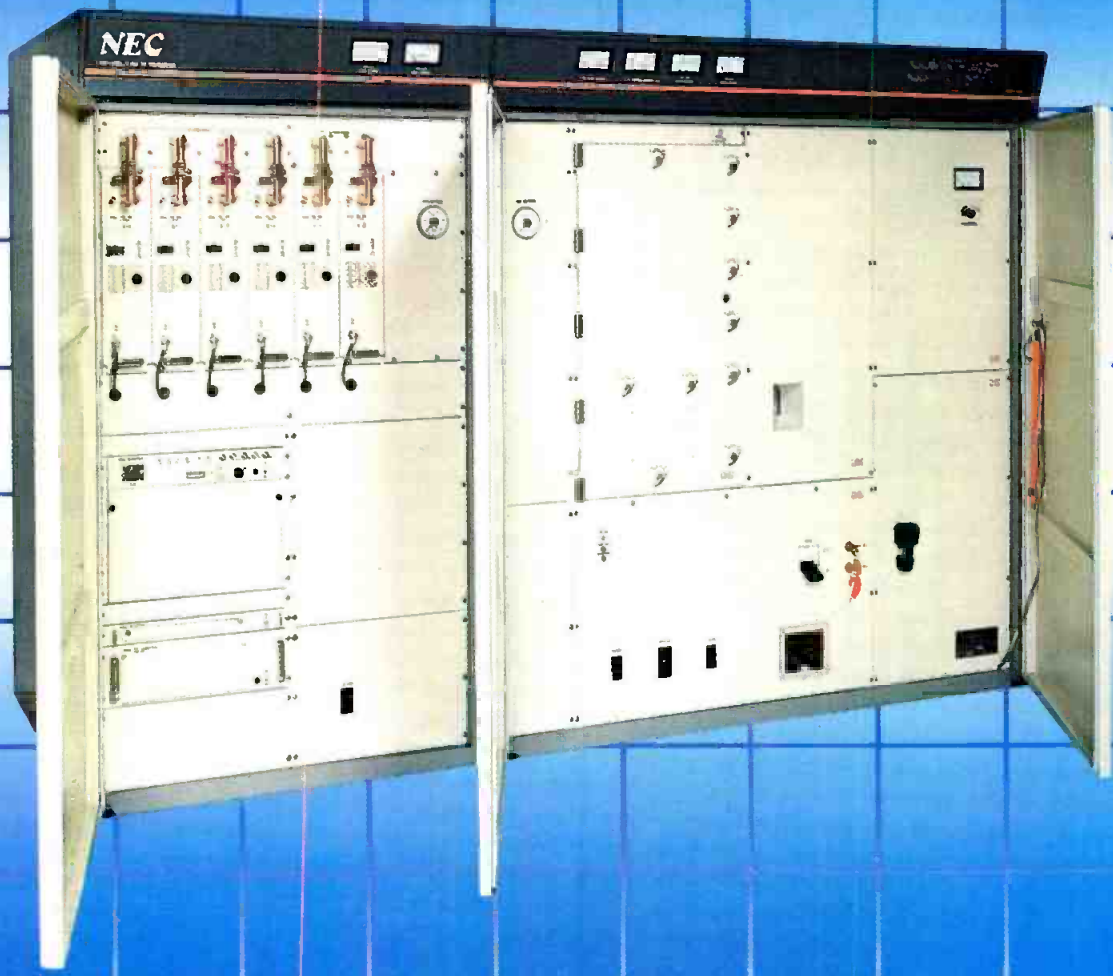

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The PSA-35A Portable Spectrum Analyzer accurately measures wideband signals commonly used in the United States and European satellite communications industry. The PSA-35A frequency coverage is from less than 10 to over 1750 MHz, and from 3.7 to 4.2 GHz. The PSA-35A features switch selectable sensitivity of either 2 dB/div or 10 dB/div. The portable, battery or line operated PSA-35A Spectrum Analyzer is the perfect instrument for the critical dish alignment and tracking requirements necessary for maximum signal reception. **$1965**

