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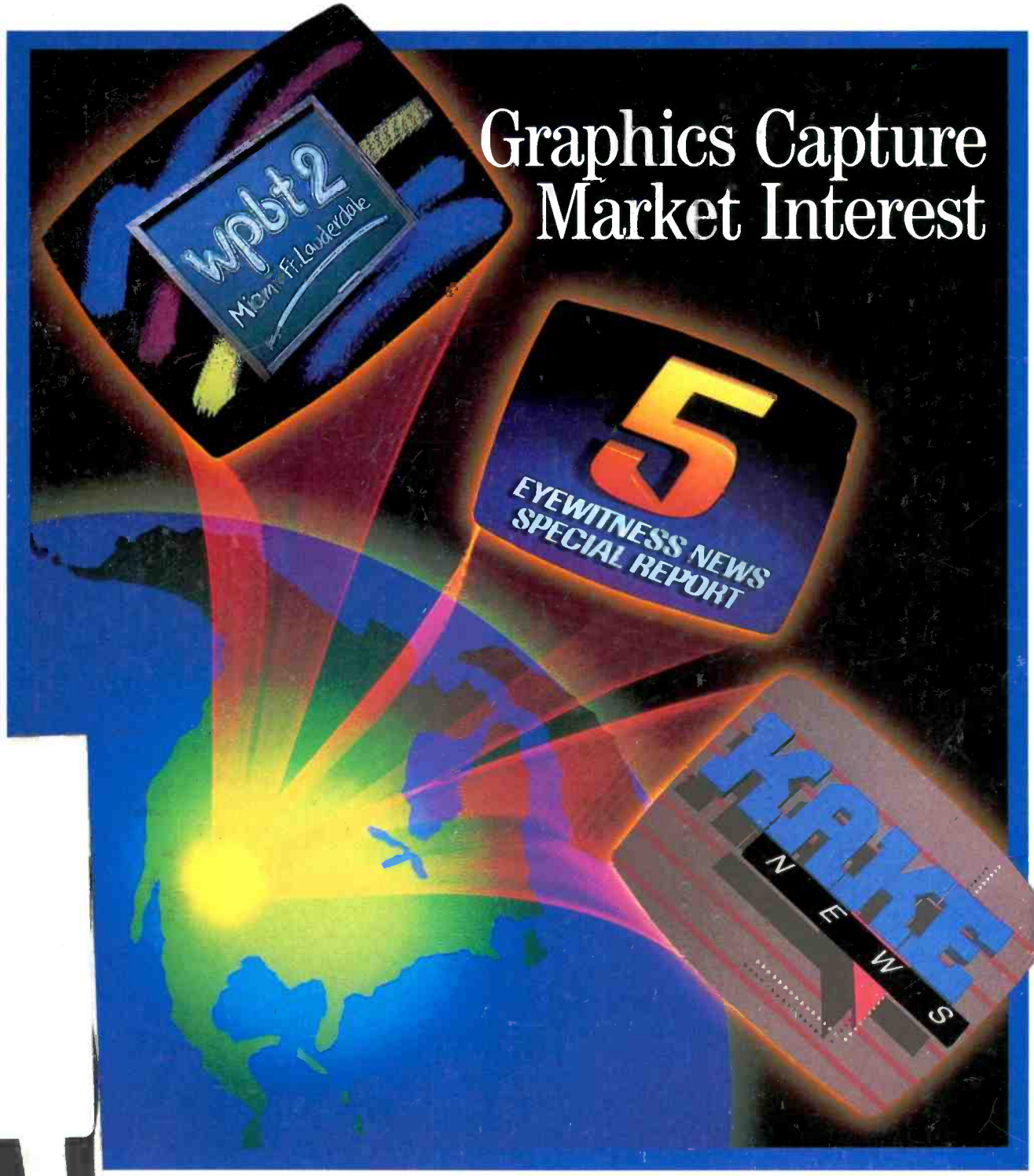
BM/E

BROADCAST MANAGEMENT/ENGINEERING



Graphics Capture Market Interest

Also in this issue:

