BME

FOR TECHNICAL AND ENGINEERING MANAGEMENT

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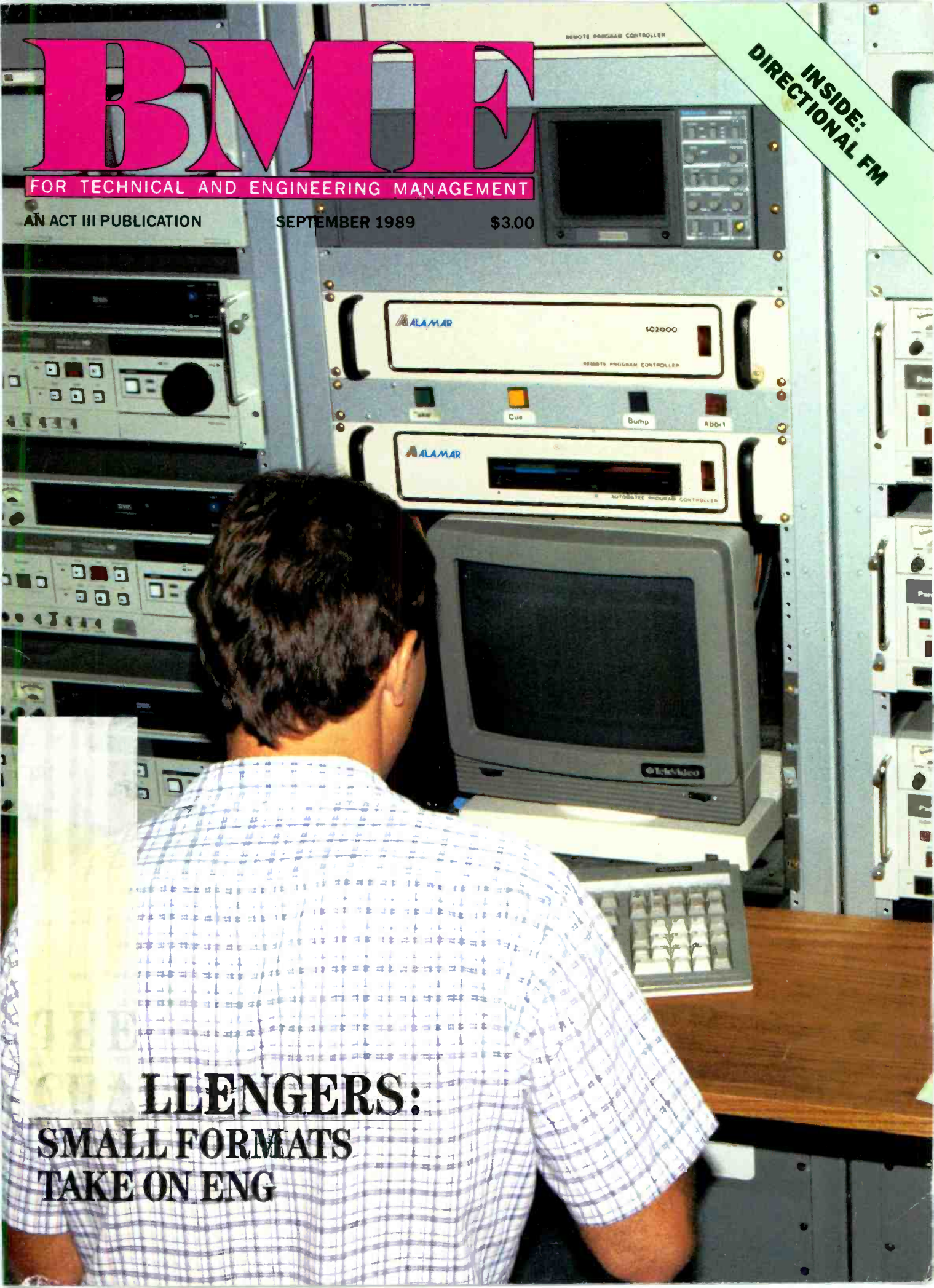

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Engineering Supervisor

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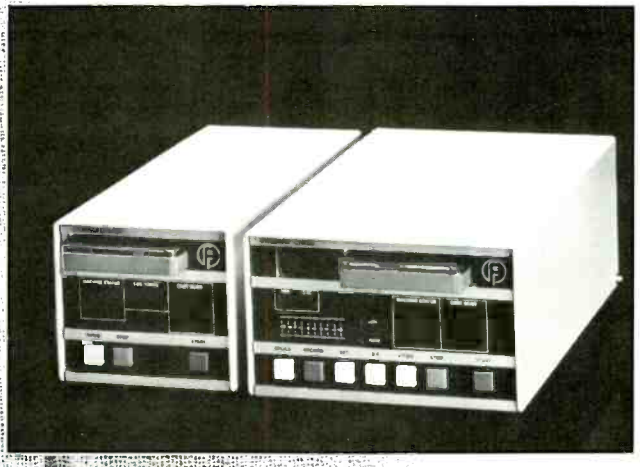

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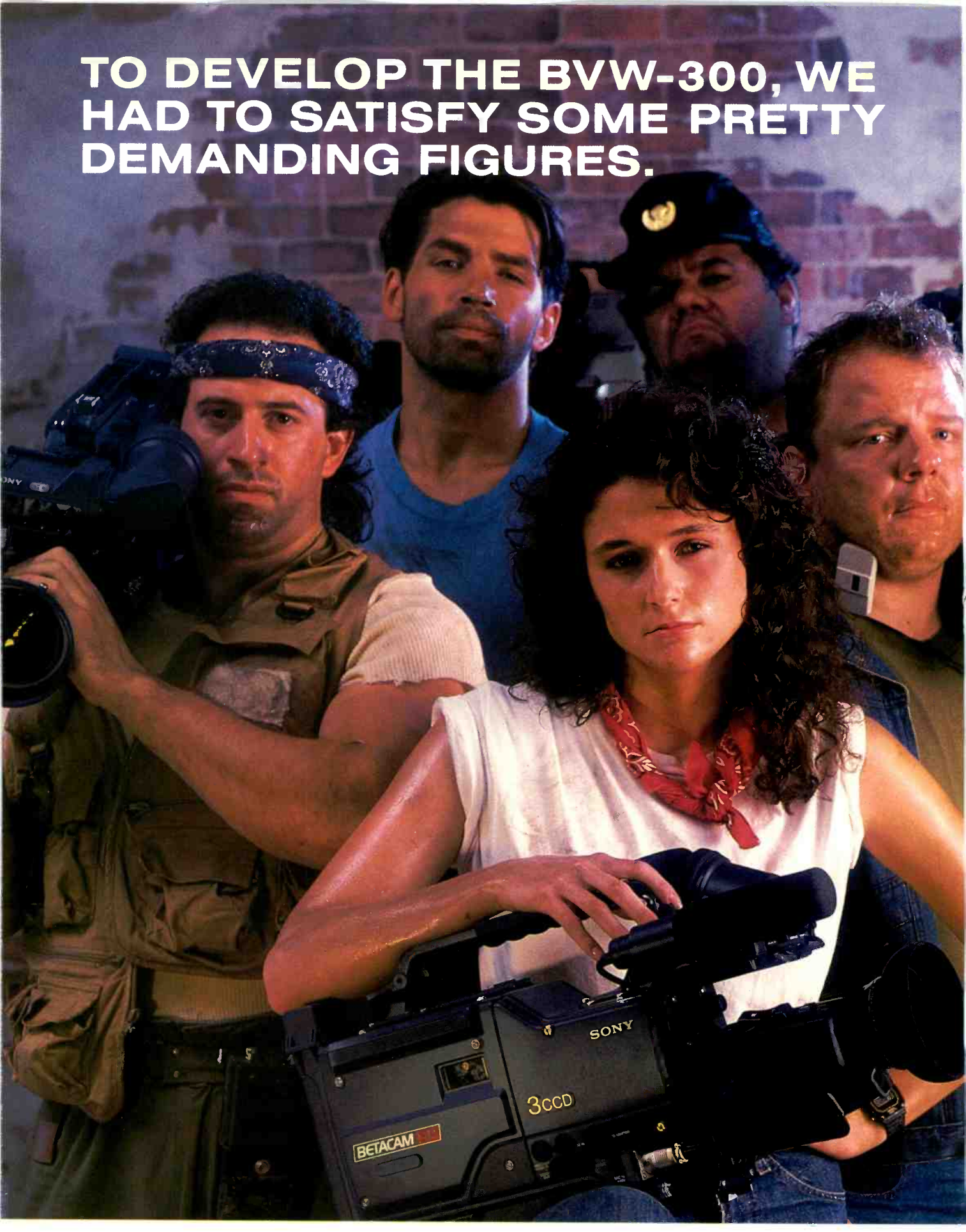

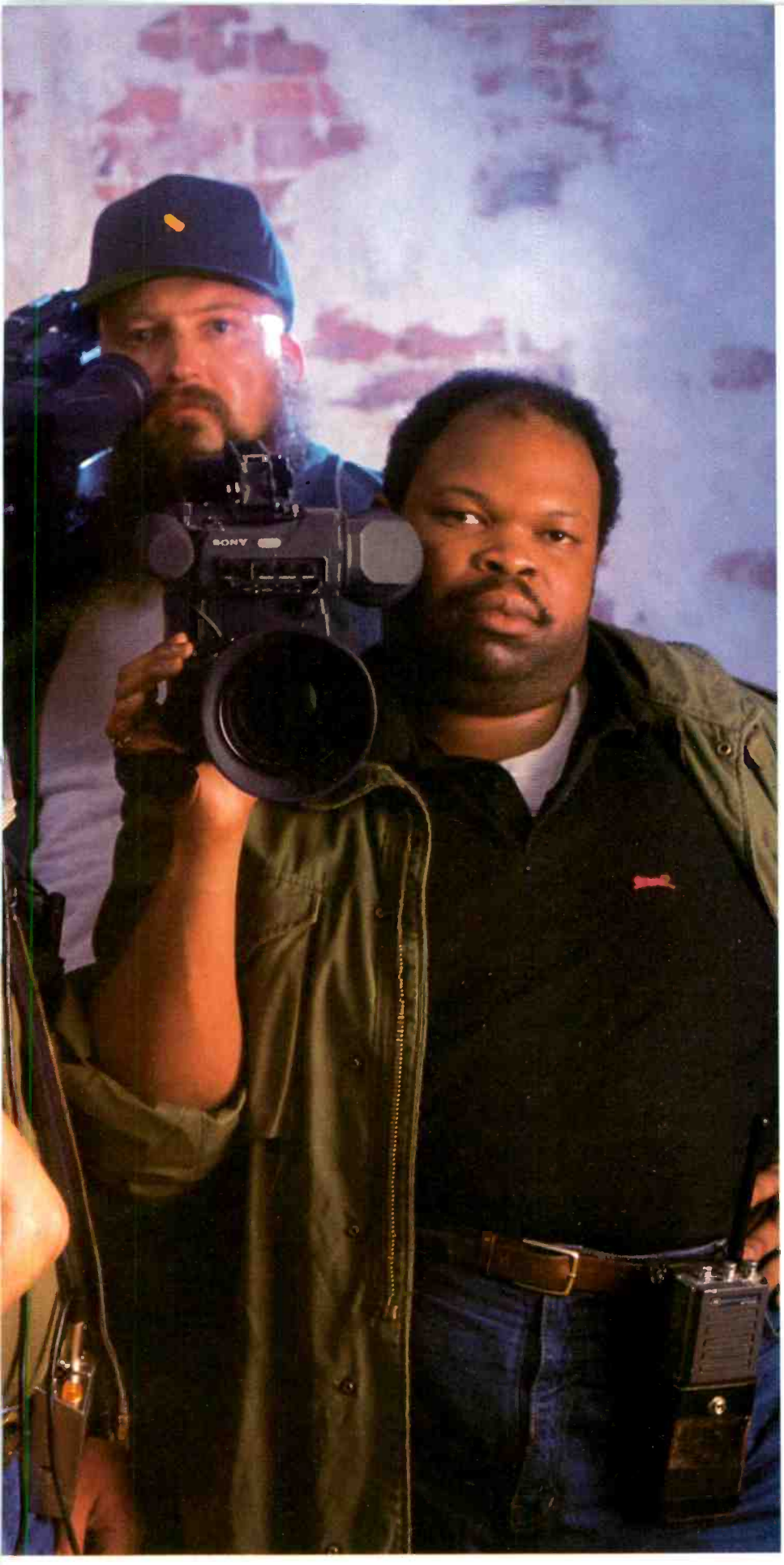

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On the cover:
S-VHS control system at KCCO/KCCW, Alexandria, MN.

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FOR TECHNICAL AND ENGINEERING MANAGEMENT

SEPTEMBER 1989
VOL. 25, NO. 9

Features

26 *The Challengers: Small Formats Take on ENG*

35 *Will the Real Stereo Please Stand Up?*

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Act III Publishing, Technical Division
401 Park Ave. So., New York, NY 10016
(212) 545-5100 Telex: 64-4001
Fax: (212) 696-4215
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Columns & Departments

15 *David Barnes: Midwest contemplates merger*

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VIEWPOINT

Sikes seems like just the man to bring a breath of regulatory sanity to the broadcasting and cable industries.

We are heartened to see Alfred Calvin Sikes, who until recently headed the National Telecommunications and Information Administration, take the reins as chairman of the Federal Communications Commission. After years of willy-nilly deregulation by the Fowler and then the Patrick FCCs, Sikes seems like just the man to bring a breath of regulatory sanity to the broadcasting and cable industries.

A former radio broadcaster, Sikes knows this industry from the inside. Veteran Commissioner James Quello has been the sole broadcaster among the FCC ranks for too long; Sikes's appointment will give Quello some welcome company, and will ensure that the broadcasting perspective will survive Quello's anticipated (and well-deserved) retirement.

Sikes has stated that his first priority as FCC chairman will be to improve the technical quality of broadcasting. These are welcome words to engineers who have seen regulations loosen while the opportunities for interference multiply. We hope that under Sikes's direction the FCC will vigorously enforce its technical regulations, and think hard before any further technical deregulation. Because development of the next generation of broadcasting technologies will have a profound effect on the future of the industry, Sikes's interest in HDTV is another welcome attribute. As NTIA head, Sikes was a strong advocate of encouraging U.S. companies in advanced television research and development activities. We applaud his efforts and hope to see them continue.

By all accounts, Sikes is a tactful politician, another quality that will serve him well in his new post. Congress's relationship with the FCC has been stormy over the Fowler-Patrick years, putting the regulatory body at loggerheads with the legislative branch on more than one occasion. With Sikes at the helm, we may see better cooperation between the FCC and the Congress, without unnecessary re-regulation. Sikes is a strong advocate of self-regulation for the broadcast industry, and favors a self-imposed industry code, similar to the NAB Code, eliminated in 1983. He is a true believer in the public interest standard, and has earned "thumbs up" ratings from industry and citizens groups, as well as from the Congress.

Our best wishes for success go to Alfred Sikes, along with his new fellow Commissioners, Andrew Barrett and Sherrie Marshall, in their new posts. ■

Eva J. Blinder

Eva J. Blinder
Editor

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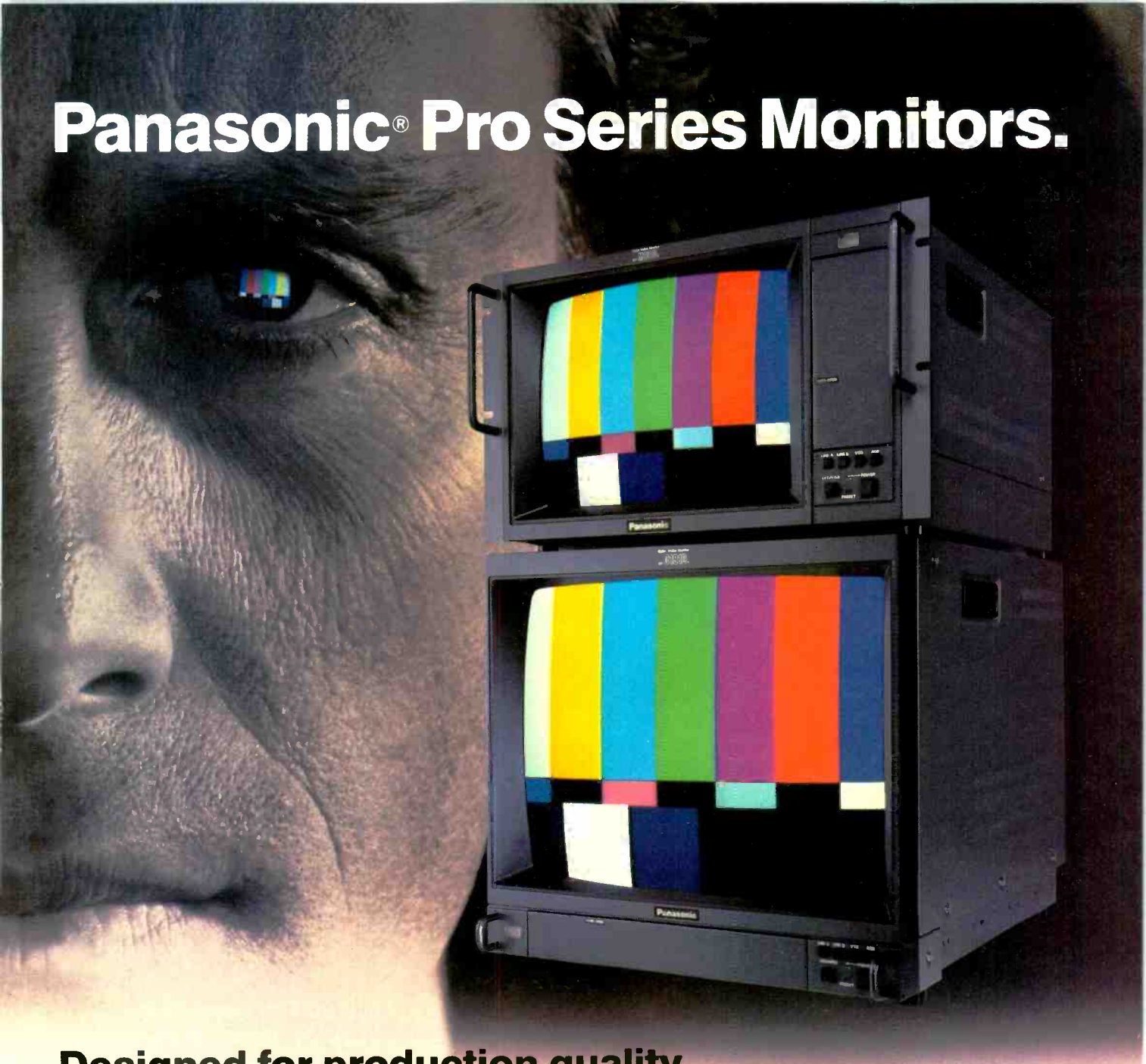

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UPDATE

Cable Television Labs and ATTC Announce Cooperative Tests ... Chyron and Midwest Contemplate Merger ...More Major Mergers ... NAB Cites RBOC Perils, Opportunities ... ACTV Consortium Announces Progress

Cable Television Labs and ATTC Announce Cooperative Tests

A recently announced cooperative agreement between Cable Television Laboratories, Inc. and the Advanced Television Test Center to use a single site to test high definition and other advanced television systems will not necessarily result in a single standard for broadcast and cable systems, both sides affirm.

"The reason for the cooperative venture is to provide one venue for the proponents where simulated off-air as well as simulated cable transmission tests can occur," said Baryn Futa, chief operating officer of Cable Television Laboratories.

E.B. Crutchfield

Under the terms of the agreement, Cable Labs will pay the ATTC up to $2.5 million over three years for the use of its facilities. The ATTC will provide test signals to the various ATV systems operating in a simulated over-the-air broadcast environment and use them in tests to be conducted for the broadcast industry.

Baryn S. Futa

Likewise, Cable Labs will run these signals through a cable and fiberoptic test bed approximating an actual cable system. Data will be compiled on the effects of cable retransmission of over-the-air broadcast signals as well as the performance of ATV systems on cable systems.

"The two entities will work together to come up with a system to be recommended to the FCC for terrestrial broadcast which would work over cable as well," said Benjamin Crutchfield, ATTC program officer. "That doesn't mean that the cable group will not be able to pursue development of a separate system for cable."

"Whether we pick the same standard is not as important as our ability to carry on our cable systems software that is transmitted by broadcasters on whatever system they use," said Futa. "Under that scenario, even if the cable industry used a different transmission system, we would still have to deal with the issue of how to carry the broadcast high definition software." ■

Chyron and Midwest Contemplate Merger

Investment bankers on both sides are contemplating the best way to go about merging Chyron Corp. and Midwest Communications Corp. into a combined company that would wield impressive clout in the industry: over $200,000,000 in annual revenues, over 100 product lines and a sales staff of more than 250.

"We're a little company doing around $50 million a year in sales and spending 12 percent or more on research and development," said Alfred Leubert, chairman of the board, president and chief executive officer of Chyron. "From our perspective we need better and more distribution of our product. We have the ability to develop the product, they [Midwest] have the ability to distribute it. No one has a better sales force in the U.S. for video products than Midwest."

Under the proposed combination, both companies would retain a great deal of autonomy, including their names—at least on the operating level. "If, for legal reasons, we had to form a holding company with a different name, that would be another matter," said Leubert.

In addition to retaining its identity, each company would be free to do business with other entities.

"One overriding criterion is that both companies would keep their identities," said David Barnes, president, Midwest Communications. "Midwest is a distribution company that sells Chyron and other products. Our sales force would continue to have that flexibility. Likewise, Chyron has other dealers besides Midwest in areas where there are better alternatives. They would continue to do so."

Another reason for the merger, both parties agree, is the impressive presence the combination of companies would bring to the industry. "We'll have a com-

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David Barnes, president of Midwest Communications.

pany that will become the third or fourth largest in the industry," said Leubert. "Above us would be Sony and Ampex and maybe one other company."