AVCOM's Single Channel Per Carrier Receiver, model SCPC-2000E, has been developed for the reception of FM SCPC signals from satellites operating in the 3.7 to 4.2 GHz band. The SCPC-2000E is a complete receiver that can tune up to 4 specific crystal controlled audio or data channels from a given transponder and is available in either wide or narrow band models. Optional circuitry is available to allow up to 8 crystals for channel selection. The SCPC-2000E may be used with the SS-1000 Slave for simultaneous reception of additional channels. **$1875**

The AVCOM COM-96 Professional Receiver is compatible with all C and Ku band LNB's and BDC's that operate in the 950 to 1450 MHz range. The COM-96T provides complete 4 and 12 GHz performance in one system.

The COM-96T is a high performance, fully agile, dual conversion satellite receiving system for demanding commercial applications. Modular circuit packaging results in a compact and highly reliable Ku and C band receiver in a standard 19" rack mount configuration. Highly stable oscillators eliminate frequency drift and allow operation over wide temperature ranges. Special threshold extension circuitry offers superior video quality. The COM-96T may be ordered with optional threshold peaking and dual IF filters for receiving international type transponders. **$939**

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For-A Debuts Digital TBC

The FA-450, new from For-A, is an advanced TBC that handles any analog, component, Y/C dub, or composite signal and provides full transcoding interface capabilities, including encoding and decoding. Two models, PAL and NTSC, are available—both offering 4:2:2 sampling and eight-bit encoding for each component.

Other features include full-frame correction, color picture freeze, dropout compensation, and dynamic tracking.

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Autogram Console Bows

Autogram has announced the debut of the R/TV-12 audio console. The unit features eight dedicated channels, plus four channels with four sources each, making the possible input total 24. Each channel, in turn, utilizes four lighted switches with a selectable status of audition, program, or both.

A hinged cover allows easy access to the console's motherboard and internal circuitry. In addition, all boards—channel, output, mix-minus, and preamp—are vertically mounted with edge connectors and external ports. Each channel board will feed either a stereo program bus or a stereo audition bus, or both simultaneously. Other selectable functions include mute/no mute, prefader/postfader mix/minus, channel off enable/disable, reset/no reset, timer, and remote slider enable/disable.

A plug-in microprocessor and small remote switch box comprise an optional "live assist" unit that allows the console operator to program up to 32 sequential steps.

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Recent installations of the **Color-Graphics Systems' LiveLine V** weather graphics system include WNBC-TV, New York; WABC-TV, New York; WBZ-TV, Boston; WWOR-TV, Secaucus, NJ; WPXI-TV, Pittsburgh; WPRI-TV, Providence, RI; and KCNC-TV, Denver. In addition, WWOR also purchased an **ArtStar 3D Plus** video graphics system ... **The Computer Arts Institute**, San Francisco, CA, another new owner of an ArtStar 3D Plus, will put its machine to use instructing students in computer-assisted animation. An intensive workshop focusing on the ArtStar's capabilities in tandem with the **Abekas** digital disk recorder will also be offered.

Two new 22-foot **Centro** Satellite Networker SNVs have been recently delivered to NBC affiliate **KCRA-TV** in Sacramento, CA, and ABC affiliate **KTVX-TV** in Salt Lake City, UT. KCRA's truck features two microwave masts, on-board editing with two Sony BVU 800s, and both NBC and Skyswitch communications packages. The dual-setup Networker for KTVX will aid that station's 12-state news coverage. The truck features removable rack-mounted RF equipment that can be connected to a 1.8-meter antenna for use as a flyaway system. The RF package can, in fact, be flown ahead to a news site, with the Networker following on land a few hours behind.

A contract, in excess of $2 million, was recently inked between **Solid State Logic (SSL)** and **Todd-AO/Glen Glenn Sound.** The order calls for eight SL 5000 film consoles: three configured as 60-input + 24 monitor, three-man, video/film post boards; two configured for 72-input + 24 monitor, three-man, film post boards; with the remainder set up for automatic dialogue replacement.