- Station Identification
- Push for AM Stereo
- MTS Clinic Studio Techniques
- Maximizing Antenna ERP
- BDA and NATPE Previews

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STUDER REVOX

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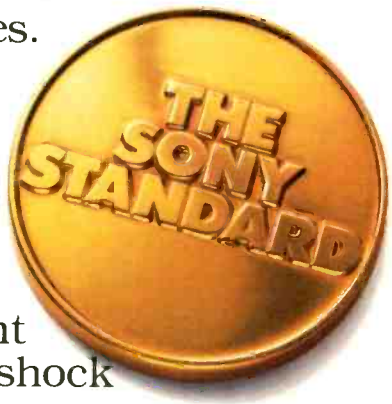

Compare it to its tube-type cousins and you'll find that it's 14% lighter, 22% smaller and eats less than half the power. 510 CCD elements per chip generate amazingly sharp resolution. Registration error holds rock-steady at a miniscule .05% throughout. Add the virtues of F5.6 sensitivity, instant startup, and high resistance to burn-in and physical shock and you have the ultimate lean machine for ENG.

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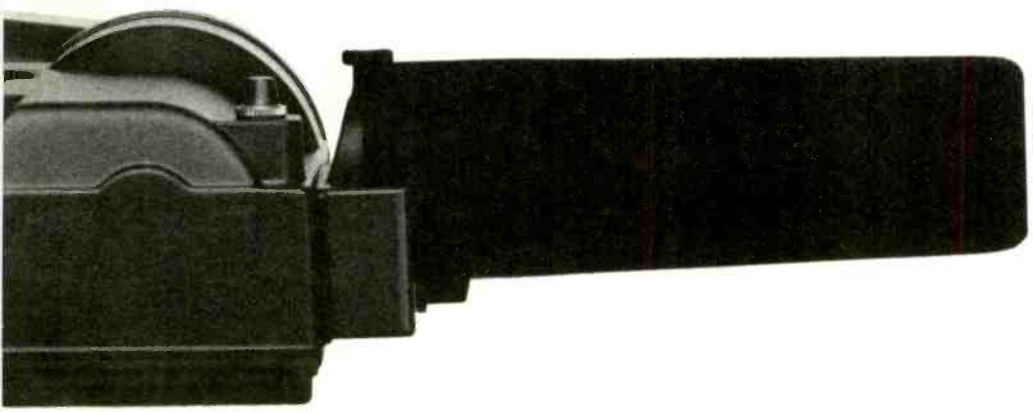
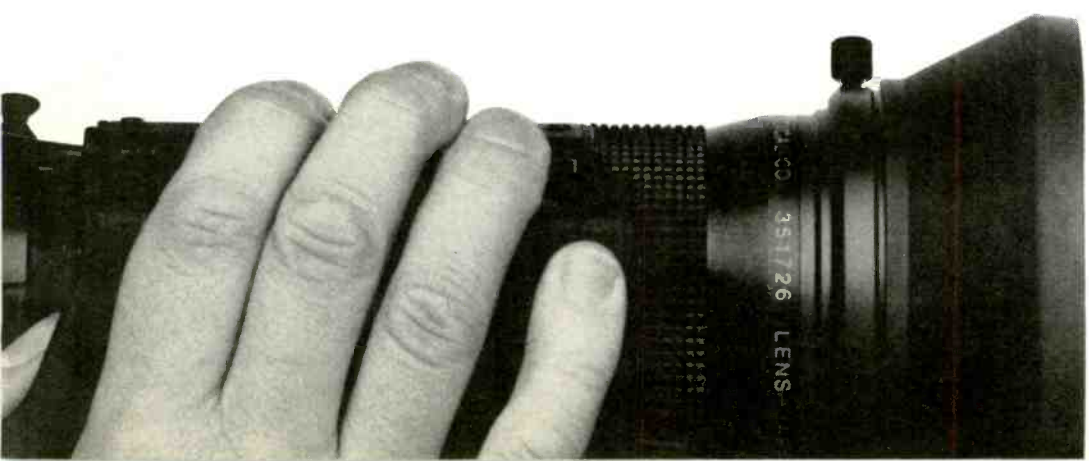
For more information, contact your Sony Broadcast representative. Or call Sony Broadcast at (201) 833-5231.