Although Leubert and Barnes expect the investment bankers won't take long to reach a decision about the best way to combine the two companies on a tax-free stock-for-stock basis, the actual process may take several months to be completed.

"Even if the bankers were to reach a decision tomorrow, it would take a good deal longer for us to go through all of the paperwork that accompanies these types of transactions," said Leubert. ■

ACTV Consortium Announces Progress

There's no doubt about it: Advanced Compatible Television is, well, advancing. A recent picture tube demonstration and monthly tests are the latest in a long progression of steps that are drawing the system closer to its date with the FCC's Advanced Television Committee.

Most recently, the ACTV consortium, consisting of NBC, Thomson Consumer Electronics and the David Sarnoff Research Center, demonstrated what they described as the first widescreen picture tube designed for advanced television receivers in the United States. A key feature of the picture tube is a level of brightness much higher than is currently found in professional widescreen monitors.

Thomson, the successor company to the RCA and GE consumer electronics businesses, is expected to produce the widescreen picture tube at its plant in Marion, IN, as soon as demand warrants. Thomson is currently the only company involved in the manufacture of ACTV hardware.

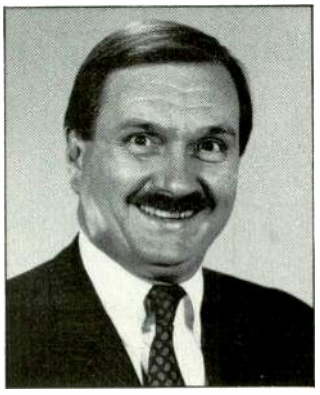
For the past six months ACTV has undergone tests for virtually every broadcastable medium to determine whether the computer simulations undertaken by the Sarnoff Research Center are accurate.

"In every case, the tests have been successful," said Jim Carnes, Sarnoff Research Center vice president. Despite the relative success of the system, there are obstacles that the research team must contend with. One concern, confronted in the cable TV test, relates to the linearity of the amplification process.

"The ACTV system contains a lot of additional subcarriers," said Carnes. "We were worried that when some of the additional subcarriers start to crosstalk into other subcarriers we would get distortions or chroma shifts or interference effects in NTSC receivers. The question is, how good does the differential gain and phase have to be? We were worried that it had to be so good that it wasn't practical."

Carnes added, "We're continuing to fine-tune the system. There are other issues that relate to cost/performance we need to address. For example, do we want to incorporate the additional information that has to be carried with an RF quadrative modulated signal? This will add to the cost of the receiver and transmitter, but it will cause transmitters and cable equipment to be better adjusted than they are now. It gives some performance improvement, but is it worth it?"

Another area where the research team is working is in reducing the signal's sensitivity to differential gain and phase. "The more robust is the system, the less it cares about things like differential gain/phase and the better it will be in



Jim Carnes

operation," said Carnes.

Carnes estimates that it won't be long before the system will be ready for FCC scrutiny. "We expect to deliver to the FCC in the early to mid-1990s hardware we believe will com-

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UPDATE

More Major Mergers

Some argue that the recent consolidations affecting the communications industry are not unique, since every industry from airlines to food companies is closing ranks. But several recent announcements about buyouts and mergers in the audio/video and broadcast industries are simply more evidence that things, for whatever reason, are changing.

One major move is the purchase of Sound Workshop and Digital Creations Corp. by Otari Corp. The primary reason for the purchase, according to Otari's marketing manager, John Carey, was expansion.

"Otari was looking to pursue a growth strategy within the professional audio market segment," he said. "That's very difficult to do in tape recorders any longer. Diversification of our product line was the most logical step for us to take." Carey added that the company had been looking at this move as a viable possibility for the past five to 10 years.

"We've always talked about it," he said. "Most of our competitors offer a mixing console product line. This purchase was a factor of Otari catching up with the times. It is not coincidental, however, that similar companies are seeking and finding buyers for their companies when times get a little tough."

The two purchased entities, according to Carey, have already been folded into Otari as part of the company's new Console Products Group. The manufacturing, design and final assembly of the products will take place in Plainview, NY, former home of Sound Design. Otari has assumed the factory lease and purchased all of the company's equipment.

Sales and marketing functions as well as customer service operations will be housed at Otari's offices in Foster City, CA.

In another significant merger, RTS Systems will be operated as a division of Telex, following the purchase of the intercom system supplier by the wireless mic manufacturer.

"RTS has always had a superior name in terms of the products they bring to market," said Telex president, Jeffrey Wetherell. "Telex, on the other hand, has a very strong manufacturing capability and extensive engineering expertise, particularly in the area of wireless communications. Based on our radio frequency expertise, we felt it probably made a lot of sense to combine the two operations."

RTS will continue to operate out of its Burbank facility.

And finally, Wold Communications—the company that pioneered the satellite transmission of syndicated television shows such as *Entertainment Tonight*—has been merged with Bonneville Communications.

The completed agreement signed by the two entities combines the assets and operations of both companies to result in a new entity, Keystone Communications. Keystone will continue operations in the cities where the two companies currently maintain offices. Salt Lake City will serve as the company's headquarters. ■

prise an ACTV system that can be put into operation." Toward that goal, NBC expects to begin rigorous field testing of ACTV production equipment in the fall. ■

NAB Cites RBOC Perils, Opportunities

Now that the seven-year ban has been lifted, AT&T is wasting no time getting into the business of providing information services. The company has reported the startup of an information package that will provide, among other things, interactive voice services.

Likewise, the Regional Bell Operating Companies are hoping to follow AT&T's lead into the information service business, and have petitioned the FCC for permission to do so.

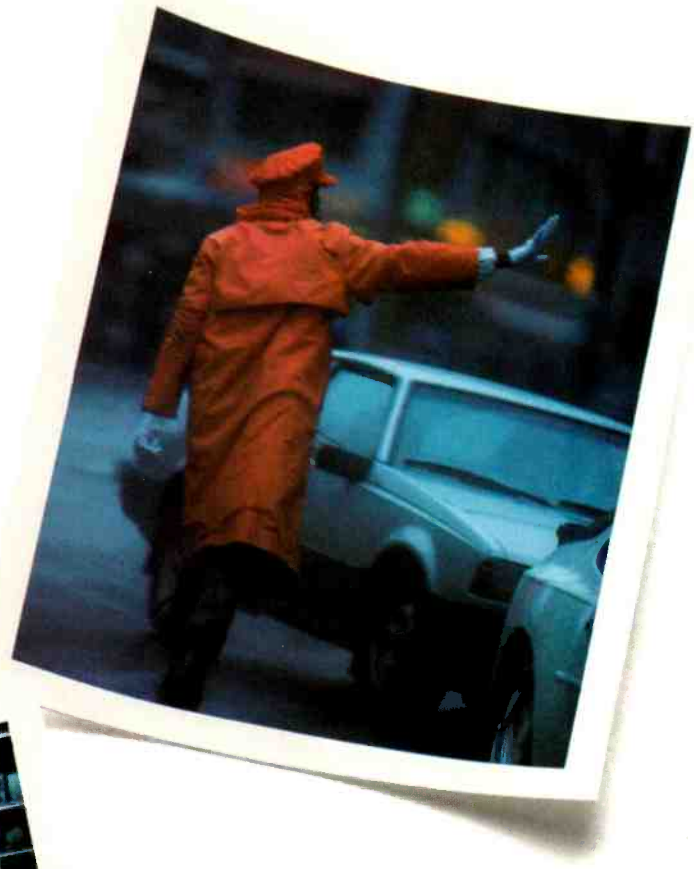
The NAB—in conjunction with eight other media groups—has asked an appellate court to affirm District of Columbia District Court Judge Harold Greene's decision not to lift the ban prohibiting the RBOCs from providing information services.

"The fact that the restriction barring AT&T from providing information services was lifted is quite a different matter," said John Abel, NAB executive vice president. "AT&T has a lot of competition—there are over 300 long distance carriers in this country—and the company doesn't provide services, beyond long distance, into the home. The RBOCs are asking for permission to extend the jurisdiction of their existing telephone company monopolies to include the ability to offer television programming in what amounts to an anti-competitive environment."

The NAB does not intend to restrict the telephone companies from the information business altogether and, in fact, looks favorably on the prospect of telephone companies overbuilding cable systems with their own broadband fiber plant.

"Broadcast programming would then have the chance to be carried on the cable's coax system, the fiber system owned by the telephone company or perhaps both," said Abel. "We could end up programming additional channels and charging subscribers through the telephone company system for these services—maybe HDTV service or others." ■

Directing Traffic In The Heart Of NYC.



Directing Traffic In The Heart Of NBC.

NBC/New York needed a routing switcher for the 1988 Summer Olympics that offered 9 levels of switching and 182,464 crosspoints. They chose 3M. Later, they needed a routing switcher for their Visa Graphics facility in New York. Once again, they chose 3M.

For over 25 years, we've been surpassing the standard in the broadcast equipment business. Before you commit to any routing system, large or small, call us at 1-800-328-1008.

We'll help you get where you're going.

Broadcast and Related Products Division

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New Plastic Derived from Silicon

By Robert Rivlin

Ever since they were discovered in the 1950s, plastics have been primarily the domain of carbon atoms linked in linear chains. Now, however, as the result of a three-year materials investigation project, scientists at the AT&T Bell Laboratories in Murray Hill, NJ have come up with a new plastic based on an irregular network of silicon atoms.

Called polysilymers, the new plastics differ from conventional plastics primarily in the structure of their atomic bonds. Most other polymers (plastics) have carbon in the backbone, while some have a combination of silicon and oxygen. The new plastics differ in having only silicon in their backbones.

Also, most other polymers have a linear structure, in which the backbone is essentially a zig-zag chain of atoms hitched together. But the new polymers have a backbone that is a branched network structure composed primarily of five-, six- and seven-membered silicon atom rings fused together.

This gives the polysilymers a very irregular structure. Further, the rings are not flat but puckered. Every bond angle is around 109 degrees; silicon favors this type of tetrahedral bond angle. So the new material is not a sheet, but a puckered assemblage of fused rings.

According to Timothy Weidman, the AT&T Bell Labs chemist responsible for the synthesis of the new material, polysilymers are made up of three silicon atoms bonded to a hydrogen atom and arranged as a ring, with the rings fusing together in an irregular network. The closest polymers previously had linear chains of silicon atoms each bearing two organic groups.

Weidman explains that the new plastic is formed by bombarding a solution of silicon with ultrasound waves. The resulting polymer is soluble and can be filtered through microfilters to remove any dust. The material is then used by spin-coating it onto a substrate. The plastic has no use other than as a thin film and is thermally unstable above 120 degrees C; it decomposes before it melts.

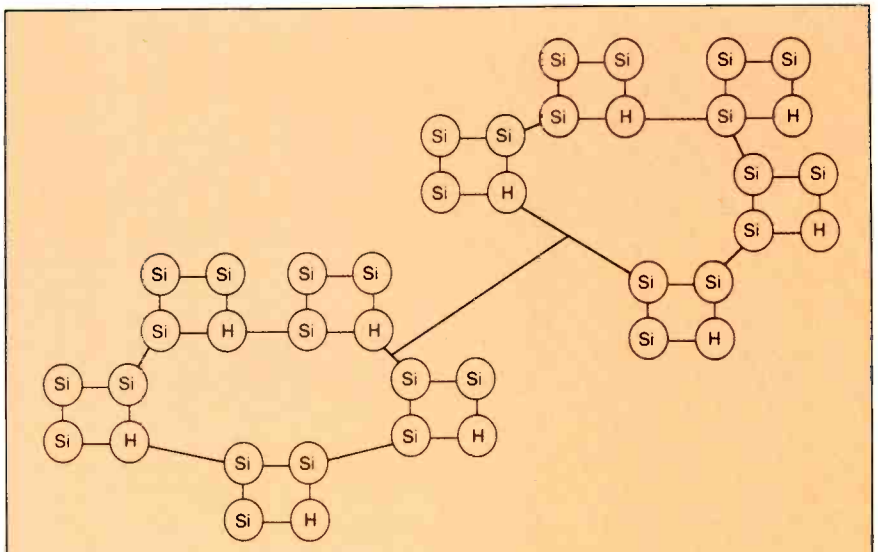


Figure 1. *Polysilymer is composed of groups of three silicon atoms bonded to one hydrogen atom, arranged in rings that are fused together in an irregular network.*

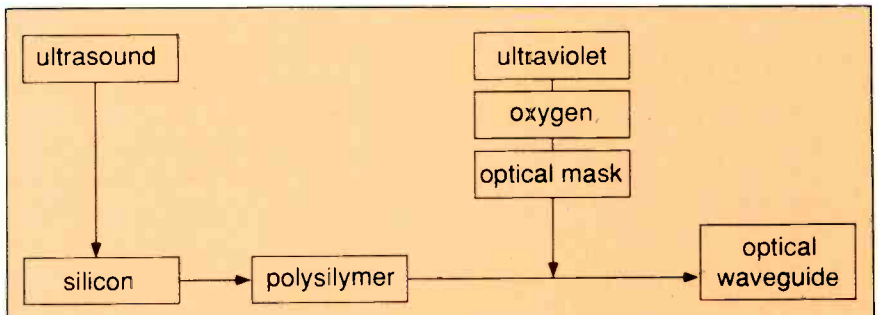
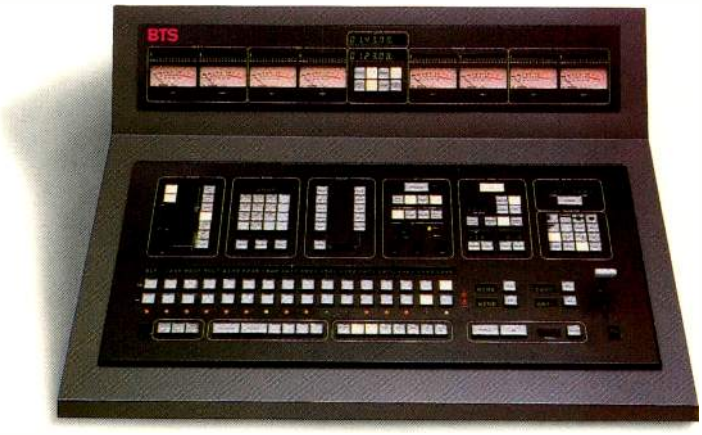


Figure 2. *To make a polysilymer optical waveguide, polysilymer is formed by exposing silicon to ultrasound. The resulting liquid is spin-coated onto quartz. It is then exposed to extremely high levels of ultraviolet light, causing oxygen in the air to fuse with the silicon atoms and lowering the refractive index of the plastic close to that of glass itself.*

Weidman is careful to stress that the new material is experimental in nature at this point, and may never see application in a commercial product, particularly because of its instability at relatively low temperatures. Already, however, the plastics are being used to explore a new technology for making optical waveguide

How to take control of a broadcast station.

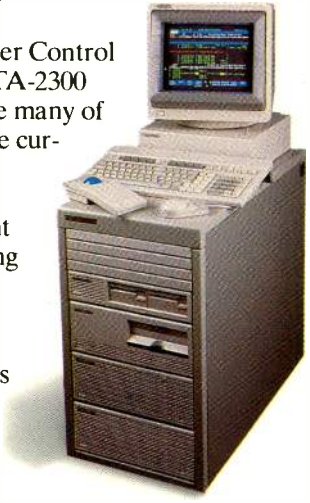


MCS-2000 Master Control Switcher

Go ahead, be ambitious. Controlling a broadcast station is no small potatoes, but these advanced products from BTS make it easy by giving you total control of all on-air programming from two workstations.

The MCS-2000 Master Control Switcher together with the BTA-2300 Automation System automate many of the routine operations that are currently handled by staff, which makes both your people *and* your equipment more efficient and productive. Computerizing your station also drastically reduces programming errors. Since that prevents make-goods, the system quickly pays for itself.

You simply pre-program the BTA-2300 Automation System to air all programs, station and commercial breaks exactly as you want, in real time. The Master Control Switcher accesses material from whatever sources you select: Betacarts, character generators, live feeds or satellite systems, for instance.



BTA-2300 Automation System

The MCS-2000 is user configurable, so you can select (and change) which buttons access which sources. Since it uses the existing outputs from the routing switcher, you don't need a second router. And its on-air bypass feature lets it serve as a simple production switcher if necessary.

The computer system is not only powerful, it's extremely flexible, allowing you to revise the program on a moment's notice. And there's no more reliable automation system available. Both products go through 100% computerized factory testing and have a 5-year warranty.

So take a controlling interest in the station. Find out more about the MCS-2000 Master Control Switcher and the BTA-2300 Automation System. For complete information and technical specifications, call BTS at **1-800-562-1136, ext. 33.**

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connections--channels that carry light pulses in much the same way as conventional connectors carry electricity.

"Optical connectors may have numerous advantages for high-density and high-speed transmission," says Larry Hornak, a Bell Labs scientist working on optical integrations strategies for integrated digital systems. "Polysilymers accelerate our research time by allowing optical waveguide structures to be prepared in minutes rather than days."

The use of the plastic in optical waveguides is made possible by sub-

Called polysilymers, the new plastics differ from conventional plastics primarily in the structure of their atomic bonds.

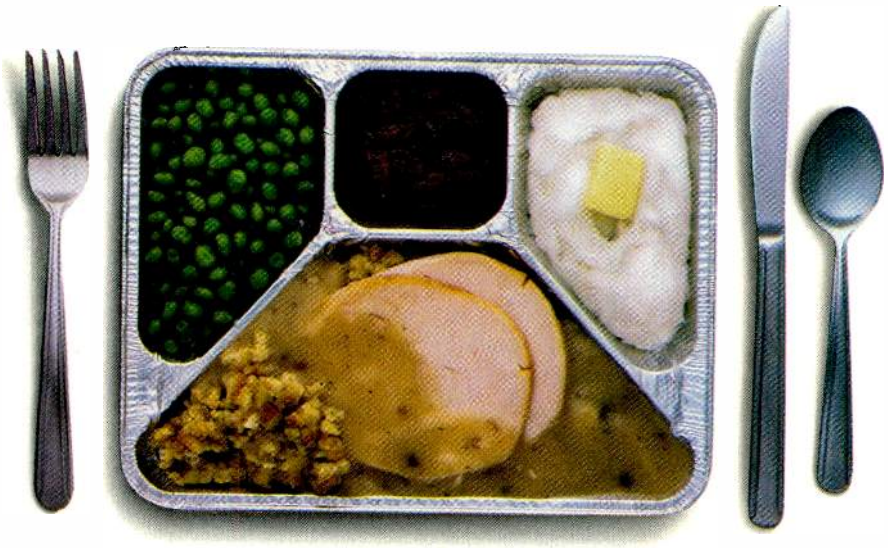
exposing the liquid polymer to oxygen in the presence of ultraviolet light. The resulting oxygen atoms picked up by the network cause the polymer to lower its initially high refractive index to a substantially lower index close to glass.

"When you put a light beam into an area of higher refractive index, the beam will stay in that area," explains Weidman. "Light will travel down a path of higher refractive index because it tends to bend back into itself. So by patterning the plastic by exposing it to the ultraviolet light through an optical mask, you can pattern the channels of higher refractive index in the polysilymer and use it as an optical waveguide."

Their special qualities also make the new plastics potentially attractive for applications such as optical computing and integrated optical signal processing.

"New materials and structures have always found unexpected applications as our understanding of what is new matures," observes Kumar Patel, the executive director of materials science research at Bell Labs. "New materials with unusual structures often have properties that will help give AT&T's products a competitive edge in the marketplace." ■

Rivlin is a freelance writer living in Katonah, NY. He was previously editor-in-chief of BME.



Tube Dinner

One of these revolutio the world looks at TV w

BTS did not invent the TV dinner. The Swanson® Company did.

But you'd be surprised at how many of the most revolutionary ideas in the history of video did come from BTS. In fact, because we look at things differently, the whole world looks at things differently.

We introduced the first 3-D computer animation system. The first CCD film scanner. The first software-based character generator. The B format for videotape recording. The modular routing switcher. And of course, the Plumbicon camera tube, for which we won one of our three Emmies.

BTS has been a technological innovator in the video industry for six decades. Our cameras,

Plumbicon Tube Camera

nary changes in the way as not invented by BTS.

switchers, videotape recorders and graphics equipment are among the best-engineered, highest quality and most reliable in the world. Our work in High Definition and CCD products is pacing an industry which faces the most sweeping technological advances since its beginning.

And we're as dedicated to better product service and support as we are to better products.

So although BTS may not yet be a household word, here's a word to the wise. In the years ahead, BTS will continue to be more forward thinking, more responsive and more innovative in our approach to video technology than anyone else.

Including the Swanson Company.

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THE CHALLENGERS:

SMALL FORMATS TAKE ON ENG

As the economics of broadcasting impinge on news programming decisions, some stations are taking a closer look at the new ENG contenders: S-VHS and Hi8.

BY TIM WETMORE

Times are hard in television. The realities of declining ratings, combined with the overall sluggish economy, are forcing broadcasters to make some hard economic decisions. There can be no argument that the broadcast business ain't what it used to be, and there are signs of it everywhere.

Some of the clearest signs are to be found in the news departments across the country. As ratings for the networks decline, alternative programming is entering the picture. News-oriented programming has become a popular vehicle for the networks and even some local stations. The attraction is twofold: Ratings are good, and it is cheaper to program say, a half-hour or an hour with news than it is to buy entertainment-type programming.

The economics do not, however, carry over to the equipment side of the news department. Less expensive equipment, as a rule, does not perform as well as more expensive hardware. Nevertheless, the news department is made up of various "stages," and the area of acquisition still offers some leeway in the evolution toward smaller, less-expensive formats.

It began in the early 1970s with the advent of ¾-inch U-Matic and has continued through the recent past with the "format wars" between the half-inch component analog formats of Betacam SP and MII. The struggle to shrink the hardware is continuing today as two new contenders, S-VHS and Hi8, grapple with each other to achieve a niche in the burgeoning news programming market. But can these small "prosumer" formats handle the rigors of broadcast news and measure up to the broadcast standard?

Actually, the contest has only just begun with the recent introduction of Sony's Hi8, an improved version of its existing 8 mm video format. The S-VHS format, available from Panasonic and JVC, has more of a track record. It has, in fact, already been used in several news departments across the country.