There has been a realignment of the sales and marketing department at **Magni Systems, Inc.**, supervised by new VP of sales and marketing Paul McGoldrick. Marked by some job title and personnel shifts, the new plan will help Magni "supply creative, reliable solutions to the test and measurement needs of the broadcast and video production industries," according to McGoldrick.

Panasonic Broadcast Systems president Stan Basara (left) presents a copy of a new contract to Ardell Hill, director of engineering and operations for the Media General Broadcast Group, at the recent RTNDA show in Orlando, FL.

Media General Broadcast Group, Tampa, FL, has announced it will convert its three stations to the Panasonic MII format. Initial MII elements will be on-line immediately, with total conversion of production, newsgathering, and commercial spot playback equipment finished by 1989.

Totalling over $1 million, the Media General product acquisitions include AU-650 studio VTRs, AU-500 field recorders, AU-400 camera recorders, M.A.R.C. cart machines, and all support equipment.

The three Media General stations are: WXFL-TV, Tampa's NBC affiliate; WJKS-TV, Jacksonville's NBC affiliate; and WCBD-TV, the ABC affiliate in Charleston, SC.

National Gateway Telecom has announced the formation of a new satellite uplink contract with **National Video Center/Recording Studios, Inc.** Under the new agreement, NGT will provide television microwave facilities from National's Manhattan studios to NGT's Satellite City earth station complex in Carteret, NJ. From there, NGT will distribute the programming via uplinks to U.S. and Canadian domestic satellites. Another new venture by National Video Center has been announced, called **Telezign.** It's a 3D animation and design company with its own creative staff of designers and animators, and the added support of National Video Center's extensive post-production resources.

The Society of Professional Audio Recording Services **(SPARS)** is now offering a series of 90-minute cassettes, with accompanying literature, concerning studio audio production. Based on lectures and presentations at the recent **Studio Business Conference** in Los Angeles, the tapes cover various topics, including "Constructing a Business Plan," "Opening a New Studio," "Entry into Video," and "The Evolution of the Multi-Studio Operation." Contact SPARS at P.O. Box 11333, Beverly Hills, CA 90213; (818) 999-0566 for further details on the cassette tapes.

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Advertisers Index

Manufacturer	Page No.	Circle No.
A.F. Associates Inc.	37	115
Alpha Audio	47	120
Ampex Corp./MTD	61	129
Associated Production Music	82	144
Avcom of Virginia	80	141
Belar Electronics	50	122
BTS Broadcast Television Systems	59	128
Camera Mart, Inc., The	82	143
Canon U.S.A.	54	126
Centro Corp.	74	137
Colorgraphics Systems Inc.	30	113
Continental Electronics, a Division of Varian Associates, Inc.	72	135
Datatek Corp.	42	118
Digital Services Corp.	56	127
East Coast Video Systems	80	142
Eastman Kodak Co.	39	116
Fidelipac Corp.	1	101
Fujinon	62	130
Grass Valley Group, Inc., The	6	104
GTE Spacenet Corp.	71	134
Harris Broadcast Group	12-13	106
Hubbard Communications Inc./HUBCOM	68	133
JVC Company of America	5	103
JVC Company of America	8-9	105
Leitch Video Ltd.	27	112
Logitek Electronic Systems, Inc.	47	121
3M Magnetic Media	52-53	—
Maxell Corp. of America	11	—
Microtime	25	111
Midwest Communications Corp.	15	107
NEC America, Inc.	79	140
Otari Corp.	50	123
Panasonic Broadcast Systems	40-41	117
Panasonic Industrial Co.	17	108
Panasonic Industrial Co.	18-19	109
Quantel	51	124
Roscor Corp.	73	138
Sachtler Corp. of America	35	114
Shure Brothers Inc.	45	119
Solid State Logic	49	—
Sony Broadcast Products Inc.	2-3	—
Sony Broadcast Products Inc.	28-29	—
Sony Tape Sales Co.	23	110
Sony Pro Video	67	132
Specialty Vehicles Inc.	75	139
Studer Revox America, Inc.	Cov. 2	100
Tamron Industries	65	131
Telex Communications	4	102
Videotek Inc.	72	136
Ward-Beck Systems	Cov. 4	146
Wheatstone Corp.	Cov. 3	145