SONY BROADCAST





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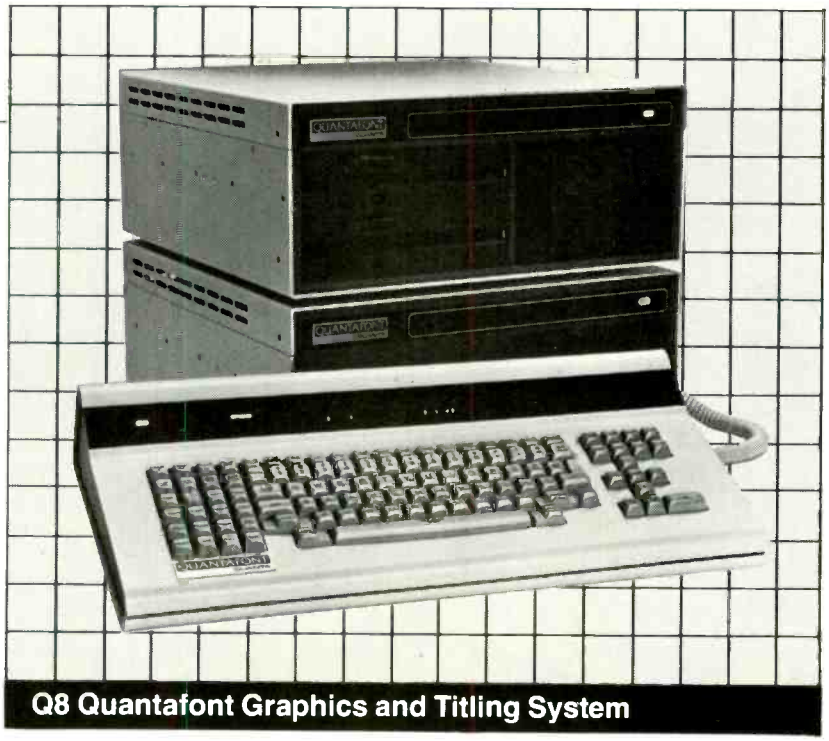

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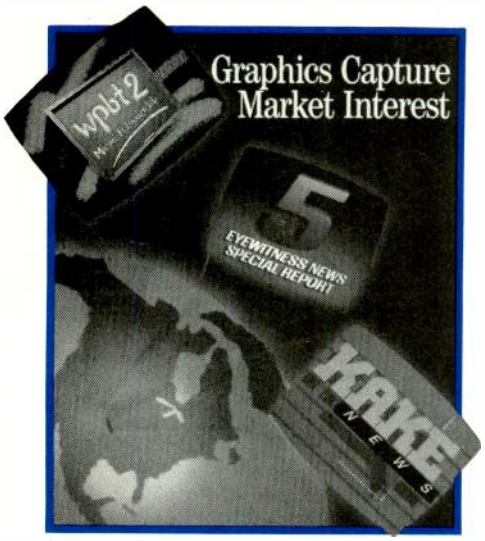

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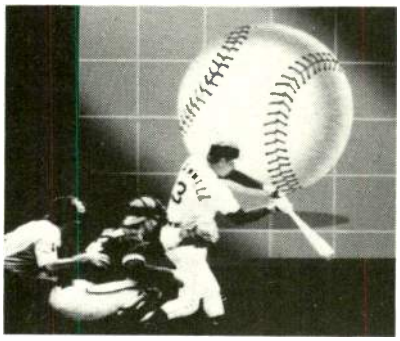

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Features

Departments

Cover:
Distinctive graphics in programming and IDs help stations target audience interest.

De Facto Standards by Cross Licensing

"Three de facto standards were created as a result of a few signatures, without a single industry- or society-called committee meeting."