KOFY is an independent station in the San Francisco market that did not have a news department a year ago. In order to compete in the market, station management determined that the station needed to create a news department and put five ENG crews in the field. Starting from scratch, the economics of the situation dictated that they go with one of the smaller acquisition formats. They chose to go with S-VHS at startup.

The news program at KOFY has been on the air since October 1988. "We started news," says news director Chuck Snyder, "because it puts us in control of our own destiny in terms of program cost and how and when you air that program. Plus, if you can do several news shows, it's less expensive than programming that time slot with most other things. I guess the bottom line is that it's sold out and everyone says it looks good."

The overriding factor in a news startup for this kind of station, of course, is how cost-effective it can be. This requirement forced KOFY to consider the new acquisition formats as opposed to the more advanced Beta and MII products, though Snyder does not really believe they have compromised a lot to get their news program. "We have a standard studio news

setup with Ikegami HK-357s," he notes, "and everything goes to our two Ampex ACRs for airing after being dubbed from the S-VHS, though we do have an S-VHS deck available for 'hot' playback if something comes in really late." An NEC DVE with Optiflex is used for any special effects needs.

Although Snyder says viewers and advertisers have been happy with the results of the S-VHS equipment, the format has some inherent limitations. One particular area of weakness is editing. The five field crews at KOFY deliver tapes to three edit suites. Since the S-VHS machines can't generate SMPTE time code and don't have a specific time code track, visual cues are used by the anchors and tape counters are sometimes employed to locate cuts.

This can be risky since it isn't the most precise method for locating edit points, but it seems to be working for KOFY. Another method for editing on S-VHS is to use one of the audio tracks to record SMPTE time code. Here, too, there is an obstacle. S-VHS has four audio tracks, but two of them are interlaced with the video, so neither of those can be used to record time code. That leaves one of the two stereo tracks. Recording SMPTE here works, but eliminates the ability to produce in stereo.

When all is said and done, however, S-VHS appears to have been more of a blessing than a curse for KOFY. "We started out with five cameras and five decks plus three edit suites," declares Snyder, "and we couldn't have afforded to do that with Beta equipment for this kind of a startup. We are also saving space with tape storage, which may seem unimportant, but that is a big advantage. Beyond that, Panasonic will introduce dockable decks in September, but other than that slight limitation and a little hassle with the cables, we have had no complaints."

Snyder's final word on S-VHS: "Once they deliver dockables to us, we'll be in great shape. I don't think there is that much difference in picture quality as far as what is transmitted to the home. The normal viewer sees no difference between this and other formats. A trained eye with a scope will see something, and you are limited in the number of generations, but the casual viewer really can't tell."

This seems to be the dominant viewpoint among those stations using S-VHS. In the Midwest, another pair of stations has taken the plunge to using S-VHS, but primarily for commercial playback. KCCO in Alexandria, MN, is a satellite station of WCCO in Minneapolis; KCCW, channel 12 in Walker, MN, is, in turn, a satellite of KCCO.

Programming, commercials and news flow from WCCO to KCCO to KCCW, though the two satellites inject their own locally originated commercials and news, with KCCO acting as the dissemination point. This is where S-VHS enters the picture.

Local advertising buys for KCCW, whether or not they are produced at KCCW, are sent from the S-VHS commercial playback system at KCCO. All commercials, even those returned to KCCO by hand delivery or by microwave from KCCW, are put into the S-VHS "sequenced" playback system before being fed down the line to KCCW. This is necessary to coordinate all feeds that end up at KCCW since any particular feed may originate at any of the three stations.

KCCO operates its own news department, which still uses U-Matic because of the quality and the time code capability. The local newscast from KCCO, along with live cut-ins from WCCO in Minneapolis are, in turn, fed down the line to KCCW. Commercials originate from WCCO and KCCO, with the KCCO spots originating on the eight AG-7500 S-VHS decks tied to the "sequencing" system at the station.

The sequencer is a simple automation system along the lines of an operator assist system. Chief engi-

Pat Driscoll of KCCO/KCCW enters data into the station's S-VHS control system.

HOW THEY STACK UP: COMPARING THE SMALL FORMATS

	S-VHS	Hi8	U-matic	U-matic SP
H Resolution				
Monochrome	400 lines	>400 lines	340 lines	340 lines (SP mode)
Color	400 lines	>400 lines	240 lines	340 lines (SP mode)
Video S/N				
Monochrome	47 dB	>45 dB	>48 dB	>49 dB
Color	46 dB	N/A	>46 dB	>47 dB
Audio S/N	48 dB (with Dolby NR on)	N/A	>48 dB (at 3% THD)	>72 dB (at 3% THD, with Dolby NR)
Audio Freq. Response	Normal: 50 Hz-12 kHz Hi-Fi: 20 Hz-20 kHz	AFM: 30 Hz - 15 kHz PCM: 20 Hz-15 kHz	50 Hz-15 kHz	50 Hz-15 kHz
Video Inputs	Video In (BNC): 1.0 V p-p, 75 ohm unbalanced S-Video In (4P): Y: 1.0 V p-p, 75 ohm unbalanced C: 0.286 V p-p, 75 ohm unbalanced Dub (7P): C: 0.9 V p-p, 1k ohm unbalanced Y: 1.0 V p-p, 1k ohm unbalanced	NTSC composite video, 1.0 V p-p ±0.1 V sync negative, 75ohms unbalanced	Video In (BNCx2): 1.0 V +11.0/-0.5V p-p, 75 ohm unbalanced, sync negative Dub In: 7-pin connector TV In: 8-pin connector	Video In (BNC): 1.0 V +11.0/-0.5V p-p, 75 ohm unbalanced, sync negative Dub In: 7-pin connector TV In: 8-pin connector
Video Outputs	TV Monitor: 1.0 V p-p, 75 ohm unbalanced Video Out: 1.0 V p-p, 75 ohm unbalanced S-Video Out: Y: 1.0 V p-p, 75 ohm unbalanced C: 0.286 V p-p, 75 ohm unbalanced Dub Out: C: 0.9 V p-p, 1k ohm unbalanced Y: 1.0 V p-p, 1k ohm unbalanced	NTSC composite video, 1.0 V p-p ±0.1 V 75 ohms unbalanced Dub output: 7-pin X 1	Video Out (BNC): 1.0 V, ±0.2 V p-p, sync negative, 75 ohm unbalanced Dub Out: 7-pin connector TV Out: 8-pin connector	Video Out (BNC): 1.0 V, ±0.2 V p-p, 75 ohm unbalanced sync negative Dub Out: 7-pin connector TV Out: 8-pin connector
Audio Inputs	Mic: CH1/CH2, -80 dBV, 4.7k ohm unbalanced Line In: Normal CH1/CH2 Hi-Fi: CH1/CH2	Mic: -60 dB, 3k ohm unbalanced Line +4dB, 10k ohms, balanced	Mic: CH1/CH2, -60 dB, 600 ohm Line In: CH1/CH2 Dub In: 7-pin connector	CH1 & CH2, XLR connectors, switchable HIGH and LOW Mic (LOW): -60 dB, 3k ohms, balanced Line (HIGH): 4 dB, 10k ohms/600 ohms, balanced Dub In: 7-pin connector
Power Requirements	120 V ac, 50/60 Hz	100-120 V ac, 50/60 Hz	120 V ac, 50/60 Hz	90-132 V ac, 48-64 Hz
Power Consumption	100 W	44 W	75 W	160 W

Note: Specifications are for representative professional recorders of each format, as follows: Hi8, Sony EVO-9800; S-VHS, Panasonic AG-7500A; U-matic, Sony VO-5800; U-matic SP, Sony BVU-950.

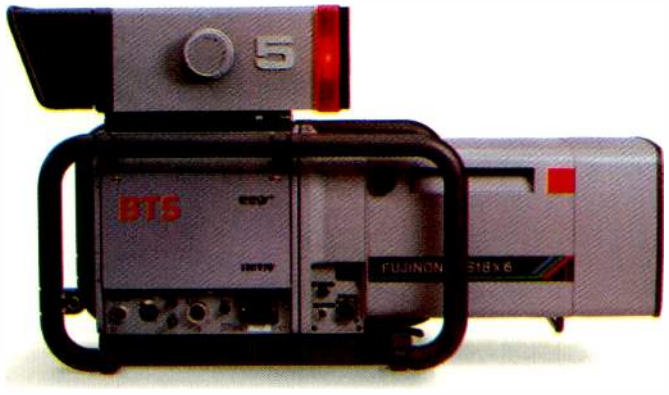
***Table 1.** Comparison of key specifications for S-VHS, Hi8, U-matic and Betacam formats.*

neer Wayne Quernemoen explains, "We need a live operator because of the indeterminate nature of cut-ins and unexpected feeds." The sequencer system uses a small computer with an interface box communicating with the tape machines, cueing them up through a data track, and a printer that logs the breaks. The system also has a schedule editing unit for modifying that log.

Since KCCO airs material, juxtaposed during a broadcast, that has originated on Beta, U-Matic, S-VHS and sometimes even other formats, do people complain? "I don't think the average viewer notices the difference in format," Quernemoen says. "No advertiser has commented or noticed, nor have we had any negative input from viewers."

Nevertheless, some are bothered by the inability of the format to handle time code with ease. Sony addressed this need in its introduction of the Hi8 video format, which offers SMPTE time code capability.

Everything you always wanted in a tube camera. Except tubes.



LDK 910 CCD Studio Camera

What you've always wanted in a tube camera is the best picture possible. But now you get the best picture in a CCD Camera — the new BTS LDK 910. And you'll never miss the tubes. Because the LDK 910 meets or beats the picture quality of tube cameras with a new CCD sensor that employs over 800 pixels per line, and over 406,000 total picture elements.

LDK 91 CCD Portable Camera

In addition to excellent resolution, the LDK 910 has a high signal-to-noise ratio, high sensitivity and accurate colorimetry. Along with a few other things you don't get with tubes. Such as BTS's frame-transfer technology, which eliminates smear. A high dynamic contrast range without blooming or burn-in. And excellent dynamic resolution enhanced by advanced electronic shutter control. It's also ready to shoot when you are — no waiting for warm up.

And here's another reason you won't miss the missing tubes. Not only is the LDK 910 priced competitively with tube cameras, but it costs less than you'd probably spend replacing worn out tubes over the life of a studio camera.

But of course, big ideas also come in small packages. The LDK 91, a lightweight, easy-to-handle ENG/EFP camera, is the LDK 910's portable companion. Singled out by *Broadcast Engineering* magazine as one of the ten "Pick Hits" of NAB '89, it has the same CCD sensor and the same top picture quality as the LDK 910.

Together, these fully compatible CCD cameras will make your old ideas about picture quality go right down the tubes. For complete information and technical specifications on the new LDK 910 and LDK 91, call BTS at **1 800-562-1136, ext. 13.**

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One user, Scholastic Video, which uses the Hi8 system to produce video yearbooks, made the move precisely for that reason. "We chose the Hi8 because of the time code capability, which S-VHS didn't have. Due to the extensive edits necessary in this kind of operation, we really had to have the time code," states co-owner Marty Allen. Based in Exton, PA, Scholastic Video recently purchased more than a quarter-million dollars' worth of Hi8 gear.

Music, graphics (generated on a Commodore Amiga PC) and effects for the video yearbooks are added to the raw footage during the final edit. The final edit, emanating from one of two edit suites, is then mastered onto a U-Matic deck with a direct dub, and then dubbed down to VHS for sale to parents who want a video yearbook of their children's time in school.

Sony has positioned its Hi8 8 mm format as an acquisition format for U-matic users and for professional videographers of various descriptions who require time code capability for precision editing. This makes the format potentially attractive for use as an acquisition format by broadcast ENG stringers, especially since most of the other small formats do not offer time code capability. During the recent pro-democracy uprisings in Beijing, NBC News used Sony's regular 8 mm video format to shoot in China due to its portability and the ease with which it could be concealed. The new Hi8 format offers those advantages in addition to more professional features.

Two central elements of the Hi8 system make it viable for use as a news acquisition format of the many products that make up the overall system. The first important part of the system is the EVO-9100 camcorder, which is equipped with a built-in time code generator. Since the proprietary 8 mm time code is recorded on a data track between the video and PCM audio tracks on each video track, each frame of video can be precisely located with no compromise to any recorded material or capabilities of the system.

In a typical system, the Hi8 cassette can be used in a 1:1 cut edit system consisting of the EVO-9800 feeder/recorder (the second important element in the system and the one that makes this a professional-level system), the RM-450 controller and a U-Matic editing deck such as the VO-9850. The EVO-9800 feeder, which offers over 400 TV lines of resolution, converts the 8 mm time code generated by the camcorder to an RS-422 serial interface SMPTE time code. This is output through a nine-pin connector for interface to other units in the system.

It should be noted that the EVO-9100 camcorder has a time code readout right on the camera, for very precise monitoring of the taping process. Additional system versatility is provided by the EVV-9000 dockable Hi8 deck, which connects to Sony's DXC-325 three-CCD camera, making it suitable for existing acquisition operations using that camera.

In these small formats, however, questions always remain concerning the quality of the images, especially when broadcast applications are being mentioned. Sony has expanded resolution beyond its 8 mm format by increasing the luminance FM carrier frequency and deviation, resulting in improved luminance horizontal resolution to more than 400 TV lines. Improvement in the video S/N is also evident.

Metal evaporated (ME) and metal particulate (MP) tape are used interchangeably in the system. Standard 8 mm video tapes may also be used to record or play back on a Hi8 system. The system is automatically activated for the tape formula through detection holes in the cassette shell. During playback, the EVO-9100 camcorder detects the mode in which the recording was made and selects the corresponding playback mode.

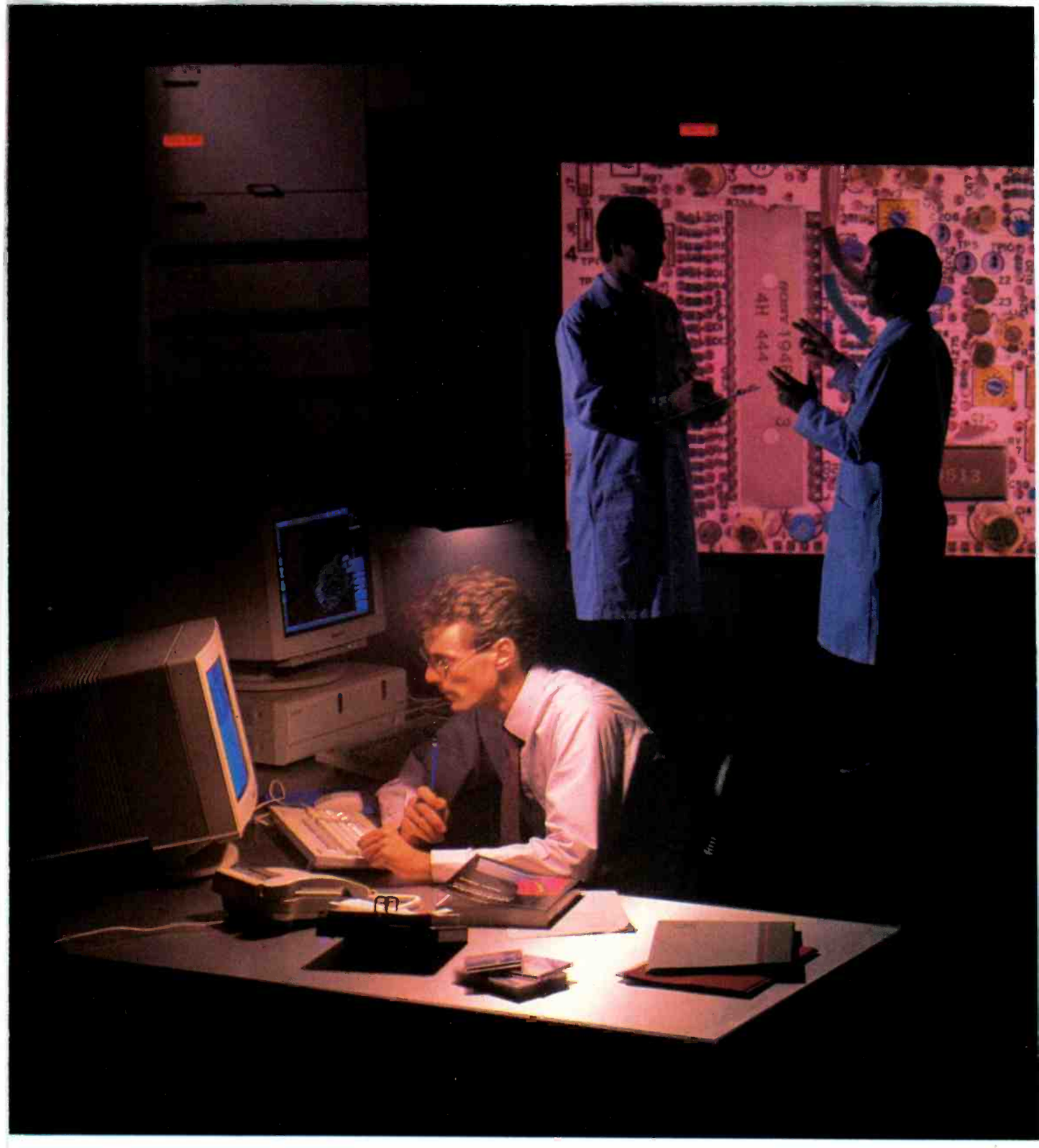
The EVO-9800 provides a jog/shuttle dial for picture search within -17 to 19 times normal speed and frame by frame search and clear still picture. The feeder/recorder also has built-in chroma noise reduction and field memory; the digital process chroma NR can be bypassed or put into auto mode. With its U-Matic dub out connector as a critical interface feature, the system also converts chrominance signals from 743 kHz to 688 kHz, so direct dubbing to U-Matic VCRs is possible. Finally, two channels of PCM digital audio with a dynamic range of 80 dB are part of the package, along with an AFM monaural channel. It also features a built-in, switchable audio limiter.

As far as applications are concerned, only a few Hi8 systems are in the field, since it was just introduced. Scholastic Video reports it is keeping its facility very busy. They operate by supplying the video equipment to the schools for the students to shoot with; after the third year, the equipment belongs to the school.

Since the shooting is in the hands of the students, the time code capability becomes necessary for subsequent editing at a different facility. And though the time code is now used mainly to locate shots and edit points, more sophisticated uses of SMPTE are planned for the system as Scholastic gains experience with it. ■

Any one of KCCO/KCCW's seven S-VHS decks (one not shown) can be fed into either of two program lines. Chief engineer Pat Driscoll loads a machine in preparation for spot play.

THIS IS NOT THE MOST IMPORTANT ADVANCE IN BROADCAST OPERATIONS.



The key to successful station operation is more than hardware.

It's people. Sony people. Designers and engineers who understand the real problems of integrating a new system into your station.

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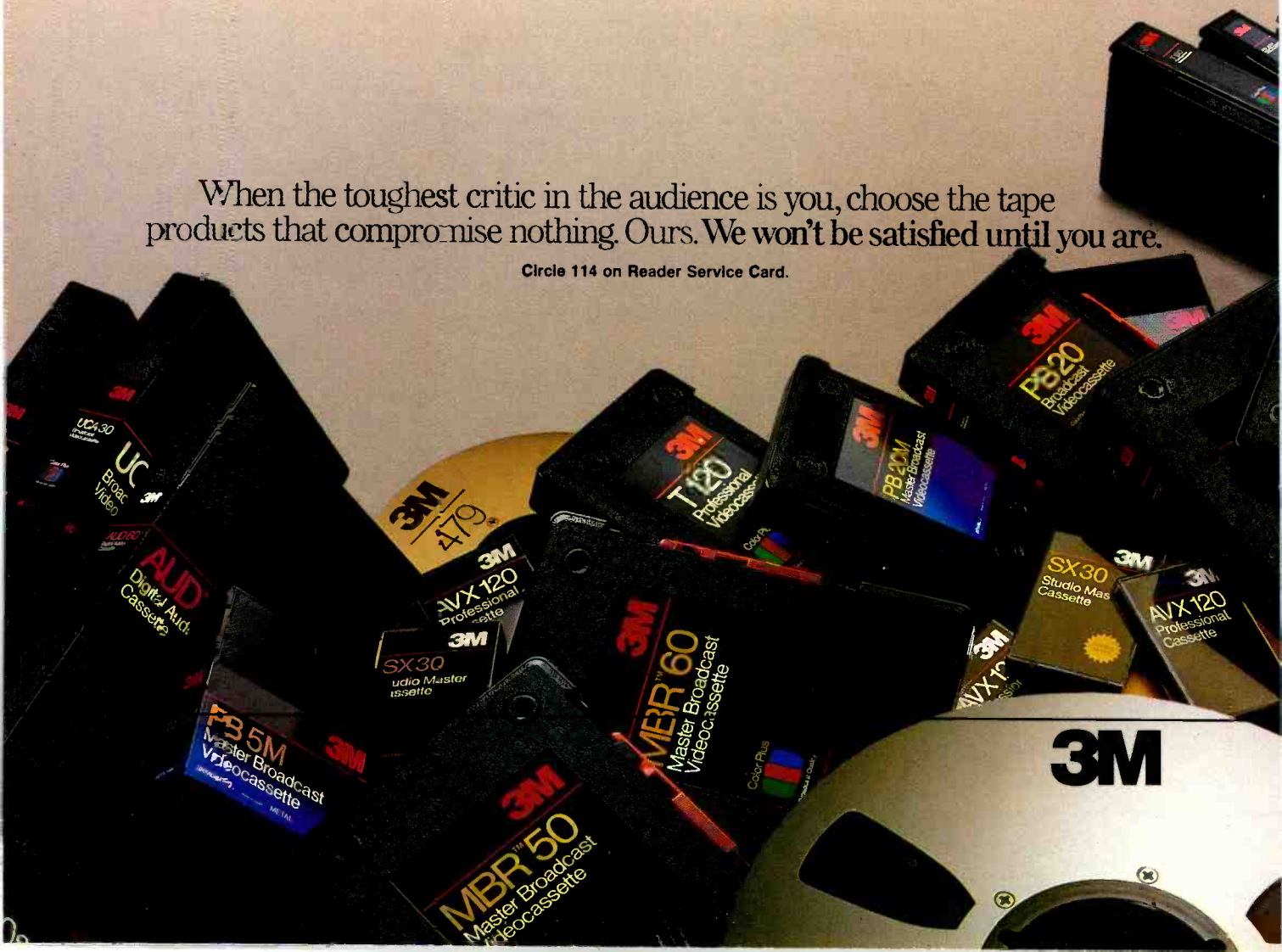

WILL THE REAL STEREO PLEASE STAND UP?