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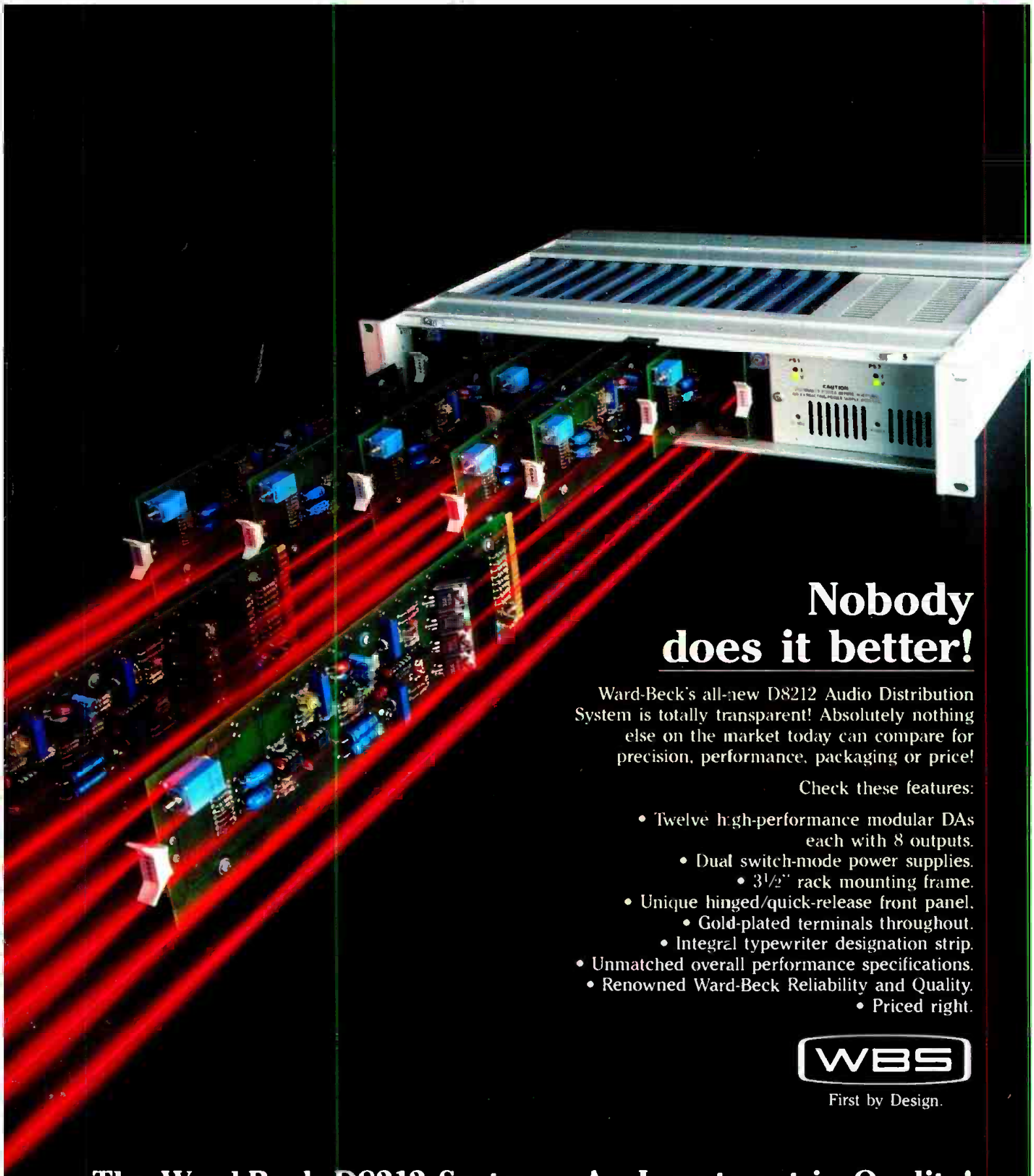

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