Three de facto standards were created last month as a result of a few signatures, without a single industry- or society-called committee meeting. Two are the result of cross licensing. Ampex announced it was licensing Sony to manufacture and sell the composite digital footprint it had developed for the ACR-225 "spot" player. At the same time, Sony licensed Ampex to manufacture and sell Betacam products, including the new wide-band Betacam SP. The third "standard" was established by virtue of NBC's decision to buy $50 million worth of M-II-format VTRs from Matsushita (Panasonic). Result: a new digital composite format that may make more sense than a digital component VTR for NTSC broadcasters, according to Ampex, and two competing analog component formats—Betacam SP and M-II.

A new analog component battlefront has been clearly drawn. M-II looks formidable with its early NBC victory. Indeed, NBC has decided it could sweep through the field as a universal surviving format, mowing down not only all previous ENG/EFP ¾- and ½-inch formats, but Type C one-inch as well. The M-II "tanks" will roll, but they will not capture the whole territory. Early Betacam may have been outmanuevered, but Betacam SP coming up from the rear is a match—and all the more so with reinforcements from Ampex and Bosch. (Following the Ampex announcement, Bosch, too, said it had agreement to build Betacam products.)

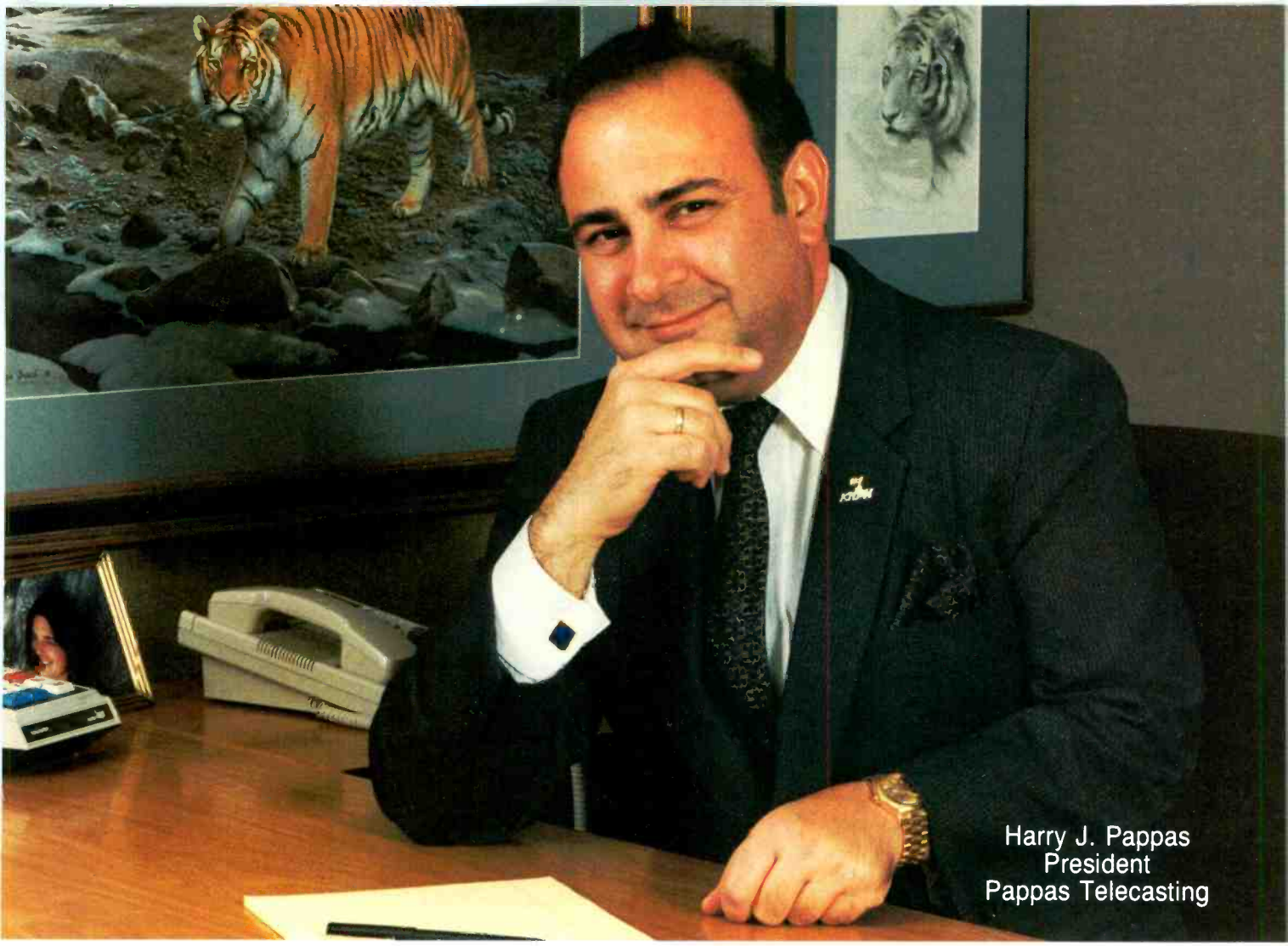
While it surprised many of us that the major VTR competitors were able to come to such private agreement after years of strenuous competition, the moves do make marketing sense.