BY RICK CHACE

In 1953, William B. Snow offered the following definition of "stereophonic" to the SMPTE[1]:

> "A system employing two or more microphones spaced in front of a pickup area [stereo microphone pairs], connected by independent amplifying channels to two or more loudspeakers spaced in front of a listening area. This creates the illusion of sounds having direction and depth in the area between the loudspeakers."

We have added the expression "stereo microphone pairs" to clarify Snow's concept of a system employing two or more microphones spaced in front of a pickup area.

In discussing stereo sound, we encounter large differences of opinion regarding what television audiences consider to be "real" stereo. But as we shall see, almost none of the stereo techniques used today can be considered "real" according to William Snow's classic definition. Because nearly all stereo broadcast by the network, independent, and cable stations around the country is "simulated," we need to make distinctions between *good* simulations and those that are less artistic. Simulating stereo is akin to performing magic: Do it

TV audiences are becoming used to high-quality pictures. Why can't the sound of stereo TV match the visuals?

well, and you have an appreciative audience that believes the magic; do it poorly and it pleases no one.

I feel there is a need for education and change. Broadcasters and their audiences need to know more about the differences between real and simulated stereo; what can be expected from each; and what must be done to maintain the integrity of stereo from production to the final stereo TV broadcast. Because of the excitement that genuine stereo brings to TV productions, it's a shame that creative television mixing techniques may "fade to black" as processed mono passes for genuine stereo.

Operator Paul Martin uses the proprietary CSS processing system to prepare realistic dynamic dialog and effects plus stereo ambiance recreation for the soundtrack of a workprint.

This article will attempt to shed some light onto the various stereo technologies and, in doing so, possibly help put more *stereo* into stereo TV.

Stereo TV stations face some difficult choices. They have invested in stereo transmitters and distribution hardware, but lack sufficient stereo material to fill a broadcast day. The easy solution seems to be to tickle that stereo light at home no matter what, even if it means putting on fake-sounding stereo. Because some stations don't make a distinction between real and fake—and broadcast comb-filtered mono most of the time—viewers may think that stereo TV isn't very good, and possibly even a ripoff. Worse, automatic comb filters, which supposedly switch in and out with some intelligence in the presence of real stereo source material, have significant potential for corrupting good stereo.

No matter how much skill and care is put into a stereo mix to make it entertaining, it must still find its way to the home viewer through the local TV station. Left and right channels must be properly placed, the comb filter box must switch itself out, and real source stereo must actually be broadcast in stereo. The TV station can correct inadvertent channel reversals that may have occurred anywhere in the production chain before the program arrives at the station. This is a new challenge to TV broadcasters. With real directional stereo, the picture dictates where the sound should be, a situation that requires more attention be paid to sound when real stereo source material is aired. The odds are 50-50 that channels will be reversed.

We believe that the broadcast industry *wants* to make stereo work. Comb filtering has served its purpose; it is time to remove the comb filter, fake-stereo boxes that give viewers and advertisers the wrong impression about stereo TV. If stations want to increase audience share and attract advertisers' dollars with stereo, it is imperative they rise to the challenge of true directional stereo broadcasting. This can be achieved as follows:

- Purchasing, promoting, and broadcasting real directional stereo source material.
- Keeping left and right channels correct on the air.
- Listening critically to the stereo that comes into the station.
- Rejecting comb-filtered mono either in-house or from outside program suppliers.
- Looking for, and supporting, stereo mixing techniques that will enhance stereo TV excitement, ratings and revenue.

Let's review some of the primary technical features of the commonly encountered stereo techniques available to the broadcaster.

Theatrical Stereo. Contrary to popular belief, the two-channel theatrical stereo system is a recording *format*, not a stereo recording or mixing technique. It is an ingenious and reliable solution for delivering four independent audio channels (left, center, right and surround) to movie theaters in a durable, compatible and standardized way. However, theatrical stereo is not a technique for add-

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ing or generating *new* acoustic or directional information. It does not refer to the subjective reality of stereophonic effects, nor to the art or effectiveness of a stereo mix, factors that are dependent on the skill of sound editors and re-recording mixers.

Because theatrical stereo's 4:2:4 matrix encoding is often used to produce very good mixes, many people think that the result is "real stereo." With rare exceptions, however, theatrical stereo mixes are not created using stereo microphone pairs; instead, they are simulated from multiple monaural soundtracks. Although sound effects in these mixes sometimes have directionality and depth, dialog does not and is almost 100 percent monaural.

One of Chace Productions' conform and layback suites.

When theatrical stereo mixes are broadcast via stereo TV, they often lose much of their impact due to closely spaced TV speakers. Theatrical stereo is optimized for theatrical playback, not stereo TV playback.

Comb-filtered pseudo-stereo is created from mono sources. Because it lacks directionality and depth cues, nobody would ever mistake comb-filtered pseudo-stereo for real stereo, yet this is exactly the format broadcast by many stereo TV stations. Comb filtering sounds artificial on voices; since most TV sound is dialog, program material ends up sounding flat and uninteresting. Comb-filtered pseudo-stereo fails Snow's definition of "stereophonic" and translates poorly through surround-sound decoders.

Re-channeled stereo is a technique that was used in the record business during the 1960s. Generally, it involves putting midrange frequencies into either the left- or right-hand channel, and bass and treble minus midrange into the other. The end result is that vocalists appear to be coming from one side of a stereo mix. Like comb filtering, re-channeled stereo fails all tests for stereo. (The term is sometimes still used to describe comb-filtered pseudo-stereo, and other fixed-field simulations.)

Network stereo. The minimum requirement for a network TV show to qualify as stereo is stereo music; dialog and sound effects are mostly center-panned mono. Some of the better-mixed network shows include panned sound effects, but generally the rigors and deadlines of TV mixing prohibit the inclusion of much directional information for sound effects.

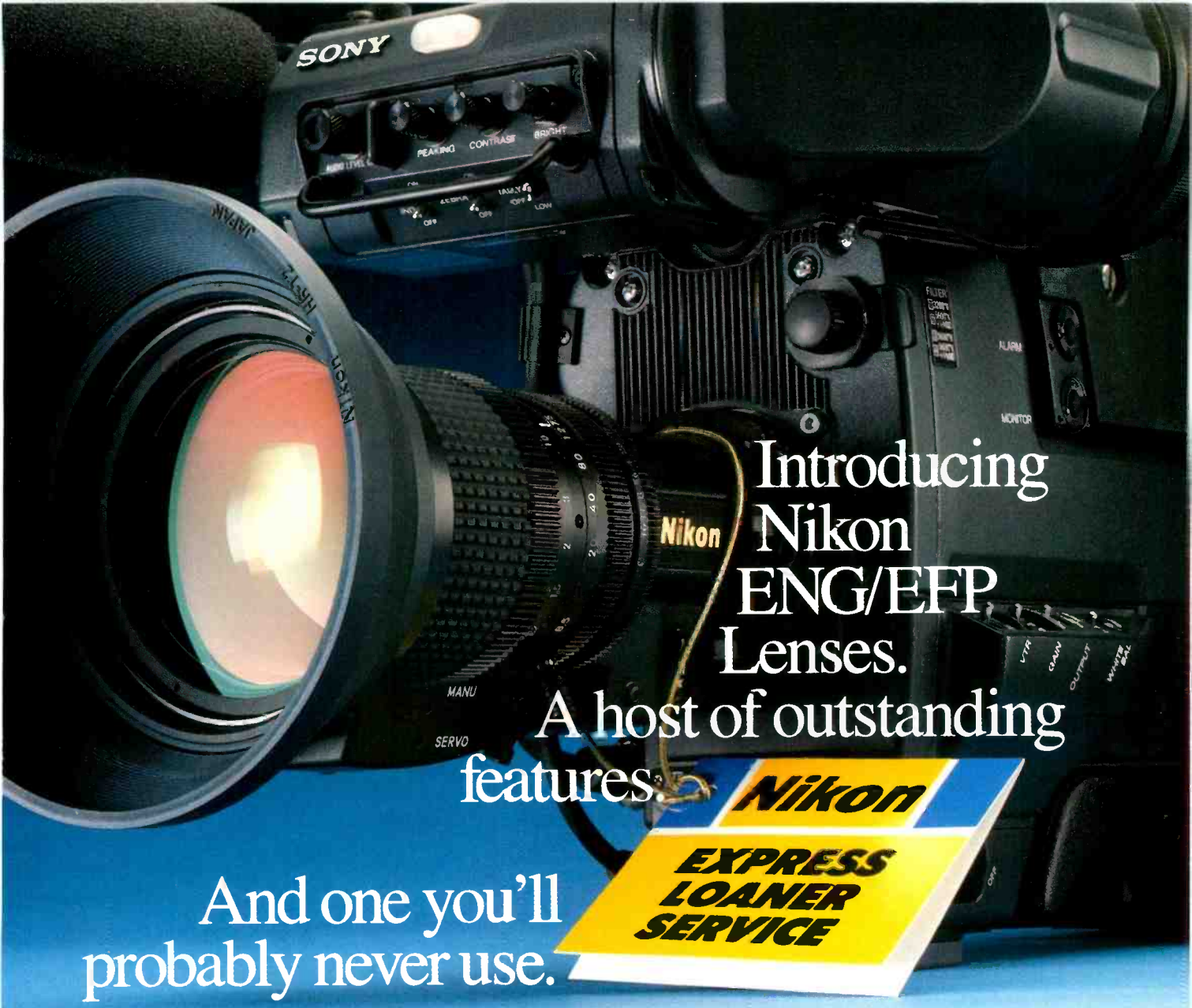
Many broadcasters consider "stereo music" to be "real stereo." But, with occasional exceptions, these music elements were *not* recorded with stereo microphone pairs. Instead, they are usually recorded with isolated microphones, each going to a single channel of a multitrack recorder to be mixed into stereo later. These multiple mono tracks are often recorded in separate passes, not simultaneously.

The following excerpt from the *AES Journal*[2] explains the overwhelming popularity of multi-mono-track recording:

> "Using the multitrack recording technique, the precise placement of the different musical instruments is unnecessary. The engineer can arrange the various sections in any configuration he [sic] desires. He then proceeds to record each section on a separate track of the magnetic tape. During the subsequent re-recording procedure, he can re-balance, equalize and add reverberation as necessary. *The re-recording procedure actually affords him a second opportunity to achieve nearly perfect results.*"

With the opportunity to achieve near-perfect results using multitrack techniques, it is no wonder that recording engineers choose to simulate stereo from multiple monaural tracks.

Almost all stereo we hear today, including theatrical stereo, is simulated from multiple monaural



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sources. Almost no stereo is recorded using stereo microphone pairs. It is easier and more exciting to create stereo artificially. Although some may call it "real," it is "simulated" or "pseudo-stereo" according to the SMPTE definition.

I would propose the following new definition for "stereo," which relies more on the perception of directionality and depth than on recording techniques. It is more in keeping with the modern practice of simulating real-sounding stereo from multitrack monaural sources. My definition runs as follows:

> "A sound field generated by two or more loudspeakers in which a listener can discretely perceive one or many apparent sound sources with correct, precise, and realistic directionality, distance, and depth characteristics."

When using the expression "stereophonic" for recordings that did not involve the use of stereo microphone pairs, we need to take into account how real the simulation *sounds*. Thus, if it sounds real, we call it "real stereo." We have been doing this for years anyway, so we are simply conforming a new definition to the *de facto* real stereo we perceive.

We believe that the industry needs to acknowledge this new definition of stereo, or notice that, by the classic definition, *all* stereo that is not recorded with stereo microphone pairs is "simulated."

Chace Surround Stereo (CSS) represents a new way of generating acoustic and directional information to provide more stereo than any other mixing technique today. Using patented, computer-controlled technology, CSS accurately places dialog and sound effects into positions between the loudspeakers that correspond to the on-screen visuals. Because of this full-time directional stereo sound, CSS greatly enhances realism on any stereo TV.

In its simplest terms, the proprietary CSS process involves replaying the mono soundtrack, which usually comprises discrete DME elements from the original film re-recording process, but which could be composite mono or magnetic track. Then, while an operator views a workprint to determine the various visual perspec-

tives, a sequence of dynamic moves of the dialog and effects material is developed in the off-line mastering studio. The process involves developing complementary stereo ambiances for backgrounds and music tracks. In this way, foreground dialog and effects can be caused to move across a stereo soundstage of music and general ambiance material.

As with theatrical stereo formats such as Dolby stereo, CSS contains a matrix-encoded surround channel. Viewers with surround decoders will hear surround sound at appropriate times in the mix; viewers without surround decoders will hear directional stereo all the time with an additional surround "effect." Chace Surround Stereo is mixed for speakers that have been placed at the sides of the screen. Viewers with small sets may want to move their speakers further apart.

Unlike other stereo mixing techniques that retain mono dialog, CSS dialog (and sound effects) move naturally according to the picture. Unlike theatrical stereo mixing techniques that are optimized for much wider-spaced speakers used in movie houses, CSS mixes are optimized to be effective on closely spaced stereo TV speakers, making it the first system to directly address the stereo TV market. CSS requires no modification to an existing stereo transmitter and distribution system, nor does it cause any transmission problems.

Good stereo is in the ear of the beholder. A uniform industry understanding about real and simulated will put Chace Surround Stereo in its proper perspective. Today's stereo TV market needs a lot of good stereo *now*. Misunderstandings about real and simulated seem to be holding back the market. I hope these discussions will pave the way for improvements in stereo TV entertainment. ■

Chace is president of Chace Productions, Inc., a Hollywood, CA-based post-production facility.

Footnotes:

1 *"Basic Principles of Stereophonic Sound," William B. Snow,* SMPTE, *October 5, 1953.*

2 *"Multichannel Recording for Mastering Purposes," Mort Fujii et al,* AES Journal, *October 1960.*

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SBE CONVENTION MARKS SILVER ANNIVERSARY

Twenty-five years old and growing, the Society of Broadcast Engineers will celebrate its silver anniversary in conjunction with its 1989 annual National Convention, October 5-8, at the Kansas City Convention Center.

In addition to an impressive list of exhibitors, the convention will offer an information-packed technical program. A special feature of this year's convention will be the Ennes Engineering Workshops, offered in cooperation with major manufacturers. These manufacturer-conducted, hands-on training sessions will provide factory training on key pieces of broadcast equipment. Additional sessions will focus on the latest developments in RF transmission systems, satellite uplinking, HDTV, engineer licensing and new FCC regulations. A seminar on worker safety is also on tap.

SBE's twenty-fifth anniversary party will be a highlight of the 1989 convention. The festivities will start with a reception for SBE members and their spouses, followed by a formal dinner for members and representatives from other professional organizations. The evening will end with an SBE birthday party, complete with presents. The reception, dinner and party will be held at the Allis Plaza Hotel, across the street from the Convention Center.

Here's what's in store for engineers attending the 1989 SBE Convention:

Wednesday, October 4

Ennes Engineering Workshops

Grass Valley Group: Dubner Graphics Factory

Workshop #1: System overview.

Workshop #2: A user's workshop designed to introduce Graphics Factory operators to software design features.

Harris Broadcast: Using Solid-State Devices

An examination of the use of semiconductors in radio and TV transmission equipment.

Sony Broadcast: D-2 Technology

This session will compare the operational features and applications of D-2, Type C and D-1 for broadcast and production facilities. Hands-on machine operation will be provided.

Broadcast Electronics: New FM Exciter

A covers-off examination of the new FX50 FM exciter.

Mitchell Vo-Technical School: Satellite Communications

A comprehensive seminar on key aspects of satellite communications. Instructors will be on hand from GTE Spacenet, Midwest Communications, Tektronix and MVTS.

Ampex Corp.: Details to be announced

Factory training on Ampex broadcast equipment.

Radio Antenna Systems Seminar (coordinated by Don Markley)

A study of antenna systems from the ground up. Markley will be assisted by Ralph Evans III (Evans Associates Consulting Engineering Services), John Sadler (FCC) and Gaeza DiEnes (Andrew Corp.).

Management for Engineers (coordinated by the Cupka Corp.)

How to survive and prosper in the rapidly changing field of broadcasting.

Thursday, October 5, 1989

Morning session: The Regulation Front

Conference Opening and Welcome Jack McKain, SBE President

Telco: Friend or Foe? Daniel Collins, Bell Communications Research

The State of the Broadcast Industry Wallace Johnson, Moffett, Larson and Johnson

NAB Looks Toward the Future Michael Rau, NAB

What Now, FCC? (presenter to be named)

Communications Technology Roundtable Michael Rau, NAB; John Battison, SBE; Jack McKain, SBE; Wally Johnson, consultant.

Afternoon Session: Broadcast Technology

Automation, Plain and Simple H. Stalnaker, VP Engineering, KEZQ, Little Rock

Using PCs in Broadcasting Ben Evans, Evans Associates

Developing Computer-Aided DA Patterns on a PC Dave Matthews, CE, WMNI, Columbus

Complementing EBS with a Direct Warning System Troy Langhan, CE, KQMJ-FM, Tulsa

Preparing for Natural Disasters (presenter to be named)

FCC Roundtable Coordinator: John Battison. Keith Larson, Robert Greenberg, John Sadler, FCC.

5:00 p.m.

SBE Membership Meeting

6:00-8:00 p.m.

Attendee reception in exhibit hall

Night Owl Session: Audio Processing

Audio Processing Panel Discussion John Bisset, Delta Electronics (other panel members to be announced)

Friday, October 6, 1989

Morning Radio Session: New Technology for Radio, Part 1

Noise-Free Radio: A New Concept George Yazell, consultant

FMX Status Report Tom Keller, Broadcast Technology Partners

AM and FM Boosters, Translators and Slave Stations Ralph Evans, consulting engineer

The Status of NRSC-FM John Bissett, Delta Electronics

Morning Television Session: Advanced Television Systems

HDTV Status Report Ben Crutchfield, ATTC

Testing Advanced TV Systems Charles Rhodes, ATTC (tentative)

HDTV Standards: Is There Any Hope?

(presenter to be named)
Competing With Cable and the Phone Company Steven Bonica, NBC
10:00 a.m.-3:00 p.m.
Exhibit floor open
10:00 a.m.
Chapter Chairmen Meeting

Afternoon Radio Session: New Technology for Radio, Part 2
Solid State Transmission Systems Bob Weirather, Harris Corp.
High Fidelity 76kHz SCA Tim McCartney, Chief Engineer, KBSU
Do You Know Where Your Signal is Going? Bob Richards, Dataworld
New FM Processing Methods Robert Greenberg, FCC
Stump the Experts Chairman: Mike Patton, Patton Circuit Systems. Carl Lahm, P.E., consulting engineer; Dave Chenowith, Continental Electronics

Afternoon Television Session: Digital Technology
Digital Recording Technology: An Overview (presenter to be named)
Digital Graphics Systems Philip Malkin, Time Arts
Interfacing Digital Hardware (presenter to be named)
Digital Troubleshooting for Bozos (presenter to be named)
Digital Format Conversion Christian Tremblay, Central Dynamics
High-Speed Digital Communications Gerry Kaufhold, SGS-Thomson Microelectronics
6:00 p.m.
Ham Radio Reception

Night Owl Session: Engineer Licensing
A group discussion coordinated by Chris Imaly. Bob Van Buhler, SBE; Dane Erickson, Hammett & Edison (other panel members to be selected)

Saturday, October 7, 1989

Morning Radio Session: Radio Transmission
Transmission Lines and Waveguide Dane Ericksen, Hammett & Edison
Dealing With Negative Towers Jerry Westberg, Westberg Consulting
Optimum Bandwidth for FM Transmission Ed Anthony, Broadcast Electronics
100 Percent Digital Generation of FM Baseband Signals Bill Gillman, Gentner Electronics

Morning Television Session: TV Transmission
Advanced Klystrode-Equipped Transmitters Nat Ostroff, Comark
MSDC Klystron Progress Report Earl McCune, Varian Associates
Using Tetrodes for High Power UHF Dr. Timothy Hulick, Acrodyne
Maintaining Solid State VHF Transmitters Gaylen Evans, Harris
10:00 a.m.-3:00 p.m.
Exhibit floor open

Afternoon Radio Session: Radio Technology
RENG and the Cellular Telephone Skip Pizzi, National Public Radio
Using Computers to Manipulate Audio John Statner, Compusonics
Computer-Based Digital Audio Greg Dean, Computer Concepts
The Shape of Things to Come Brad Naples, New England Digital
Digital Signal Processing Richard Cabot, Audio Precision
Interfacing VHS Videocassettes for High Quality Audio D. Wayne Woollard, Chief Engineer, KDON-AM/FM

Afternoon Television Session: Television Technology
Using Fiber Optics F. David Harris, Purdue University
New Approaches to Small Format Video Recording Neil Neubert, JVC
Future TV Transmission Technologies Rick Lehtinen, *BE* magazine
LPTV has Arrived Keith Larson, FCC
Solutions for Unique TV Coverage Situations Thomas O'Flaherty, Andrew Corp.
Designing a Candelabra Tower System for a Secondary Market Don Borchert, DE, WIS-TV, Madison
6:00 p.m.
SBE Reception/Banquet with Guest Speaker
9:00 p.m.
SBE 25th Anniversary Party

Sunday, October 8, 1989

Morning Session: Frequency Coordination
Frequency Coordination Update Gerry Dalton, KKDA

Engineering Safety Workshop
Safety in the Workplace Kent Kroneman, KUED, Salt Lake City
RF Radiation Compliance Milford Smith, Greater Media
Transmitter Maintenance Safety Marvin Borne, DE, WBNS-TV, Columbus,
How to Handle PCBs Christoher Holthaus, attorney

SBE 1989 EXHIBITORS

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Amperex Electronic Co.
Andrew Corp.
Arcor Electronics/Wire & Cable
Arrakis Systems
ATI-Audio Technologies Inc.
Audio Precision
Avitel Electronics Corp.

Bogner Broadcast Equip. Corp.
Broadcast Audio Corp.
Broadcast Electronics
Broadcast Rentals & Sales
Broadcast Technology Society
Broadcasters General Store
BSW/Broadcast Supply West
BTS

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Clear-Com Systems
Comark Communications
Comprehensive Video Supply
Computer Concepts Corp.
Concept W Systems
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Crouse-Kimzey Co.
Current Technology

Bill Daniels Co.
Dataworld
Delta Electronics
Di-Tech
Dielectric Communications
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Fidelipac Corp.
Flash Technology Corp.

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Mission Electronics
Mitchell Vo-Tech
Moseley Associates

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National Video Consoles
NPR Satellite Services

Odetics Broadcast
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Potomac Instruments

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Ram Broadcast Systems
RF Technology
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Scala Electronic Corp.
Schneider Corp. of America
Shively Labs
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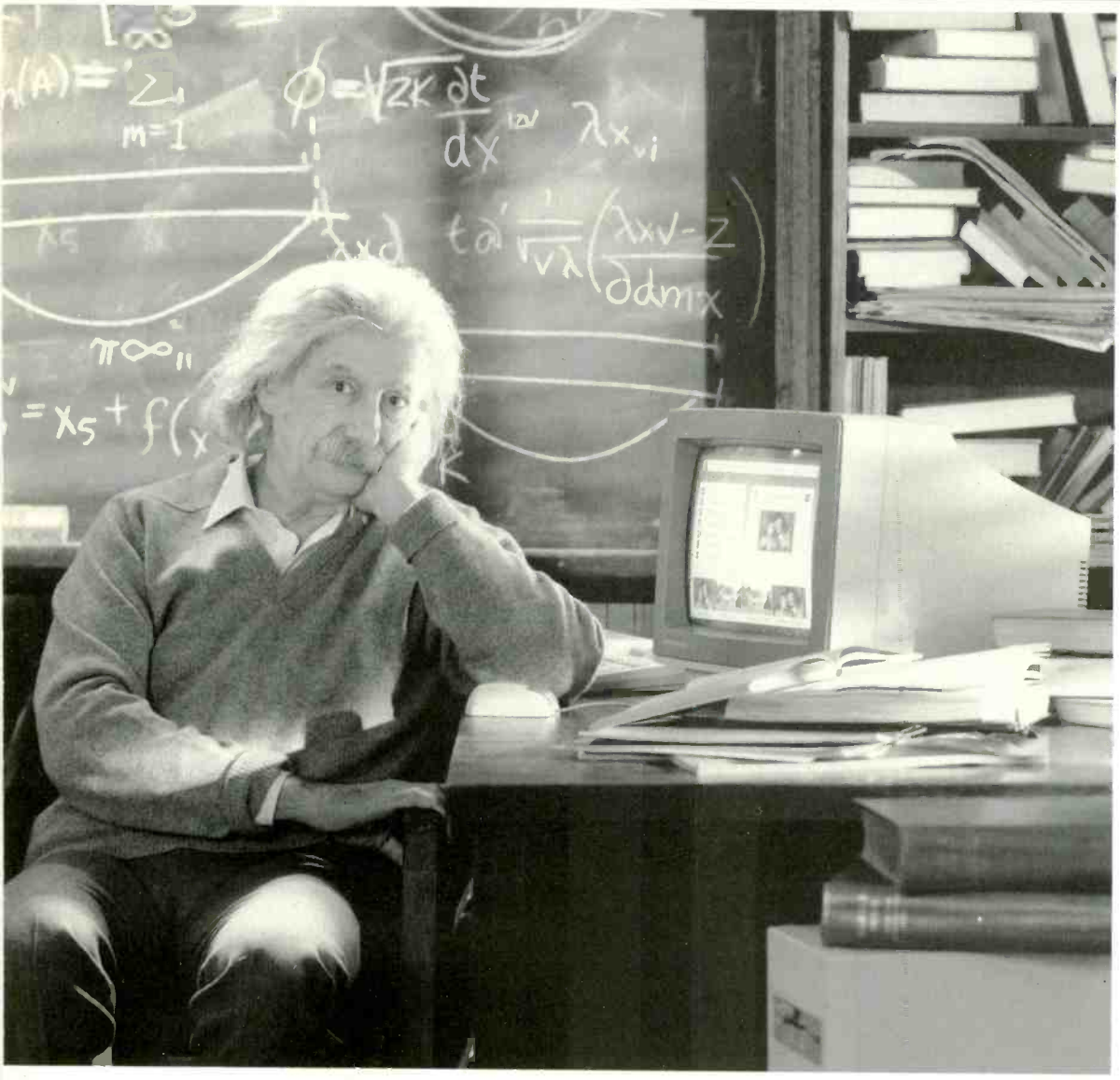

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RADIO ENGINEERING

NUMBER TWELVE SPECIAL SECTION SEPTEMBER 1989

Audio Groups Announce DAT Agreement

Two major trade organizations have concluded an agreement to join forces to support legislation for a new consumer Digital Audio Tape (DAT) recording system.

The Electronic Industries Association's Consumer Electronics Group (EIA/CEG) and the Recording Industry Association of America (RIAA) will both support a new generation of DAT machines that allows digital-to-digital copying of prerecorded music, but limits subsequent reproduction of the copies, according to Gary J. Shapiro, VP for government affairs of EIA/CEG.

The proposed system essentially would allow first-generation digital copies of music to be made from CDs, prerecorded DAT cassettes and digital broadcasts, but not second-generation digital copies of the copies. Music recorded on DAT from analog sources would produce up to two generations of digital copies, but no third-generation copies could be made. Home taping on conventional analog recorders would not be affected.

The agreement follows years of debate over legislation to restrict home taping. The lack of agreement has kept DAT from being marketed to U.S. consumers.

In making the announcement, Shapiro said, "Although we are concerned about asking Congress to mandate a specific technology, we believe this proposal should be supported as it improves the DAT standard and will provide the necessary political and legal environment to allow sales of DAT recorders to the American consumer. This cooperative will begin to establish a better working relationship with the recording industry."

Other groups are expected to endorse the legislation, including the Home Recording Rights Coalition, a broad-based group of consumers, retailers and manufacturers formed in 1981 to fight restrictions on home taping. The National Association of Retail Dealers of America (NARDA) is predicting support as well. Ed Knodle, co-chairman of NARDA's government relations committee, said, "NARDA anticipates supporting this legislation. We look forward to the day that DAT will be a product on retailers' shelves."

Coming soon to a neighborhood stereo store: DAT.

Also voicing optimism over the accord was Mark Silbergeld, director of Consumers Union's Washington office. He said, "The proposal will allow consumers to make a perfect digital copy and should increase the likelihood that DAT will be sold soon." ■

FCC Waives 'One-to-a-Market' for Boston AM

In granting an application to assign the license for WHDH-AM in Boston to a subsidiary of New England Television Corp. (NETCO), the Federal Communications Commission has waived its rule prohibiting the common ownership of radio and television stations in the same market.

NETCO agreed in January 1989 to purchase WHDH-AM from Channel Broadcasting, Inc., a subsidiary of Sconnix Broadcasting Corp., pending FCC approval. NETCO also owns VHF outlet WNEV-TV in the Boston market.

Granting the application, according to the FCC, would result in NETCO's common ownership of a TV and radio station in the same market, a cross-ownership that normally would be prohibited by the FCC's rules. The Commission, however, recently adopted a waiver policy that allows the FCC to view some applications for crossownership favorably in particular cases in the top 25 markets where there will be at least 30 separately owned, operated and controlled broadcast licensees or "voices" after the proposed merger.

WHDH-AM demonstrated to the Commission that, in the Boston market, there will be at least 51 separately controlled stations after the merger. The FCC announced it had found that the waiver request provided the necessary documentation to show that the "top 25 markets/30 voices" standard had been met. ■

SHORT-SPACED DIRECTIONAL FM

New FCC regulations will allow limited short-spacing of commercial FM stations with the use of directional antennas. Is this really in the broadcasters' or the public's interest?

BY SKIP PIZZI

Allocation of broadcast facilities in the commercial FM radio band has traditionally been a fairly straightforward process. Unlike the AM band, where contour protection and daytime/nighttime propagation differences create great complexity, FM stations are merely required to be at certain geographic distances from each other. These minimum "Required Separation Distances" vary with how far apart in frequency the stations are (co-channel, first-adjacent, second-adjacent, etc.), and with the stations' respective licensed classes of operation. True omnidirectional radiation is assumed, and terrain variations beyond the average of eight standard radials are not considered. Moreover, radiated power and antenna height above average terrain (HAAT) are always assumed to be at maximum for the class of operation. This is the way it has been since 1963, when the FCC adopted these rules under its Docket 14185.

Now, however, new rules seem about to be enacted, under Docket 87-121, that would significantly alter the above arrangements. A new protection system will be implemented using signal contours, rather than linear separations between transmitter sites; the contours will be equivalent to the protected and interfering contours derived under the old system. The significant difference here involves the use of directional antennas in such a way as to adhere to these contour protection rules, even though the old minimum distance requirements may be abrogated. But the FCC will allow such authorizations to only go below the old distance requirements by five miles (8 km) for the time being.

The distance separation rules (and their resulting contours) were derived from a minimum permissible signal-to-interference ratio (S/I) of 20 dB for co-channel situations, and 6 dB for adjacent channels. Adding these to the FCC's specified protections for the various classes of stations results in the determination of protected and interfering contours for co-channel and adjacent channels shown in Table 2. In other words, one station's interfering contour must not overlap a neighboring station's protected contour. For all Class A and C stations, the protected contour is the 1 mV/m (60 dBu) coverage projection; Class B stations are protected to 0.5 mV/m (54 dBu) and Class B1 to 0.7 mV/m (57 dBu).

There are many in the industry who worry that these new rules may seriously increase interference on the FM band, thereby reducing the quality of the service to the listening public. Among these is the NAB, whose Petition for Reconsideration of these rules was recently dismissed by the FCC. Industry observers saw this as the last possible obstacle for full enactment, and the wheels are now in motion towards this end. A revised license application (Form 301) has been prepared, and the FCC began accepting such short-spaced directional applications on June 26 of this year.

The concerns center around a number of issues that opponents feel should have been considered as a part of this update of the rules. Instead, the FCC left alone much of the 1963 rules, and made only minimum changes to accommodate the short-spaced directional assignments—too few, according to the critics. First, the 20 dB minimum co-channel S/I ratio results in a 50 dB audio S/N ratio for *monophonic* reception, as does the 6 dB minimum adjacent channel S/I (although the latter is also quite dependent on receiver performance in terms of capture ratio and adjacent channel selectivity). While 50 dB mono is certainly far from today's high fidelity standard for noise levels, for a 50 dB *stereo* S/N ratio, a 40 dB co-channel or 25 dB adjacent channel S/I ratio is required, according to NRSC tests on a range of commonly available receivers. (Remember that many car FM radios do not have mono buttons and most FM stations broadcast in full-time stereo. The relatively low modulation index of stereophonic FM also means that even a high-capture-ratio receiver will be hard pressed to suppress interfering signals in low S/I conditions.)

Another frequently voiced concern involves the fact that, currently, many FM stations' actual geographic relationships are greater than the

minimum allowed, so that a move to five miles inside the old minima might actually have a far more substantial short-spacing impact relative to previous conditions. For example, consider an isolated pair of co-channel Class A stations that were previously 10 miles farther apart than the minimum spacing requirement; under the new rules, one of these stations can move 15 miles closer to the other, using a directional pattern to protect the latter's 60 dBu contour. This is likely to have a greater effect on fringe coverages in the area between the stations than the five-mile rule change might at first lead one to believe.

A related issue deals with the perhaps naive assumption that current FM antennas radiate truly omnidirectionally. A typical side-mounted omni antenna may exhibit strong directional lobing characteristics due to the parasitic action of the tower structure and other nearby reflectors. If such is the case, an existing station's lobe may extend well beyond its supposed interference contour, or conversely, in the case of an unintended null, a station's protected contour may fall far short of where it should be, making listeners along that axis more susceptible to interference.

Finally, there is a school of thought that recommends that these new rules not be implemented until a better coverage prediction methodology is available. Again, the contour prediction method to be used under Docket 87-121 still only considers the eight-radial-average terrain calculation for existing stations' contour predictions, and is not terrain-sensitive in predicting their actual coverage. While this simplification may have caused some unexpected interference in the past, it could have disastrous results in this regard when used to determine short-spaced directional authorizations, according to some commenters.

In response to some other comments, the FCC will maintain the assumption of maximum facilities within a class for neighboring stations when authorizing a short-spaced directional FM. This will still allow those stations operating at less than maximum authorization to boost ERP and HAAT at a subsequent date. The FCC has also stated that, at present, it will not authorize any such short-spacings that would preclude the potential Class A upgrading to 6 kW maximum ERP currently under consideration.

The FCC has also emphasized that short-spaced directional operations will *not* be considered during allotment processes (in which communities are granted the ability to have a

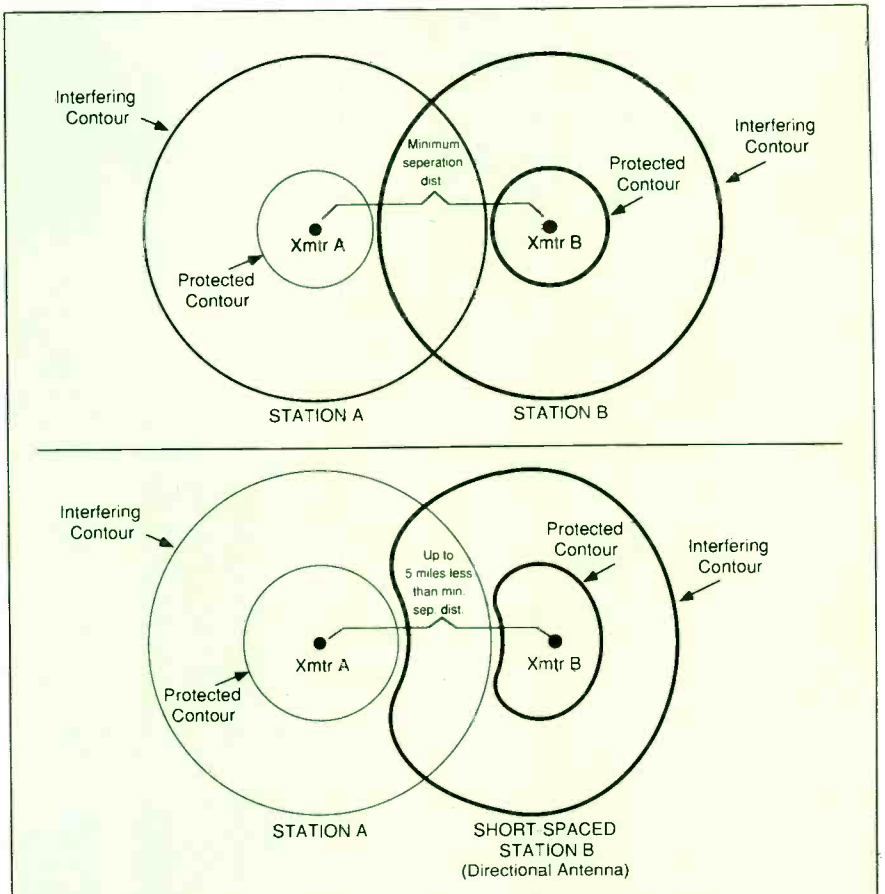

Figure 1. *Contour protection requirements for a short-spaced directional FM station.*

Station Class	Protected Contour (dBu)	Interfering Contour Co-channel (dBu)	Interfering Contour Adj. Channel (dBu)
C	60	40	54
C1	60	40	54
C2	60	40	54
B	54	34	48
B1	57	37	51
A	60	40	54

Table 1. *The protected and interfering contours for each class of FM service.*

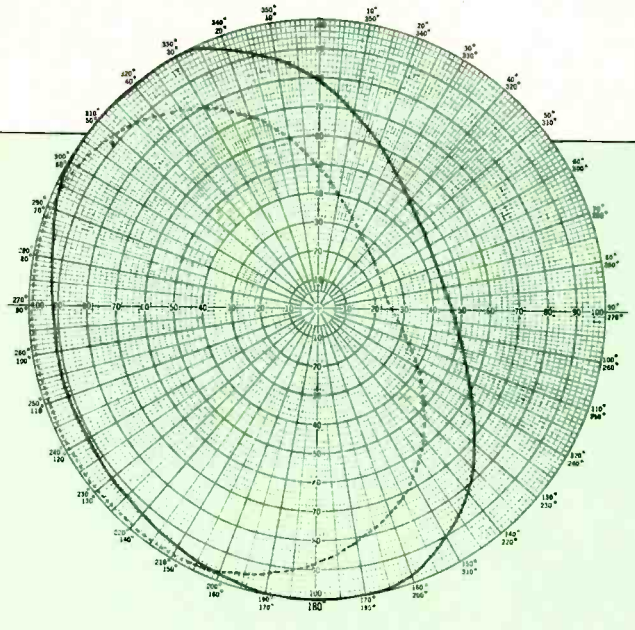

Figure 2A

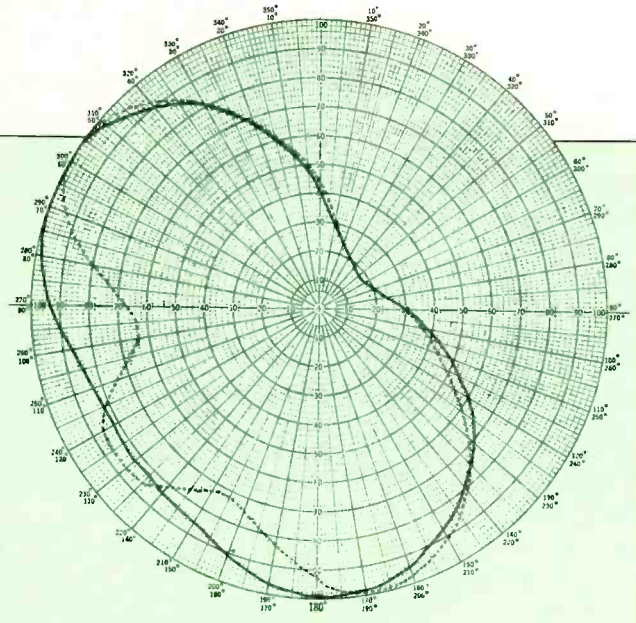

Figure 2B

Figure 2C

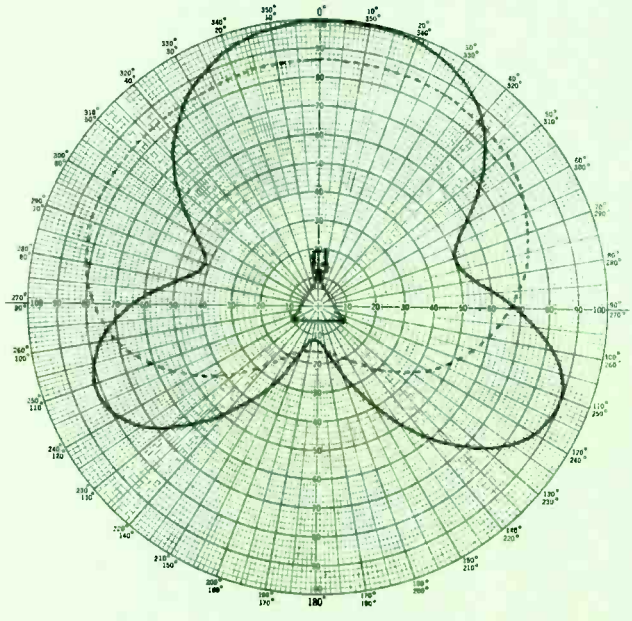

Figure 2D

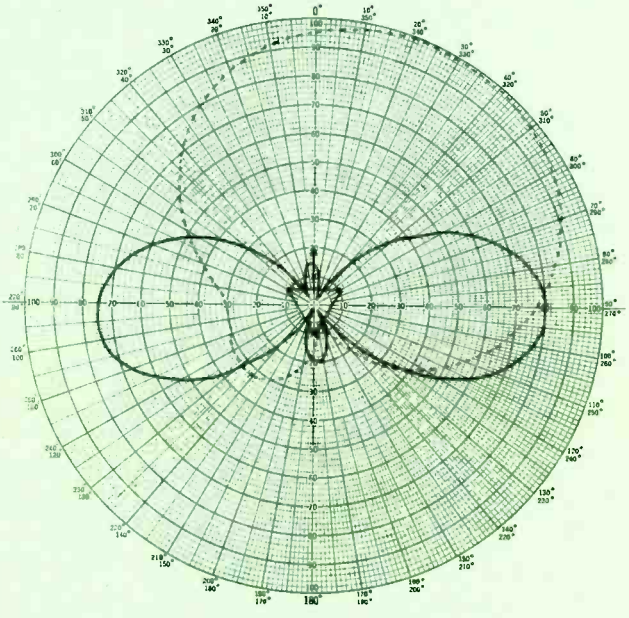

Figure 2. *Omnis and directionals compared. Fig. 2a shows a side-mounted directional ring radiator, and 2b shows a directional panel. Fig. 2c and 2d are actual patterns of two* omni *antennas, showing the effect of side mounting on their coverage. (Solid line denotes horizontal polarization, dotted line shows vertical.)*

station at a given frequency), but only during the assignment process (in which an applicant for an allotment is granted permits and licenses to operate in that community). Allotments will continue to use the minimum separation distances. Stations located within 200 miles of the Mexican border will also have to maintain existing separations from Mexican FMs.