But surprise gives way to shock as one tries to analyze the import of Sony's implied support for the "out-of-nowhere" digital composite format coming out of Redwood City. We simply weren't prepared for it. We've been "conditioned" to believe digital component was the proper digital route based on the worldwide standards forged by SMPTE and EBU and accepted by the international CCIR body. Analog component equipment has been seen as an interim step toward component digital—but *composite* digital?

Ampex quickly points out that the digital composite recorder is not a substitute for a component recorder. It expects to build both. But there is a compelling reason for a composite unit, and it is one of economics. A digital composite machine will be 30 to 50 percent less expensive, thanks to half the number of heads and a simpler electronics unit. (In other respects, the two machines are quite alike.) This factor alone will make it attractive to NTSC broadcasters who are not primarily concerned about generating tapes for international exchange.

But this additional format choice will certainly delay broad conversion to component digital, and this perturbs EBU members in particular who opt for the 4:2:2 choice. Some view the introduction of a diversionary format as a breach of international responsibility. Are larger purposes being sacrificed for lower-priced solutions? Will interformat interface problems offset such advantages? We believe the marketplace is the place to decide this one. With second sources available, coming to a decision should be less traumatic than it has been in the past.

The Editors



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Harry Pappas was so impressed with his first Comark "S" Series 220kW Transmitter, he bought a second.

You don't get to be a leader in the independent television broadcast industry by making the wrong decisions about TV transmitters. When Harry Pappas was ready to build his New Super-power station, WHNS-TV in Asheville, N.C., he chose the Comark "S" Series 220kW Transmitter. In Harry's own words: "The transmitter lived up to the promises made by the Comark people...and then some. In terms of performance, specifications and efficiency ratings, I couldn't have asked for more."

Naturally when it came to choosing the transmitter for his next station in Omaha, Nebraska, there was only one choice: Comark's "S" Series 240kW rig.

At Comark, we are especially proud to have gained the confidence of a knowledgeable industry leader like Mr. Pappas. But building superior transmitters is only a part of our story. We continue to work even harder at building a superior transmitter company.

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Ampex, Sony to Share Recording Technologies

In a pair of historic agreements announced just a week and a half before NAB, Sony Corp. has agreed to adopt the Ampex digital composite video recording format while Ampex has licensed Sony technology to manufacture and market Betacam half-inch VTRs.

The licensing pacts in no way signify the end of competition between the two leaders in videotape recorder manufacture, however. The agreements include no provision for market exclusivity, ensuring that Ampex and Sony digital VTRs and Betacam units will compete against each other worldwide as their one-inch recorders do currently.

Speaking at a New York press conference, Mark Sanders, vice president and general manager of Ampex Corp.'s Audio-Video Systems Division, estimated that it would be at least a year before either company introduced a composite digital studio VTR. (Ampex's ACR-225, a digital spot player using the composite format, was displayed at last month's NAB show.) Since the format specifies only the "footprint" of the video signal on the tape, Sony is not tied in to any particular recorder design.

Sanders further noted that the composite format is more economical in manufacturing and tape consumption than digital component and suggested that within a decade, digital composite recorders might be priced even lower than comparable analog VTRs.