Note that noncommercial/educational (NCE) FM stations operating in the "reserved" portion of the band (channels 200-220) have always had the ability to implement a directional pattern for contour protection of other existing NCE stations, both in allotment and assignment processes. For those in the upper portion of the reserved band, however, protection of commercial FM stations was ruled by the minimum separation requirements. The new rules will allow those NCE stations in channels 218-220 to operate with respect to commercial station protection under the same new short-spaced directional rules, leaving unchanged the way NCE stations have operated with respect to each other.

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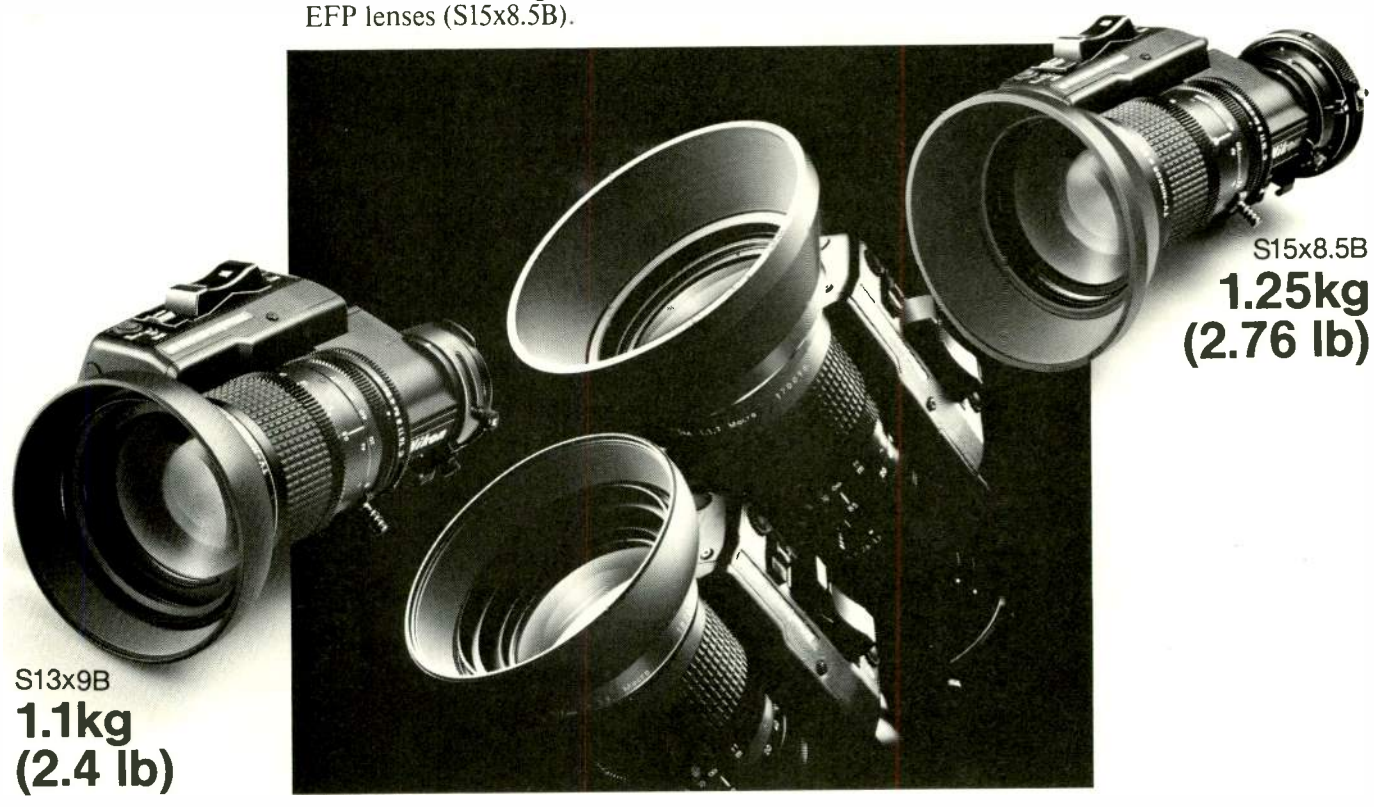

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The new rules do contain many specific requirements for directional antenna applications. First, a station's directional pattern cannot create a situation in which anything less than a 3.16 mV/m (70 dBu) contour covers the entire community of license. Next, beam tilting will not be considered, even though it might actually reduce radiation at the radio horizon; the full, untilted contour will be used for prediction purposes. In addition, short-spaced applicants may be required to provide more than the standard eight radials in their own signal's contour mapping, to show that no signal overlap occurs in places between the standard eight radials that exhibit extreme terrain variation. No protection for a station wishing to short-space will be given beyond that which is applied for; in other words, no assumption of maximum facility within a class will be made. (The maximum facility contouring mentioned earlier will apply only to the neighboring stations and allotments a short-spaced applicant may potentially interfere with.)

The antenna itself will also be strictly regulated. It cannot have a maximum-to-minimum pattern ratio of more than 15 dB (*i.e.*, the deepest null cannot be more than 15 dB below strongest lobe in the horizontal plane). It also cannot change more than 2 dB across every 10 degrees of arc (the "slope" of the pattern). These are continuations of the traditional FCC requirements for directional FM antennas, and commenters felt that today's antenna technology cannot provide reliable performance with more radical pattern designs. Detailed documentation of pattern characteristics must be provided by an applicant, along with statements guaranteeing that the antenna's installation has been carried out as the manufacturer recommends, and with verified proper orientation.

The directional FM antenna marketplace is expected to experience some growth as a result of these new rules. Currently, less than 10 percent of FM licensees use directional antennas, but this figure is now likely to expand. Unlike AM radio, the conversion to a directional pattern for an FM station does not require construction of additional towers in a large array.

Yet some industry insiders do not expect an explosion of orders for directionals; rather, as Bob Surrette of Shively Labs puts it, "These new rules will eliminate the crazies"—meaning that the new rules codify, clarify, and stabilize FM directional

requirements. He therefore expects to see less radical or impossible design specifications come his way, and notes that the new regulations don't introduce much that is new to the technology, or difficult to accomplish using traditional ring radiators or the more recent panel designs. Currently, Shively builds one directional FM a week on average, and Surrette doesn't expect this to change.

"The consultants will probably feel the increase the most," he adds.

Although it seems that these changes are a *fait accompli*, there are others in the industry with whom they still don't sit well. Many are of the opinion that even under the old rules, interference already occurs in FM all too frequently, due to terrain factors (both very mountainous and very flat) that are not adequately considered. Others mention the side-mounted omni problem as an insufficiently recognized issue. Time will tell if these parties' concern about increased interference under the new rules is warranted. Meanwhile, an important new wrinkle will be added to FM broadcast regulation, as directional radiation comes to the commercial FM band.

Many thanks to John C. Kean of Moffet, Larson and Johnson, Inc., one of the foremost experts on this issue, for his invaluable assistance in preparing this article. ■

Pizzi is BME*'s audio editor.*

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Kean, John C., "FM Directional Antennas and the New FM Short-Spacing Rules," *1989 NAB Engineering Conference Proceedings*, pp. 55-61.

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Report & Order, FCC MM Docket 87-121, "Amendment of Part 73 of the Commission's Rules to permit short-spaced FM station assignments by using Directional Antennas" (adopted December 12, 1988).

Notice of Proposed Rulemaking, FCC MM Docket 87-121, "Amendment of Part 73 . . . " (adopted February 25, 1988).

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IN NEW ORLEANS, RADIO '89 IS HOT

The weather may be sultry, but the mood is definitely upbeat as the National Association of Broadcasters prepares for Radio '89, which convenes September 13 through 16 in New Orleans. According to the association, by mid-August convention registrations were already running eight percent over the same time last year. Exhibits sold out at a record 40,000 square feet, up from last year's 37,000 square feet.

Radio engineers will find a host of special seminars and discussions at Radio '89. An annual feature, the two-day AM Directional Antenna Seminar, will be in its twenty-first edition. Other special seminars will include technical aspects of shortwave broadcasting and a digital radio station workshop featuring the latest advances in sampled-data theory, digital transmission techniques and audio storage.

Also, engineering panels will address transmitter remote controls, PCs for broadcast engineers, successful communication techniques and the causes and cures of interference. Radio '89 will see the debut of NAB's Marconi Radio Awards, a nationwide program to recognize outstanding stations and individuals. Award categories include Outstanding Station, Station of the Year, Air Personality (or Team) of the Year, and Newcomer Station of the Year. Long-time radio broadcaster Dick Clark will host the gala awards presentation, which will follow the closing dinner on September 16. Entertainment will be by Paul Shaffer and the World's Most Dangerous Band.

NAB will honor Ray Livesay, chairman of the board of the J.R. Livesay Radio Broadcast Group, with the National Radio Award for his "long-term involvement and continuing contribution to the radio industry." Other featured events include a keynote address by D. Wayne Calloway, chairman and CEO of PepsiCo, at Friday's management luncheon.

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AM Directional Antenna Seminar
3:15 - 4:30 p.m.
Remote Control Technical Panel

Friday, September 15
8:00 a.m. - 2:00 p.m.
AM Directional Antenna Seminar
2:00 - 3:15 p.m.
Interference: Its Causes and Cures
3:30 - 5:30 p.m.
FM Engineering

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TBC	—	**Dual**	—	—
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*Basic System

Based on available data as of June, 1988.

ALTA GROUP, INC

535 Race Street, San Jose, CA 95126 • FAX 408-297-1206 • Tel. 408-297-ALTA

Circle 127 on Reader Service Card.

New Products

Beginning this month, BME brings you greatly expanded coverage of the latest developments in new equipment.

Alta Unveils Wideband TBC/Synchronizer

Alta Group's Cygnus 5.5 wideband TBC/synchronizer provides 5.5 MHz of bandwidth in both composite and Y/C modes. The unit also provides 3 dB chrominance noise reduction on composite inputs and one-line chroma-luma delay capability, and has a built-in 4x1 video and stereo audio routing switcher. Production effects include digital picture freeze, strobing, variable mosaic, variable colorization and variable posterization. List price is $5950.

Reader Service #200

Anton/Bauer Announces Battery System

An addition to Anton/Bauer's Logic Series, its new Compac-Magnum 13 and Compac-Magnum 14 high-voltage batteries are designed to replace low-capacity, low-voltage slide-in batteries in CCD cameras. The new batteries include all Logic Series features: Micro-Code Program Module, ACS Impac injection-molded case, gold-plated contacts and 100 percent testing with serial numbered printout shipped with battery. Units can be charged in one hour or less with all Logic Series chargers.

Reader Service #201

Omicron Video Offers Genlock System

Omicron Video's Omni-Gen 701 for NTSC systems genlocks Amiga 500/1000/2000/2500 computers without computer modifications. All image data is converted to broadcast-quality NTSC composite signals or Y/C 358 signals. Keyer and fade-to-black controls are located on a remote control panel. Other features include a built-in broadcast-standard sync generator and sine squared/comb filtering to minimize horizontal crawl.

Reader Service #202

Leader Offers CD Jitter Meter

Leader Instruments's new Model LJM-1851 CD jitter meter performs simultaneous measurements of jitter (3T) and HF levels (3T or 11T) for the EFM (eight to 14 modulation) signals used in CD players. The unit's sigma measuring mode computes the jitter within ±1 percent; the EFM signal level is indicated as a peak to peak value for the 3T or 11T bit component and is selected by pushbutton.

Reader Service #203

AMS Industries Unveils Computer-Controlled Consoles

AMS/Calrec's computer-controlled broadcast consoles feature free assignment of faders; assignable control

AMS/CALREC

areas that replace conventional channel strips; instantaneous memory reset of all console settings; and three RAM and multiple disk-based memories. The system allows up to a maximum of 128 channels, eight stereo groups, four stereo outputs, 24 recording groups.

Reader Service #204

Tascam Presents 24-Track Recorder/Reproducer

Tascam's MSR-24 24-track recorder/reproducer uses one-inch tape on 10½-inch reels, operating at either 7½ or 15 ips. Other features include built-in dbx Type I noise reduction, S/N of 108 dB (A-weighted at 15 ips), noise-free spot erase function and direct-drive, high-torque capstan motors. List price is under $15,000.
Reader Service #205

TASCAM

Auditronics Presents Mix-Minus/IFB System

The 1900 standalone mix-minus/IFB from Auditronics permits up to eight discrete, simultaneous mix-minus/IFB setups for field correspondents. The company recommends it for newscasts, talk shows, elections and other applications where it is necessary to feed program information to a remote location minus the audio from that location. The 1900 may be used with most existing audio consoles.
Reader Service #206

Sencore Intros Stereo Power Amp

Sencore's PA81 stereo power amplifier features twin autoranged meters that measure wattage directly on both left and right channels all the way to 500 W (250 W/channel), or up to 5000 W using the optional dummy load accessory. The unit also has built-in 2-, 4-, 8-, 16- and 32-ohm zero reactance loads, as well as all required bandpass IHF/EIA audio filters.
Reader Service #207

SENCORE

Clear-Com Unveils Digital Matrix Intercom

Matrix-Plus, Clear-Com's digital matrix intercom system, consists of a display intercom station, central matrix and modular interface system. Intercom station provides fully digitized audio between station and matrix, with total noise and crosstalk immunity and enabling full-function station operation over a single unshielded twisted pair. Central matrix features multiprocessor/multimemory system architecture and dual/redundant power supplies. Plug-in interface cards enable connection to standard two-wire conference line systems as well as two-way radios, telco lines and four-wire equipment.
Reader Service #208

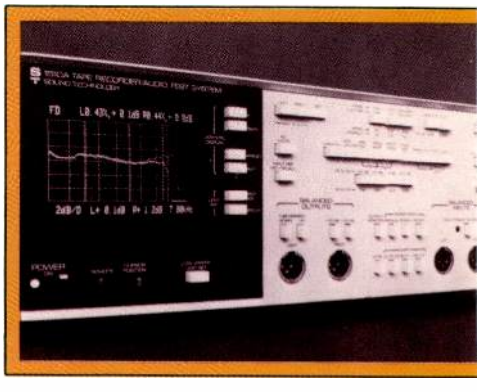
Christie Premiers Programmable Battery Support System

Christie Electric's CASP/2000 system offers battery rejuvenation, battery analysis, battery charging, battery recognition, system programming, system readouts, hardcopy printouts and programmable power source. The unit operates on primary ac power from 90 to 135 V ac, or 180 to 265 V ac, automatically selected, at frequencies from 47 to 440 Hz.
Reader Service #209

HEWLETT-PACKARD

Hewlett-Packard Rolls Out Analyzer

Hewlett-Packard's HP 3563A controls-systems analyzer accepts direct input of analog and digital signals for testing control systems, electronic devices and digitized analog signals. A built-in signal generator produces analog- and digital-stimulus signals for network analysis. The analyzer also provides clocking and synchronization functions to support testing of systems that contain both analog and digital signals. List price is $24,900.
Reader Service #210



SOUND TECHNOLOGY

Sound Technology Announces Audio Test Instrument

The Model 1510A audio test instrument from Sound Technology fea-

tures a built-in CRT display and provides both alphanumeric and screen graphics. The unit's microprocessor and internal memory store 14 commonly used audio test routines including stereo phase, second or third order distortion, swept frequency response, channel separation, noise, wow and flutter and tape dropouts. The 1510A can be externally controlled through its IEEE-488 interface bus. List price is $6650.
Reader Service #211

BVS Premiers Model SA103 Safe Area Generators

Broadcast Video Systems' Model SA103 safe area generator provides four independent channels controlled from a 16-button keypad. Each channel may be programmed individually with a choice of safe action, safe title, center cross, blanking markers, two programmable rectangles, 10-second countdown clock and a six-row, 28-character slate generator. The Model SA102 portable unit is switchable between safe action/title and crosshatch.
Reader Service #212

Winsted Presents Tape Storage System

Winsted Corp.'s TapeHook & Rail tape storage system is designed to accommodate any brand of tape case. The TapeHook features a pressure-sensitive backing with a special formula adhesive that bonds the hook permanently to the tape case. The hook then snaps into place on the wall-mounted extruded aluminum TapeRail. Hooks are available in two sizes to fit most cases.
Reader Service #213

Hotronic Unveils Options for AH91 TBC

An RS232/RS242 serial interface is one of two options recently introduced for Hotronic's AH91 dual channel TBC/frame sync. The serial interface gives edit controllers complete control of all digital functions on the control panel through a PC. A second option is a stereo audio switcher, permitting the user to select audio A or audio B while switching video. When the audio switch is set to auto mode, the audio simply follows video.
Reader Service #214

Stantron Intros Designer Series Cabinets, Consoles

Factory-assembled, Stantron's new line of cabinets and consoles feature light or dark oak wood grain trim. The line is available in 17 standard colors that may be selected from single- or multiple-bay systems. Every unit comes standard with prethreaded/tapped front and rear mounting rails and features all-welded steel frames.
Reader Service #215

Macrovision Presents Video Encryption System

Macrovision Corp.'s VES-200 recordable video encryption system for television transmission and videocassettes consists of a rack-mountable encoder unit and multiple decoder units with keypad controls and 24-character alphanumeric display with menu and prompts. The system's ability to encrypt full-motion TV video (NTSC RS-170A) permits the encrypted signals to transverse any medium that can handle full-motion video, including microwave. A PAL version is in development. List price is $28,000.
Reader Service #217

PANASONIC

Panasonic Presents CCD Camera, Dockable VCR

Panasonic's Model 300CLE three-CCD video camera is compatible with NTSC composite, S-VHS component analog and most other component recording systems. The camera produces more than 700 lines of horizontal resolution and greater than 60 dB S/N. The company's AG-7450 dockable S-VHS portable VCR can be used with the 300CLE or the 200CLE camera, as well as the industrial WV-F70 two-CCD camera. List price on the 300CLE is $9500 (with lens); on the AG-7450 is $3500.
Reader Service #216

Intelco Unveils Laser Return Loss Set

Model 450, Intelco's self-contained return loss set, includes built-in laser source and power meter, dynamic range from 0 to 55 dB (with zero calibrated from a total reflection cable), full GPIB control, ±5 nm wavelength precision, custom LCD with autoranging measurements and analog bar metering, power from internal battery, ac line or external dc. List price is $11,900.
Reader Service #218

Cinema Products Announces Steadicam Model IIIA

Cinema Products Steadicam Model IIIA incorporates the company's Telescoping Post/Balance, designed to allow immediate expansion or contraction of the main post. The side-to-side balancing camera base plate allows the operator to move the camera from side to side by turning a knob. The telescoping post/balance is also available as a kit for retrofitting existing Steadicam Model III units.

Reader Service #219

CINEMA PRODUCTS

Wavetek Premiers Peak Power Meter

Wavetek Microwave's new Model 8500A peak power meter features an electroluminescent display. It covers a frequency range of 30 MHz to 40 GHz with low-speed sensors and 750 MHz to 40 GHz with high-speed sensors. Each sensor contains an EEPROM programmed with National Institute of Standards and Technology traceable calibration factors. The meter is available in both one-channel ($11,000) and two-channel ($14,500) models.

Reader Service #220

SOMICH

Somich Presents Baseband Enhancer

Somich Engineering's DBE-1000 dynamic baseband enhancer features a totally protected stereo pilot signal and switchable phase-linear 67 kHz notch filter, providing almost 30 dB of SCA subcarrier protection without compromising separation. The manufacturer says the unit's proprietary processing circuit eliminates stereo aliasing at all but the most aggressive settings. List price is $1895.

Reader Service #221

Vinten Rolls Out Automotion Pedestal

Vinten Broadcast's Automotion X-Y-H Servo pedestal is based on the design of the industry-standard Fulmar pneumatic pedestal and is compatible with all Microswift pan and tilt heads. The pedestal can be guided by an operator or by programming positions as part of Microswift's 800-shot memory. Alignment repeatability is ±1 mm.

Reader Service #222

VINTEN

PANDUIT

Panduit Premiers Fiberoptic Cable Tags

Self-laminating marker tags for use with fiberoptic cables from Panduit Corp. are made from rigid vinyl with a UV-resistant black legend on bright yellow background. The tags measure 3.5 x 2 inches and can be installed as flags or wraparounds. The tags are available in packages of five.

Reader Service #223

Bruel & Kjaer Unveils Cardioid Mic

Bruel & Kjaer's Type 4012 studio microphone is a prepolarized condenser-microphone with a first-order cardioid directional pattern. On-axis frequency response at 30 cm is flat from 40 Hz to 20 kHz (+1, -2dB). The manufacturer says the mic has a high output level and the ability to drive very long cables without noticeable deterioration of signal.

Reader Service #224

Lyon Lamb Premiers Real Time Converter

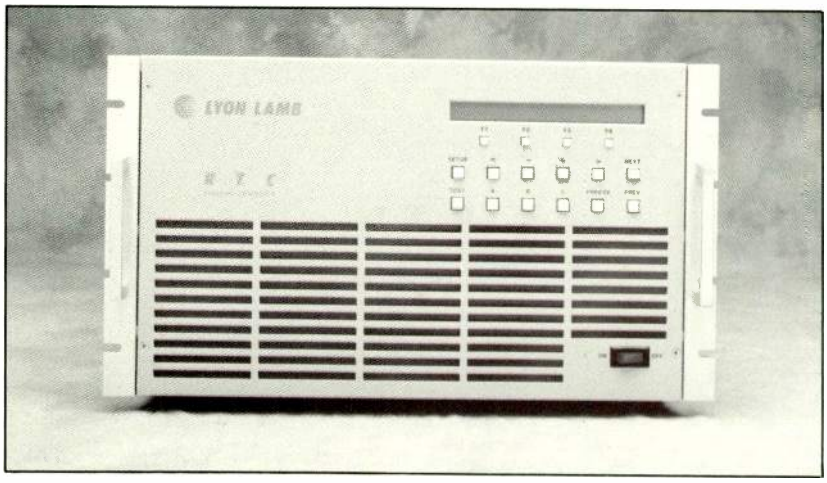
Lyon Lamb's RTC real time converter digitally converts up to three independent high-resolution sources of any scanning frequency in the 23 kHz to 75 kHz range. Standard outputs include broadcast-quality NTSC and PAL composite video, component video, Y & C, and low-resolution RGB with sync.