BM/E feted winners of its 1985 Best Station and Facilities contest Monday night, April 14, at a cocktail party held in their honor during the NAB convention. A readership ballot selected the winners based on entries printed in the December 1985 issue of *BM/E*.

Displaying their awards are, left to right, Tom Sittner, KSJL-AM, San Antonio, TX; Jim Stitt, WLLT-FM, Cincinnati, OH; Chuck Waltman, KIMN-AM/KYGO-FM, Denver, CO; Ross Kauffman, WCVB-TV, Boston, MA; and Rich Thorne, The Post Group, Los Angeles, CA.

Does your station or facility have what it takes to be a winner? Watch for the Best Station Contest ad in an upcoming issue of *BM/E* or send a postcard with your station's call letters and address, and name of the person to be contacted, to: Editor, *BM/E Magazine*, 295 Madison Ave., New York, NY 10017. Contest rules and entry information will be mailed out in August.

Phil Ritti, director of marketing for Ampex Magnetic Tape Division, said that Ampex-manufactured 19 mm digital tapes and Betacam tapes would be available when the recorders themselves are shipped to beta test sites. "Our plans are to support machine formats by the time they are deliverable," Ritti asserted.

According to Sanders, Ampex's decision to support the Betacam format was sparked in part by Sony's recent announcement of an enhanced Betacam SP format using metal particle tape and matching the specs of Matsushita's M-II. In order to offer a complete system, Ampex will also reenter the camera market, which it left several years back, to manufacture a Betacam-compatible ENG camera. Ampex-manufactured Betacam systems could hit the market in about a year, Sanders said.

In an unrelated announcement, Ampex revealed it has acquired a

NAB Bulletin: NBC Fuels Format Fire with M-II Announcement

At an NAB press conference, Saturday, April 12, NBC announced its intention to adopt Matsushita's half-inch M-II format for all network videotape needs, from ENG to on-air playback of programs and commercials.

According to Mike Sherlock, NBC executive vice president, operations and technical services, all five operating divisions of NBC—operations and technical services, news, sports, television stations, and television networks—concurred in the decision and will adopt M-II at all levels.

Under NBC's long-term agreement with Matsushita, Panasonic will be the primary equipment source. The agreement stipulates that Matsushita must "significantly expand" its U.S. service and marketing organization. Sherlock indicated that JVC could be a second source for M-II video equipment. The half-inch metal tape cassettes used by M-II players will be manufactured by Fuji Photofilm and by TDK, as of press time. Sherlock estimated the value of the long-term agreement at $50 million or more, depending on affiliate response. NBC affiliates will be offered "favorable terms" if they opt to purchase M-II equipment.

In-depth coverage of this agreement will be featured in *BM/E*'s June "Show-in-Print" issue.

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As the leader in the United States in the design and manufacture of mobile units, Midwest utilizes the finest in video equipment — and that means JVC. We know that when you're on the road you need a camera that will give you top-quality performance.

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WXEL's M30 Mobile Unit carries four JVC KY950U Color Cameras which produce broadcast quality signal-to-noise ratio, resolution and performance. The KY950U uses a prism optical system and Plumbicon* pickup tubes.

WXEL's M1 Mobile Production Unit utilizes two JVC KY320U Color Cameras. The KY320U also uses the newly designed 2/3" electrostatic focus/electromagnetic deflection Plumbicon* tubes to give it excellent dynamic range suitable for the wide variety of applications demanded in on-location work.

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20-percent share of Cubicomp Corp. The agreement, effective April 1, authorizes Ampex to market and manufacture Cubicomp's PictureMaker 3D graphics animation system. Cubicomp will continue to market the PictureMaker and ModelMaker systems worldwide.

Katz Sells Stations

Katz Communications, owner and operator of 11 radio stations, has sold all of its broadcasting operations to an employee group headed by Dick Ferguson. The employee group includes current Katz Broadcasting executives and general managers of some of the properties. The new company plans to give employees the option to purchase common stock. A new name for the broadcasting operation has not yet been chosen.