Reader Service #225

Atlas/Soundelier Offers Enclosure Components

Atlas/Soundelier's System VI enclosures are now available in standard components in the choice of complete factory-assembled housings or individual factory-assembled modules. Available accessories include writing shelves, swivel casters, slope front video monitor housings, wedge modules for multi-bay enclosure systems and solid or louvered front and rear doors.

Reader Service #229



LYON LAMB

Belden Unveils NEC+ Rated Cables

Belden offers six National Electric Code+ rated OFN simplex and duplex BitLite fiberoptic cables. The cables have passed the UL 1581 Vertical Tray flame test for commercial installation applications and are commonly used for short-distance transmission of data, control, video and instrumentation signals. Standard core fibers of 50, 62.5 and 100 micron are available.

Reader Service #230

Berk-Tek Presents Plenum Duplex Fiberoptic Cable

Berk-Tek has developed a plenum-rated duplex fiberoptic cable with improvements such as 50 percent weight reduction, wider temperature range, lower attenuation and less connectorization time.

Reader Service #231

Tannoy Announces Near Field Monitor

Tannoy's NFM-8 (DMT) near field monitor incorporates an eight-inch dual concentric driver in a ported, medite enclosure offering solid bass reproduction. Tannoy's patented Differential Material Technology drive unit creates a flat frequency response up to 25 kHz (±3 dB).

Reader Service #226

Minolta Intros TV Color Analyzer

Minolta's TV-Color Analyzer II is designed to enable objective white-balance adjustment of color monitors. In addition to the standard primary-analyzer mode for red, green and blue-beam intensities, the unit features a chroma mode that shows chromaticity coordinates and luminance in either cd/m2 or foot-lamberts List price is $4000.

Reader Service #227

Shure Announces L Series Wireless Mics

Shure's L series of wireless microphones incorporate the L1 Body-Pack transmitter. The LS13/839 and LS14/839 lavalier systems consist of the transmitter, L3 or L4 receiver and 839W omnidirectional lavalier microphone. The L1 transmitter features wide-range audio gain control, "mirror image" companding and 50 mV output level. The 839W mic features a controlled low-frequency rolloff to reduce pickup of unwanted noise. List price for the LS13/839 system is $445; the LS14/839 is $580.

Reader Service #228

DWIGHT CAVENDISH

Dwight Cavendish Intros Quality Control Station

The Copymaster videocassette quality control station from Dwight Cavendish features a control panel from which an operator can monitor the technical integrity of a range of audio and video elements. Among them: color video picture, video waveform, linear audio and HiFi audio. A 13-inch color monitor is provided for picture monitoring and VU meters are included for audio level evaluation.

Reader Service #232

KINETIC

Kinetic Support Offers Vehicle Camera Mount

Kinetic Support Systems' VCM F189 vehicle camera mount can place a camera almost anywhere and with any orientation relative to a vehicle. The mount's configuration can be adjusted quickly to permit the camera to be moved within a one- to two-foot range without disassembly. The standard kit contains couplings and assemblies for most desired locations on a vehicle; an enhanced kit provides extra couplings and assemblies for more elaborate mountings.

Reader Service #233

Riser-Bond Introduces Cable Fault Locator

Riser-Bond Instruments' Model 1210 is a microprocessor-controlled, multipurpose LCD waveform time domain reflectometer cable fault locator. It features adjustable VOP and output impedance settings for high resolution and accuracy (±.01 percent), a built-in thermal printer for printouts of waveforms and data, and rechargeable nicad batteries. List price is $4395.

Reader Service #234

RISER-BOND

Graham-Patten Offers VAMP III

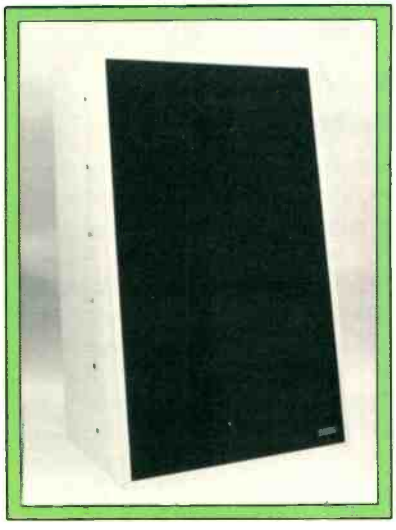
The latest addition to Graham-Patten's Video Audio Multiplexing Process line, VAMP III, encodes two separate channels of baseband audio into 16-bit linear PCM at a 48 kHz sampling rate. The two coded channels are interleaved and formatted to produce a single 1.544 Mb/s T-1 serial data stream. At the receive end, the T-1 signal is demultiplexed and PCM data is then decoded into two separate baseband audio channels. Frequency response is ±0.2 dB, 20 Hz-15 kHz; S/N is 85 dB unweighted. The encoder lists for $2700; the decoder is $2200.

Reader Service #235

B&K-Precision Rolls Out Portable Oscilloscope

B&K-Precision's Model 1422 is a compact dual-trace oscilloscope designed for field service applications. The unit can be powered from ac, an optional internal battery pack or an external 10-16 Vdc source. It features 10 mV/division vertical sensitivity, an 8x10 division high-brightness rectangular CRT and front-panel X-Y operation. Eighteen sweep ranges span from 1 μs/division to 0.5 seconds/division in a 1/2/5 sequence, variable between ranges.

Reader Service #236



ALTEC

Altec Unveils Series A700 Speakers

Altec Lansing's A700 speakers feature a trapezoidal, slope front cabinet housing a 515-8G driving a vented bass horn and a 909-8A compression driver on a MR994A Mantaray horn. Other components of the A700 series include the A700XLF subwoofer systems, 1632A electronic crossover/system protector, 9442A and 9444A power amplifiers and A700SK suspension kit.

Reader Service #237

Videotek Upgrades Prodigy Switcher

New software for Videotek's Prodigy production/post-production switcher allows the operator to designate the preset audio bus to be a live program video bus; input selections made on the preset audio bus will select and indicate the program video bus crosspoint. A second new option recalls Snapshots from Prodigy's memory without affecting the program video bus setup. Existing Prodigy switchers can be upgraded without charge.

Reader Service #238

VIDEOTEK

Orion Releases Options For Audio Consoles

Orion Research has introduced three new options for its NewsMaker series of software-based audio consoles. The FRS (Fault Recovery System) option protects console operators against power failures with redundant CPU systems and power supplies, automatic switchover module and RAM-based "Last Image Recall." The MM-16 Mix-Minus Matrix adds an additional 16 mix-minus sends to any NewsMaker console. The third option is a floor stand with space for a meter panel and external signal processing equipment.

Reader Service #239

Concept W Offers Camera Adapter System

Concept W's Camplex CP-201 camera adapter system can extend camera range up to 5000 feet on a single coax, as well as provide genlock (black burst feed to camera), camera video, two-way intercom (two- or four-wire), call/tally function, mic/line audio, aux audio return/IFB (from production), and remote power (power sent down coax to operate camera adapter only up to 1000 feet). Adapter can be clipped to operator's belt and connected to camera with standard 14-pin multiconductor VCR cable or standard BNC connections. Total weight is under 1¾ pounds. List price is $2995.

Reader Service #240

CONCEPT W

Sundance Premiers Videodisc Editing System

Using a proprietary serial co-processor, called the MDI (Multi-Disc Interface), Sundance Technology's Quicksilver videodisc editing system utilizes a Macintosh Plus or SE to control up to eight disc players, providing up to eight hours (CLV) of video material accessible within a few seconds. The cuts-only system creates an edit decision list compatible with CMX, Grass Valley and Paltex, as well as a "plain English" edit list. Output is recorded onto any VTR with a Sony/JVC serial (RS-422) interface. List prices start at $16,740.

Reader Service #241

Akzo Announces Sound Control Matting

Akzo Industrial Systems' Enkasonic sound control matting is a 0.4-inch thick composite of extruded nylon filaments that obstruct sound transmission. The company says it is ideal for retrofit of sound-rated floors.

Reader Service #242

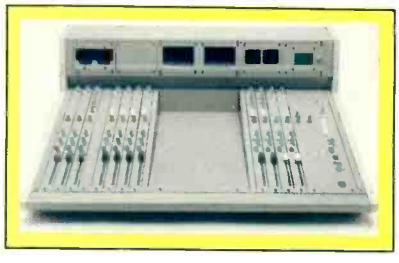
LNR Expands Video Receiver Line

LNR Communications' Model DRV4 Intelsat-quality video receiver now has the capability to house up to three audio subcarriers each within the 4.2-8.1 MHz frequency range. LNR video receivers in the field may be upgraded to incorporate these audio subcarriers with a single module.

Reader Service #243

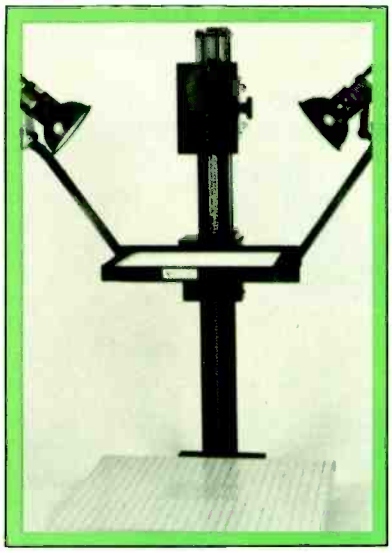
MBI Intros Revised Series 16 Mixers

New modules for MBI Broadcast Systems' Series 16 line of mixers include bar graph metering; full remote control of telephones including answering and terminating calls and comprehensive talkback; and additional frame sizes to accommodate up to 29 channels, each switchable between two inputs. The mixers' look has changed as well, to light grey with a varnished white wood trim.



MBI

Reader Service #244



BENCHER

Bencher Intros M3 Copystand

Bencher's M3 Copy Outfit Model 430-11 features a movable copy stage and opal plexiglass insert to permit backlighting for video and digital transfer of transparencies and small objects. Other features include a 6¾- x 10-inch camera mounting plate supported by four machined steel shafts, rack and pinion carriage drive and swivel light support arms.

Reader Service #247

Andrew Offers Plug Connector for Foam Coax

Andrew Corp. has announced the availability of an SC plug connector for its ½-inch foam dielectric Heliax coaxial cable. The L44CW connector fits LDF4-50A foam dielectric and FT4-50 high-temperature foam dielectric cables. The connector meets MIL-C-39012 specifications.

Reader Service #245

MACKIE

Mackie Designs Announces 16-Channel Mixer

Mackie Designs has introduced the CR-1604, a rack-mountable 16-channel mixer with seven aux sends per channel, four-bus main output, three-band equalization, true stereo solo, true constant power panning and sealed rotary controls. The first six channels feature studio-grade, EIN -129 dBm phantom-powered mic preamplifiers. List price is $999.

Reader Service #246

Superior Electric Unveils Portable Power Conditioners

Superior Electric's portable PPC series Stabiline power conditioners maintain output voltage at 120 V ±5 percent, 60 Hz over an input range of 95 to 132 V. In addition, they provide 120 dB typical common-mode noise rejection and 60 dB typical transverse-mode noise attenuation. All units have six-foot cords and plug assemblies for connection to power source and grounding receptacles for connecting user's equipment to power conditioner.

Reader Service #248

Hitachi Unveils Studio/Field CCD Camera

Hitachi's SK-F700 camera features ⅔-inch FIT chips and produces 400,000 pixels. The camera produces a picture with 700 lines of resolution and S/N of 60 dB. Vertical smearing has been suppressed 120 dB, according to the manufacturer. Remote control functions of other compatible Hitachi cameras can be fully used except for registration items.

Reader Service #249

HITACHI

I-Den Intros IVT-9B TBC

An upgraded version of the IVT-9, I-Den's IVT-9B digital time base corrector features component (Betacam, MII), Y/C358, Y/C688 and composite video inputs. Other features include full 5.5 MHz bandwidth, built-in frame memory, built-in auto chroma control circuit, built-in RS-170A sync generator (with black burst output) and field/frame freeze capability. List price is $5000.

Reader Service #250

GENTNER

Gentner Intros Digital Frequency Extender

The EFT-3000 digital frequency extender from Gentner Electronics uses three standard dial-up telephone lines to provide a single audio feed with a frequency response of 50 Hz to 7.5 kHz. Other features include built-in return channel; built-in phone couplers with auto-answer/auto-disconnect capability; built-in touch-tone keypad and memory dialer; 10-second, one-button setup that automatically equalizes each phone line's frequency response; and two built-in mic/line level selectable inputs and headset amplifier.

Reader Service #251

RGB Announces Video Scan Converter

RGB Technology's Videolink 600 automatically syncs to EGA (350-line), VGA (all modes) and Macintosh II (480 line) systems. Synchronization is automatic over a 21.5-35.0 kHz scan range. The unit converts the graphic output of the computer display to NTSC or PAL television. List price is under $10,000.

Reader Service #252

HME Premiers Interface Unit

HM Electronics' RW760 interface unit allows its 700 series intercom products to connect to two-wire, noncompatible three-wire, four-wire or telephone intercom systems. In two-wire mode, the interface connects phone systems to the standard three-wire intercom system. The four-wire mode will connect to all four-wire intercoms such as four-wire phone systems. An

HME

ac adapter is available to power the unit if power is not supplied by the three-wire intercom line.

Reader Service #253

Barco Offers HDTV Monitor

The 20-inch HD-Monitor 5153 from Barco offers resolution up to 1000 TV lines or higher and can display all of the different HDTV scan systems currently in use (horizontal scanning from 28-33.75 kHz), according to the manufacturer. The unit includes RGB inputs for component processing.

Reader Service #254

ALLIED BROADCAST

Allied Broadcast Offers Prefab Radio Stations

Flagship Studio Broadcast Buildings are the latest offering from Allied Broadcast Equipment. These preconstructed radio stations include every item needed for broadcast operations, according to Allied, including the transmitter. Allied also distributes Arrakis Systems' Modulink studio systems.

Reader Service #255

AMS Industries Presents M/S Microphone

AMS/Calrec's M/S stereo microphone is used upright, inverted or end fire on a boom. Features include coincident signals up to 10 kHz, output signals L/R or M/S, fully variable patterns from omni through cardioids to figure eight, attenuator for high source levels and variable angle control from 0 to 180 degrees.

Reader Service #256

Soundcraft Intros Console Options

Soundcraft has announced a range of new modules for its SAC200 radio console, consisting of simplified versions of the input modules and new Source Select module. With these options, various operational functions have been removed from the front panel but remain accessible on the circuit board.

Reader Service #257

SOUNDCRAFT

Anritsu Announces Optical Sweepers

Anritsu's MG9505A and MG9603A optical sweepers feature sweep ranges up to 100 GHz. The units use optical heterodyne detection to obtain extremely wide operating bandwidths and high linearity. Emitted wavelength of the MG9505A is 1.33 μm ±0.02 μm and 1.55 μm ±0.02 μm for the MG9603A. Both instruments have an LD temperature-control system permitting power level and spectral line-width to fluctuate less than instruments using current control, according to the manufacturer.

Reader Service #258

Solid State Logic Offers Machine Control Interfaces

ScreenSound is Solid State Logic's digital audio editing, mixing and recording system for off-line video and film post-production and audio-for-video editing applications. The system interfaces with VCRs and VTRs and film reproducers with full machine control; it also interfaces at machine level with the Quantel digital production center through the Harry digital video editing system when operating in the Harrysound mode.

Reader Service #259

Shintron Rolls Out Hum Killer

Shintron's CB100-HK1 hum killer isolates video line from up to 700 V of hum and processes the video with no trace of hum, according to the company. The unit is a combination isolator, cable-comp amp of up to 1000 feet, sync-tip clamping amp and video distribution amp with six outputs. A dc 12 V version is available. List price is $800.

Reader Service #260

Meret Intros Data Links

The MDL600 and MDL800 series of atmospheric data links from Meret,

Inc. can transmit analog or digital signals, respectively, and feature an adjustable field of view for ranges up to 50 meters at bandwidths up to 10 MHz. The manufacturer emphasizes the units' small size: the transmitters measure 3.9 inches long by 1.3 inches in diameter and the receivers measure 4.5 x 1.4 inches. Transmission is by LED. List price is $1500.
Reader Service #261

American Laser Presents Infrared Video Transmitter

American Laser Systems' Model 761 video transmission system transmits one channel of baseband video and audio through the air on a low-power infrared light beam up to one mile. Baseband video signal is introduced via coaxial cable terminated in a BNC connector; audio is in via an XLR connector. The manufacturer says the system requires no FCC licensing or right-of-way permits. List price is $7750.
Reader Service #262

TimeLine Offers Lynx System Supervisor

TimeLine's Lynx System Supervisor contains several hardware features with immediate uses within existing Lynx control systems, including multiple GPI closures for event triggering; dialogue beep function; multiple slaved time code generators to drive external equipment; and a MIDI implementation. Other features include automatic time code capture; multiple input speed reference system with VSO capability and lock sine wave pilot output; MIDI events output; MIDI time code generation; and serial system diagnostics.
Reader Service #263

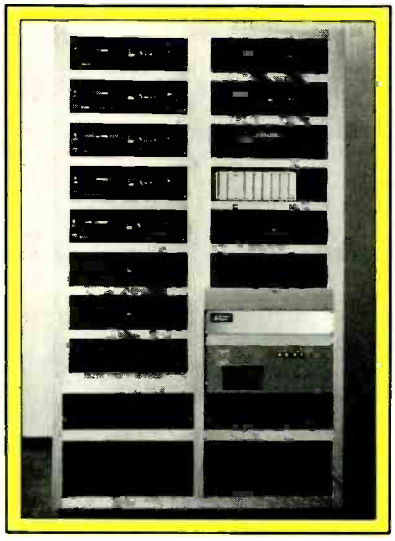
Studio Technologies Announces Stereo Simulator

The Generation II stereo simulator from Studio Technologies converts mono program material into simulated stereo. Designed for broadcast use, the unit features a screwdriver adjustment and internal control switch to prevent unauthorized changes.
Reader Service #264

Schafer Rolls Out Digital Live Assist System

Schafer Digital's DAPS 800 digital audio programming sequencer incorporates eight Sony Beta VCRs with music and commercials recorded with the use of digital processors. Commercials, IDs and other short events are stored on VCRs and automatically downloaded to hard disk to allow instant access in any order desired. The system interfaces with

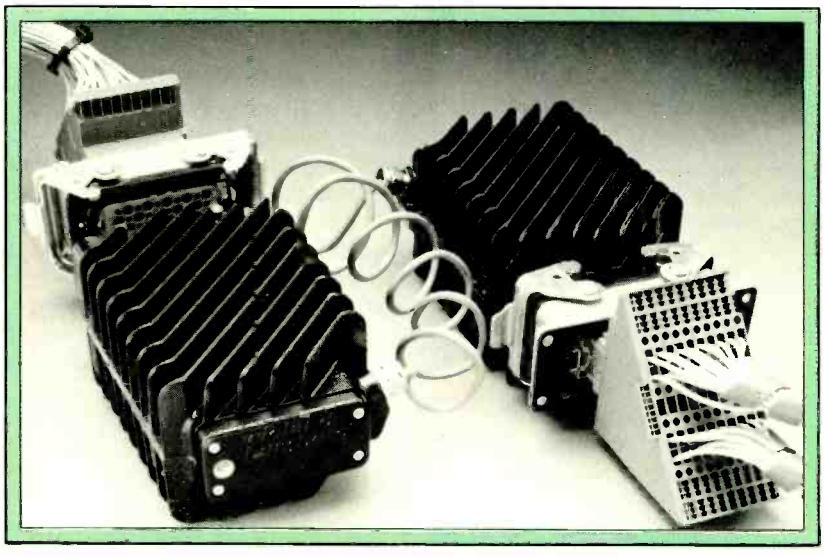
most popular music scheduling systems.
Reader Service #265



SCHAFER DIGITAL

Dubner Announces 30-K CG

Dubner's 30-K character generator is a dual-channel, full-color preview system. The CG's mainframe is housed in one unit and consists of a 68020 32-bit microcomputer and two independent display planes, each with a built-in encoder and downstream linear keyer. Other features include a sync regenerator and two 20 MB disk drives for removable storage. Each display plane has 4 MB of memory for full antialiased text composition over complex backgrounds. Outputs are RGB analog and NTSC composite.
Reader Service #266



ELECTROVERT

Electrovert Announces Intelligent Connectors

Electrovert Inc.'s intelligent multi-plex connectors feature state-of-the-art electronics built into standard 40-pin connector, designed to organize all the communications data (receiving or transmitting) and connect it into a string of serial data to be sent down the two-wire link. The complete unit sells for $853.30 in quantities of one to 20.
Reader Service #267

Fluke Intros Scope Driver Software

John Fluke Mfg.'s PM 2235 oscilloscope driver software package, designed to ease GPIB/IEEE-488 programming, supports the company's PM 3320A, PM3350 and PM 3365 analog/digital storage oscilloscopes. The software features an auto-configuration utility that automatically determines system configuration. Status and error-checking procedures are also included. The software is available in BASICA/GW-BASIC, Microsoft C, Microsoft Pascal and Microsoft QuickBASIC versions. List price is $495.
Reader Service #268

Magna-Tech Premiers Electronic Looping

Magna-Tech's EL II electronic looping system is designed for use in video or film automatic dialogue and Foley post-production sound recording. The system will store on line as many as 200 loops for playback and recording. Functions include the ability to store cue sheet information in memory before looping sessions start. Four soft keys on the keyboard can be programmed for routine, repeat functions.
Reader Service #269

Prime Image Offers Downstream Keyer

The Prime Image DSK-601 component downstream keyer is designed to complement the company's S-Switch component production switcher. The unit features six component inputs with both component and composite auxiliary inputs and an on-board colorizer. In addition to keying, the DSK-601 allows effects to be cut or faded in or out by adding a third bus to the S-Switch. List price is $1200.
Reader Service #270

Bally Unveils Prefab Structures

Designed to be used for protection of valuable equipment, Bally Engineered Structures' pre-engineered buildings can be installed in virtually any environment, according to the company. The structures are assembled from lightweight modular panels of four-inch thick urethane insulation, foamed in place between metal skins.
Reader Service #271

ANNOUNCING BME'S THIRD ANNUAL EXCELLENCE IN ENGINEERING AWARDS

NOMINATIONS ARE NOW BEING ACCEPTED

Photo: Gareth Hopson

For the third consecutive year, BME magazine will present the Excellence in Engineering Awards, recognizing those organizations and individuals who have made significant contributions to the art of broadcast and teleproduction engineering.

Honorees may include stations or facilities that have demonstrated innovation in design or operation; industry groups that have spearheaded technological progress; or researchers who have furthered the science of broadcasting.

To nominate an organization or individual, or for more information, contact Eva J. Blinder, Editor, BME magazine, 401 Park Avenue South, New York, NY 10016, (212) 545-5100.

BME

Nominations must be received no later than October 30, 1989.
Award winners will be announced in the February, 1990 issue.

Find Distance and Bearing the FCC Way

By Ronald F. Balonis

For some things, a computer is a fascinating calculating machine whose awesome precision and exactness lulls you into believing that its results actually are exact and precise. But differences in "exactness" or "preciseness" can arise, due to a computer's built-in mathematical ability or to a program's algorithms and equations. Sometimes these differences are significant merely as the subjects for armchair debate or letters-to-the-editor. But sometimes having exactly and precisely the same results is all that matters—for example, when calculating mileage separation distances for FM and TV allocations. For these calculations, a little bit of a difference can make the big difference between a close and a short-spaced allocation.

The FCC, of course, is the final arbiter in its proceedings for any distance calculation differences. For these situations of calculatory dilemma, they are, and have been, caught in the middle. But perhaps not anymore—maybe.

In MM Docket No. 86-144; FCC 87-296: Broadcast Services; Review of Technical Parameters for FM Broadcast Stations, the FCC made some changes to the "official" way of making distance calculations. Effective November 9, 1988, they changed, for increased accuracy, the required method for calculating the distance between two reference points (stations) for FM and TV allocations. They adopted a set of precise coefficients for the equation to use for distance calculations.

The improved method is still one of the so-called flat earth ones—just more precise and more accurate. In broadcasting, assuming a flat earth gives a mathematical model that relates closely to the reality of broadcasting. For the most part, the propagation of FM and TV signals is by line of sight. The earth over which FM and TV signals travel is, for them, flat and straight. And if everyone's using the same model of reality, there can be no dispute.

Although section 73.208(c) gives the algorithm and the equation for distance calculations in precisely explicit and exacting terms, it does not specify it as an "official" or "standard" computer program or algorithm for one. However, from a programming standpoint, all that's left out of this section of the rules is actually coding it into a computer program. And that is where this month's Compute program comes from.

DISTBRG.BAS directly implements, with variable names and in coded form, the method and equation of 73.208(c) for the calculation of distance. Lines 600-635 code the subroutine that converts the reference point coordinates to decimal degrees—73.208(c)(1). Line 505 calculates the middle latitude—73.208(c)(2). Line 520 calculates the number of kilometers per degree latitude difference—73.208(c)(3). Line 525 calculates the number of kilometers per degree longitude difference—73.208(c)(4). Line 535 calculates the north-south distance in kilometers—73.208(c)(5), and the east-west distance in kilometers—73.208(c)(6). And line 540 calculates the distance between the two reference points by taking the square root of the sum of the squares of the east-west and the north-south distances—73.208(c)(7).

For calculating the true bearing azimuth, the roundness of the earth cannot be discounted, so, whenever possible, DISTBRG.BAS uses a spherical trigonometric method to calculate azimuth (lines 560 to 578). The spherical trigonometry equations require the ARCCOS function. On many computers, this is a "derived" function with a

```
DISTBRG.BAS          + DISTANCE & BEARING USING FCC 73.208 +

FROM: <LAT./LONG.>     TO: <LAT/LONG>       N-BRG-E    -- KM --     -- MI --   <R><>

     411057/755217        411015/755236      198.87        1.37         0.85   ?
     411455/755250        411059/755210      172.71        7.34         4.56   ?
     355050/1005050       345050/1015050     219.48      143.43        89.12   ?
     410600/745144        410640/761556      271.06      117.89        73.25   ?
     410428/761620        410640/761556        7.83        4.11         2.55   ?
     45.0/90.0            45.0/95.0          271.77      394.25       244.97   ?
```

Figure 1. *Demo screen for DISTBRG.BAS.*

```
0   'DISTBRG.BAS  ++ DISTANCE & BEARING BY FCC 73.208 ++
5   '             + BY RONALD F. BALONIS  12/04/88   +
10  '
30  DEFDBL M,L,E,A,B,C,D,K:PI=4*ATN(1):RAD=180/PI
40  TLE$="+ DISTANCE & BEARING USING FCC 73.208 +"
50  '
100 CLS:PRINT "DISTBRG.BAS          ";TLE$:PRINT
105 LX=5;'---LINE COUNTER
110 PRINT "FROM: <LAT./LONG.>     TO: <LAT/LONG>    ";
115 PRINT "   N-BRG-E    -- KM --    -- MI --   <R><>"
120 LOCATE LX,1:PRINT SPACE$(79):LX=LX-1:'--CLEAR LINE
125 LX=LX+1:'---NEXT LINE
130 '
150 LOCATE LX,5
155 LINE INPUT D$:J=INSTR(D$,"/")
160 IF J=0 THEN STOP ELSE GOSUB 600:D1=D
165  D$=MID$(D$,J+1,10):  GOSUB 600:D2=D
170 '
175 LOCATE LX,25
180 LINE INPUT D$:J=INSTR(D$,"/")
185 IF J=0 THEN 120 ELSE  GOSUB 600:D3=D
190  D$=MID$(D$,J+1,10):  GOSUB 600:D4=D
195 '
200 GOSUB 500:LOCATE LX,40
210 PRINT USING"   ###.##  ######.##";BRG;DIST;
215 PRINT USING"  ######.##";DIST/1.609347219#;
220 INPUT "  ";ANS$
225  IF ANS$="R" THEN 120 ELSE 125
230 '
500 '---COMPUTE DIST & BRG USING FCC 73.208 METHOD
505 ML=((D1+D3)/2)/RAD:'----CALCULATE MIDDLE LATITUDE
510 '---AND COMPUTE KM/DEGREE LONGITUDE & LATITUDE
515 LTKM=111.13209#-.56605*COS(2*ML)+.0012*COS(4*ML)
520 LNKM=111.41513#*COS(ML)-.09455*COS(3*ML)+.00012*COS(5*ML)
525 '---CALCULATE DISTANCES-- NS (|) & EW (-)
530 NS=ABS(LTKM*(D1-D3)): EW=ABS(LNKM*(D2-D4))
535 DIST=(NS^2+EW^2)^.5:'---DISTANCE IN KM (/)
540 '---FIND BEARING BY PLANE & SPHERICAL TRIGONOMETRY
542 IF NS>0 THEN BRG=ATN(EW/NS)*RAD ELSE BRG=90
544  IF D1>D3 AND D2>D4 THEN BRG=180-BRG
546   IF D1>D3 AND D2<=D4 THEN BRG=180+BRG
548    IF D1<=D3 AND D2<=D4 THEN BRG=360-BRG
550 '
560 A=D1/RAD:B=D3/RAD:L=(D2-D4)/RAD
562 IF L > PI THEN L=L-2*PI ELSE IF L <-PI THEN L=L+2*PI
564  D=SIN(A)*SIN(B)+COS(A)*COS(B)*COS(L)
566  IF D>=1 OR D<=-1 THEN RETURN:'--- WITH TRIG BEARING
568   D=PI/2-ATN(D/SQR(1-D*D))
570   C=(SIN(B)-SIN(A)*COS(D))/(COS(A)*SIN(D))
572   IF C>=1 OR C<=-1 THEN RETURN:'-- WITH TRIG BEARING
574    BRG=RAD*(PI/2-ATN(C/SQR(1-C*C)))
576    IF L<0 THEN BRG=360-BRG
578     BEEP:RETURN:'------------ WITH SPHERICAL BEARING
590 '
600 '---CONVERT COORDINATES INTO DECIMAL DEGREES
605 DD=VAL(D$):I=INSTR(D$,"."):'--LOCATE DEC. POINT
610 '---LOGIC DETERMINES THE FORMAT
615 'F=FORMAT  1=DD.DDDD  2=DDMM.MM  3=DDMMSS
620  F=(I<>0)*(I<5)-2*(I>4)-3*(I=0)
625  IF F=1 THEN D=DD:RETURN
630   IF F=3 THEN GOSUB 635:DD=D
635    D=INT(DD/100):D=D+(DD-D*100)/60:RETURN:'--END.
```

Figure 2. *DISTBRG.BAS, a program to calculate distance.*

range of plus or minus one radian (lines 568 and 574). Therefore, for the distances (short) and the azimuths (near 0 and 180) that are out of the function's range, the simple trigonometry equation—arctangent of the triangle formed by the lines of latitude and longitude—is used for calculating the bearing. A beep identifies a bearing calculated by spherical trigonometry.

Besides the actual algorithm to calculate the distance, the program includes a user-friendly subroutine for converting the reference coordinates into decimal degrees, 73.208(c)(1). Lines 155 to 190 input the coordinates into the string D$. Both latitude and longitude are input on one line separated by a slash (/), and the input coordinates can be DD.DDDD, DD.MMMM, or DDMMSS. The conversion subroutine is in lines 600 to 635; its first line locates the decimal point using the INSTR function. The format is then determined using logic to assign a value to the format variable F in line 620.

In a logical assignment, TRUE is 0 and FALSE is -1. For the format of DDMMSS (3), F = (0) * (-1) -2 * (0) -3 * (-1). The value of F then controls the conversion to decimal degrees in the rest of the subroutine.

The program's designed to build a line-by-line list of calculations on the screen. Using a DD.DDDD, DD.MMMM, or DDMMSS format, type in the FROM point's coordinates as one entry, separating the latitude and longitude with a slash (/) like this: DDMMSS/DDMMSS. Then type in the TO point's coordinates in the same way. Be sure the coordinates are correct. The program expects data in one of the three formats, else garbage in, garbage out. In a second or two, the calculated distance displays in kilometers and miles, followed by the bearing. (The conversion To/From miles is also another source of calculation differences. DISTBRG.BAS uses 1.609347219; it's the one to use for applications related to USGS topographic maps.) Do a null enter for another calculation, or enter an R to <R>edo it. A null enter at the first prompt ends the program. As always, errors prompt a restart of the calculation and use the print screen for hard copy.

Exactness and precision can be very important when the calculations involve FM or TV allocations, or other allocation matters. Take as an example the effect it has with the rounding rules for FM or TV distance calculations. For FM, 73.208(c)(8) states that "distances are to be rounded to the nearest kilometer." For TV, 73.611(d) states they are to be "rounded to the nearest tenth of a kilometer." On "close" mileage separation situations, a tenth of a kilometer can make a big difference for FM and, for TV, it only takes a hundredth of a kilometer. ■

Balonis is chief engineer, WILK, Wilkes-Barre, PA. His Compute programs are available for download on A/V Sync (404) 320-6202.

FM Allocations: Hurry Up and Wait

By Harry F. Cole

Remember about six years ago, when the implementation of the new FM channel assignments from Docket No. 80-90 was a real concern? Back then, serious (and justifiable) worries existed as to whether the tsunami of new FM applications would so swamp the Commission's staff that it might paralyze much of the FCC's operation. This was not an idle fear in light of what was happening at just about the same time with low power television: In LPTV, the Commission opened the doors and invited applicants in, and in they came—25,000 or more, crippling the process and preventing the prompt initiation of LPTV service in many areas.

Perhaps because of the unfortunate LPTV experience, the FCC's FM people approached the Docket No. 80-90 channels differently. By adopting a novel set of procedures which called for, among other things, a staggered schedule of channel availabilities, the staff managed to regulate the flow of applications.

Now, however, it seems that the Commission has fallen back on its old ways, particularly in the FM area. As we have reported in recent months, the face of the FM allocation scene has been dramatically revised over the last year or so. We now have a total of seven classes of commercial FM channels (with the adoption of the new Class C3), directionalization is a permissible allocation tool for FM stations, cities of license can be changed with relative ease (and no competition) and, in the latest development, the Commission has doubled the maximum power for Class A stations from three to six kW. The result has been to create new opportunities galore for possible improvements to existing stations' operations.

Unfortunately, it appears that the new changes are becoming effective with little thought to the practical problems of dealing with the number of applications likely to be submitted. The likely upshot is that eager applicants may have long waits for approval.

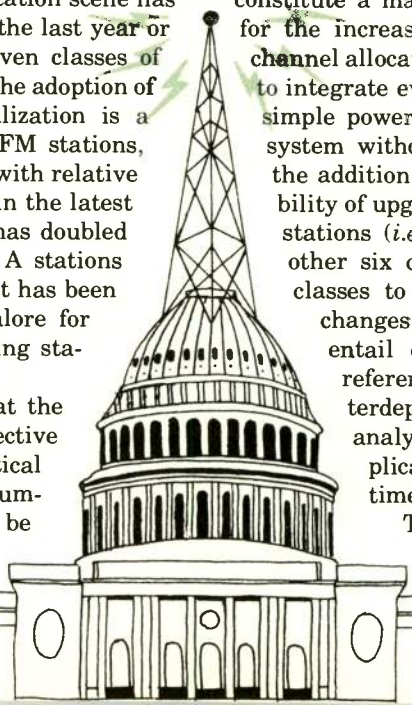
Already the backlog is building. Minor change applications, which at one time might be granted within approximately three months of filing, now seem to take six to nine months. And God forbid that such an application should be dismissed for some reason. Petitions for reconsideration of dismissals of minor modifications are so backed up that it may be three *years* before a reconsideration petition will be reviewed and acted on.

The situation is likely to get worse before it gets better. For example, rather than simply adopt an across-the-board power increase for Class A stations—a move some argued would be consistent with the protection standards applicable to all existing stations—the Commission has opted to require all but 500 of the 2000 or so Class As to file individual modification applications.

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

The mere volume of new applications might not, in and of itself, constitute a major-league problem were it not for the increased overall complication of the channel allocation scheme. It might be possible to integrate even a large volume of relatively simple power increase applications into the system without much disruption. But with the addition of directionalization, the possibility of upgrading in virtually all classes of stations (*i.e.*, from Class A to any of the other six classes, and from any of those classes to even higher classes), possible changes in cities of license (which will entail changes in channel allotment reference points) and the obvious interdependence of all these factors, analysis and evaluation of these applications is likely to become more time-consuming and problematic.

This is especially true since modification applications do not



appear to be subject to any "cutoff" procedures designed to permit prompt and easy identification of mutually exclusive applications. One of the most beneficial aspects of the Docket No. 80-90 approach was the "window" system of opening channels for applications: Everyone knew when each "window" would open and close, and thus everyone knew that, as of a date certain, the universe of competitors for a given channel was defined.

The Commission does not appear to have adopted any equivalent system by which it might deal with the modification applications likely to be generated by the various new allocation standards. Of course, some modification efforts (*e.g.*, upgrading channel classifications, city of license changes) require a preliminary rulemaking proceeding, which at least will provide a notice and comment period for interested and potentially affected stations. But Class A power increases will not be required to go through rulemaking; neither will directionalization applications. And yet, any changes arising from such situations should obviously have an impact on other similar situations. This includes both applications *and* rulemakings, of course.

Because of these various, interdependent factors, we can and probably should expect a long wait before the anticipated benefits of the new FM standards will be realized. This is unfortunate because it may not be absolutely necessary. It seems that, with a modicum of thought to the problems likely to be encountered, the Commission might have been able to devise one or more procedural approaches (akin, but probably not identical, to the "window" system) which would at least reduce the possibility of "daisy chains" and which would assure adequate notice, to all potentially affected parties, of possible changes in the FM allotment landscape.

Now that directional applications are being accepted, and Class A power increases and city of license changes are in the works, it may be too late to try to put the toothpaste back into the tube. Not, of course, that the Commission won't necessarily try to do just that. In July, for instance, the FCC finally got around to deciding that a number of applications it had dismissed because of buffer zone considerations should, in fact, not have been dismissed. Accordingly, it reinstated those applications. However, in each case the application was mutually exclusive with multiple others that had already gone forward. The Commission found itself ordering the reopening of three separate hearings, one of which had been settled, one of which had been decided by an administrative law judge (ALJ) last March, and one of which had been decided by an ALJ two years ago! Needless to say, the introduction of a new applicant into each of these proceedings is hardly conducive to the efficient and expeditious authorization of new radio service.

This is *not* intended to discourage you from trying to take advantage of the opportunities the FCC has

made available to you. It is, however, intended to alert you that you will have to be patient, and you will probably have to be super-careful about monitoring developments on your channel and adjacent channels in your general vicinity. Management, engineering staffs and consulting engineers should work together so that everyone knows what developments are being tracked and why.

On a completely different front, you should be aware of increasing concern at the Commission relative to, of all things, tower lighting. Early this summer the Commission issued a public notice reminding licensees that their towers have to be marked and lighted in accordance with the specifications on their authorizations. Before a station's tower lighting can be varied or reconfigured, approval must be obtained from the FCC's Antenna Survey Branch. Further, daily inspections must be made to ensure that all lights are on and operating properly. If an outage occurs which cannot be corrected within 30 minutes, the local FAA Flight Service Station (FSS) must be contacted immediately so that it can issue a warning to pilots.

In the FCC's view, the question of tower lighting is a "safety-of-life issue," especially in the wake of reports of aircraft collisions with unlighted or improperly lighted towers. Accordingly, the Commission is prepared to take appropriate action. For example, approximately one month after the issuance of its June public notice, the Commission fined a San Francisco AM station a total of $9000 for problems arising from a failure to light its towers. Of the total fine, $8000 was for actually not lighting the towers as required, and another $1000 was for indicating in the station's log that the lighting had been inspected and was operating properly. The FCC's own inspection indicated that there was no beacon on one tower and the lighting on the other towers was inoperative. Worse, the Commission found evidence that the towers had been unlighted for some time. In view of these circumstances, it is somewhat surprising that the fine was as small as it was.

The frequency and severity of enforcement may be affected by the nature and extent of air traffic in the area: Towers located in or near frequently used airspace are likely to be monitored more carefully than others. In any event, though, it is clear that tower lighting is a matter of increasing importance in the FCC's eyes. ■

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BUSINESS BRIEFS

Agfa Magnetic Tape, Ridgefield Park, NJ, will contribute a $5000 matching grant in the form of recording tape to the institutional winner of the Fifth Annual TEC Awards, sponsored by *BME*'s sister magazine, *Mix* . . . **Chromatics, Inc.**, Tucker, GA, has signed an OEM agreement with **Celeris, Inc.**, Chatsworth, CA, giving Chromatics sole distribution rights to Celeris' TacPac and RasPac graphics software products . . . The **Jerrold Division** of **General Instrument Corp.**, Hatboro, PA, has begun an R&D program to expand fiberoptic bandwidth to 1 GHz. The company has already demonstrated a 1 GHz line extender platform derived from its Quadrapower line extender, the XQLE.

Robert N. Vendeland has been appointed general manager for the recently opened West Coast office of the Audio/Video Systems Division of **Peirce-Phelps, Inc.**, Philadelphia . . . Michael Mazur has joined Los Angeles-based **Editel** as telecine colorist . . . **ALTA Group**, San Jose, CA, has appointed **Omnivue, Inc.**, New York, to provide sales resource and marketing support for ALTA dealers in the New England and Mid-Atlantic regions . . . **The Camera Mart, Inc.**, New York, has moved its International Division from the Big Apple to Miami, FL. The new address is 8200 N.W. 27 St., Suite 108, Miami, FL 33122; telephone (305) 591-8118 . . . Will Houde has joined **Seehorn Technologies**, San Jose, CA, as president; Gabriel Franklin will serve as vice president of engineering. Houde is the former GM and vice president of Apple Computer; Franklin and his company, Encore Systems, are authors of the Ashton-Tate database program Full Impact . . . Colorist Clive Christopher has joined the staff of **Complete Post**, Hollywood, CA.

KGO-TV, San Francisco, an ABC O&O, has purchased a BTA-2300 automation system from **Broadcast Television Systems, Inc.**, Salt Lake City . . . **Comsat Corp.**'s Intelsat Satellite Services unit took part in relaying the world's first international broadcast of a digital HDTV signal in April. The broadcast was part of a joint demonstration by Comsat, **AT&T**, Intelsat and KDD, Japan's international telecommunication administration . . . The **National Aeronautics and Space Administration** picked **New England Digital**'s ABLE 60 computer as part of the equipment aboard the agency's *Galileo* Jupiter orbiter. The computer is also used to control the White River Junction, VT-based company's Synclavier digital audio system.

October 23-25 are the dates for the **11th Annual Satellite Communications Users Conference** at the Washington Convention Center in Washington, DC . . . The **Second Annual LPTV Conference & Exposition**, sponsored by the **Community Broadcasters Association**, is scheduled for November 5-7 at The Riviera, Las Vegas.

Mix Magazine, *BME*'s sister publication, has issued a new catalog for its **Mix Bookshelf** service. The catalog may be obtained by writing Mix Bookshelf, 6400 Hollis St., #12, Emeryville, CA 94608 . . . An addition to the Mix Bookshelf is the **Sound Recording Handbook** by John M. Woram, from Howard W. Sams & Co. The foreword is by *Mix*'s editor-in-chief, David Schwartz. ■

Dobovan Productions, Inc. Honolulu, gave its newly acquired Ampex D2 machines a Hawaiian welcome, as president John Dobovan (right) and his DPI staff dressed the VPR-300 VTRs with leis. "We felt the Ampex D2 machines were the right route for us," said Dobovan, "because of their unique multigeneration setup function, which minimizes multigenerational loss when working in analog."

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* Patent Pending
** Patent Numbers 4,030,121 and 4,262,304

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