The sale is valued at $68.3 million in cash and includes radio stations WEZN-FM Bridgeport, CT; WAAF-FM and WFTQ-AM, both Worcester, MA; WZZK-AM/FM, Birmingham, AL; WSYR-AM and WYYY-FM, both Syracuse, NY; WYAY-FM, Gainesville/Atlanta; WDBO-AM and WWKA-FM, both Orlando, FL; and KWEN-FM, Tulsa, OK; as well as The American Comedy Network.

Satellite Switch Ups NBC Transponder Space

In order to obtain more transponder space, NBC recently physically turned 170 of its affiliates' Ku-band dishes from the SBS satellite to RCA's K-2 satellite.

The switch was acheived remotely from the facilities of NBC's Skypath central control and monitoring systems in New York and Burbank during the four and a half early-morning hours when the network is silent.

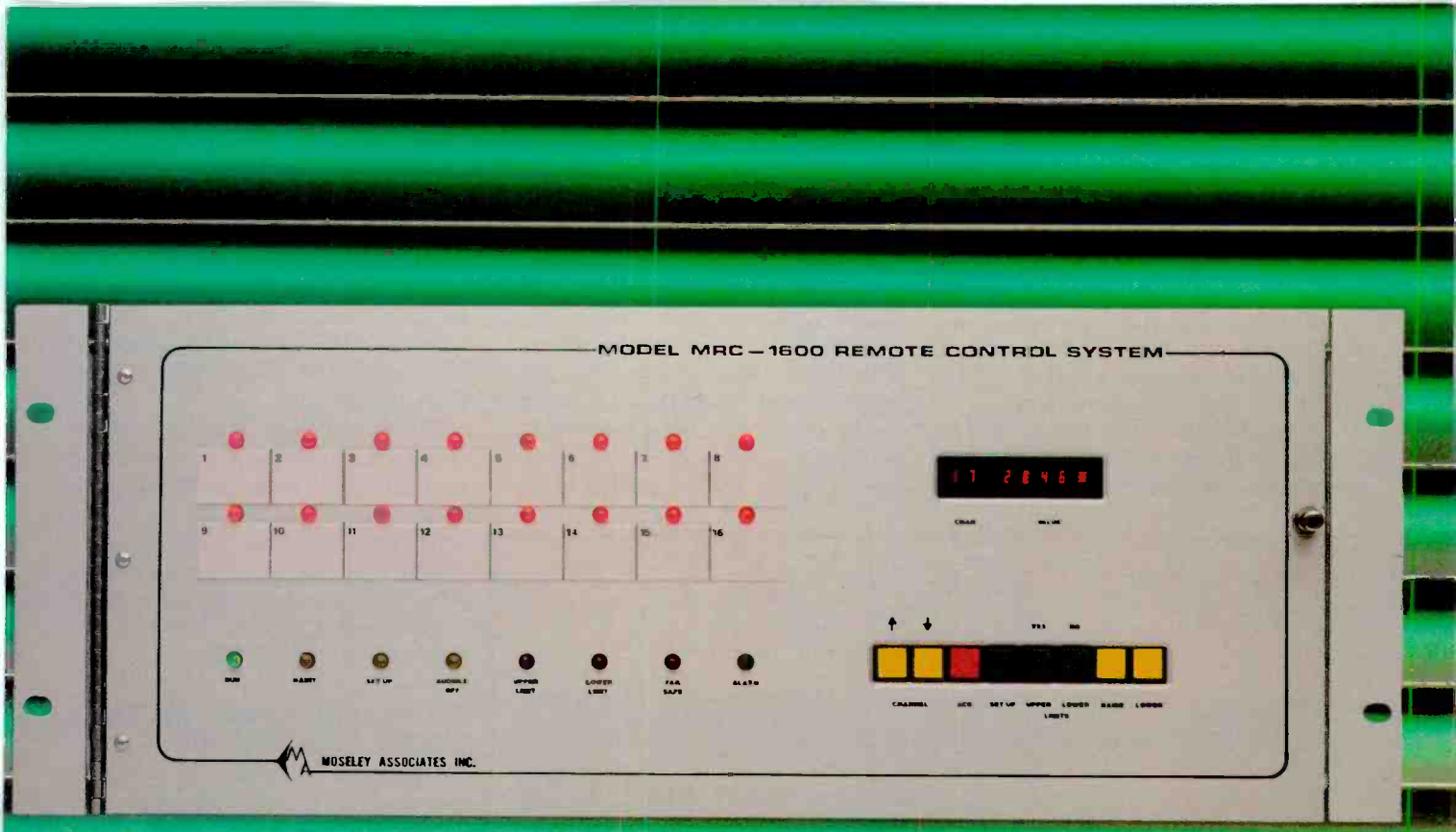
Michael Sherlock, NBC executive VP of operations and technical services, called the move "a tremendous technological feat that marks the culmination of close to three years' work with the Comsat organization."

The RCA K-2 satellite, located at 81 degrees west longitude, has the highest-power transponder in the sky. The switch gives NBC six full-time transponders in addition to the four it had on the SBS satellite, which the network intends to keep for occasional sports and news coverage.

NBC signed a ten-year, several-hundred-million-dollar agreement with Comsat General Corp. in Oct. 1983 calling for the leasing of transponder space on the SBS satellite until the launch of RCA's K-2 satellite this year.

Additionally, NBC leases uplinks at 10 locations, including master stations in New York and Burbank, and six transportable uplinks for news and sports.

In April of last year, with Ku-band technology in place, NBC virtually eliminated the use of land lines and microwave relays as means of transmission and be-



The Moseley MRC-1600. Simply Sophisticated.

It's the middle of AM drive time when the call comes. Your highest-priced talent has an alarm and can't read the meter on the remote control.

Is it one volt or ten? Five thousand watts or fifty?

You've been meaning to get rid of that old analog remote control unit, and now is the time.

Optional CRT and Logger.

The MRC-1600 gives you digital simplicity. With real numbers and units of measurement that even Harry-in-the-morning can read.

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With a full 16 status, 16 telemetry and 32 command channels, the MRC-1600 is not only simple, but sophisticated. Solve your remote control problems today. Contact Moseley Marketing or your Authorized Moseley Distributor.

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gan distribution of its network service to its 207 affiliates exclusively by its Skypath satellite system. Ground system equipment is monitored by the Satellite Network Management System, which NBC developed jointly with Comsat and the Harris Corp.

Central control of the SNMS is located in Skypath control rooms in New York and Burbank.

Satellites Link Up Live PBS AIDS Special

Live-by-satellite hookup of four locations around the country formed the core of the PBS *Frontline* special, "AIDS—A National Inquiry," broadcast March 25. Denver-based Norac Productions handled the transmission for the two-hour prime-time special, with C-band uplinking to four satellite transponders of feeds from locations around the country.

An examination of the issues and a live panel discussion came from the National Library of Medicine in Bethesda, MD, and the University of California at San Francisco.

The live on-air "teleconference" required the Westar IV satellite transponders to be matched for a total of four hours with no allowance for downtime, according to Philip Garvin, president of Norac. In all, 22 cameras were used, six of them aboard an F&F Productions 55-foot truck at the NLM.

Townsend Gains Backing, Seeks Acquisitions

Townsend Associates has announced its acquisition by Avenir Group, Inc., a development banking company of Bloomington Hills, MI, and Westport, CT. The deal leaves the Townsend organization intact, but with the addition of a new board chairman from Avenir.

Avenir's acquisition of Townsend comes at a good time for the transmitter company. According to George Townsend, "The exit of the RCA Broadcast Equipment Division opened an opportunity for Townsend Associates to accelerate its growth."

Now, backing from Avenir will provide funds for Townsend's expansion. "It allows Townsend Associates to go on the acquisitions trail," says vice president of marketing Bob Anderman.

NAB Asks Refunds for Audio Service

The NAB has asked the FCC to take action on a problem that has plagued radio broadcasters for more than a year.

Last year, when telco carriers were granted tariff increases, many stations found themselves with phone bill increases as great as 400 percent for STLs and remote broadcast lines.

Now, the NAB is asking the Commission to reduce program audio rate levels and to go as far as establishing appropriate refunds for overcharged broadcasters.

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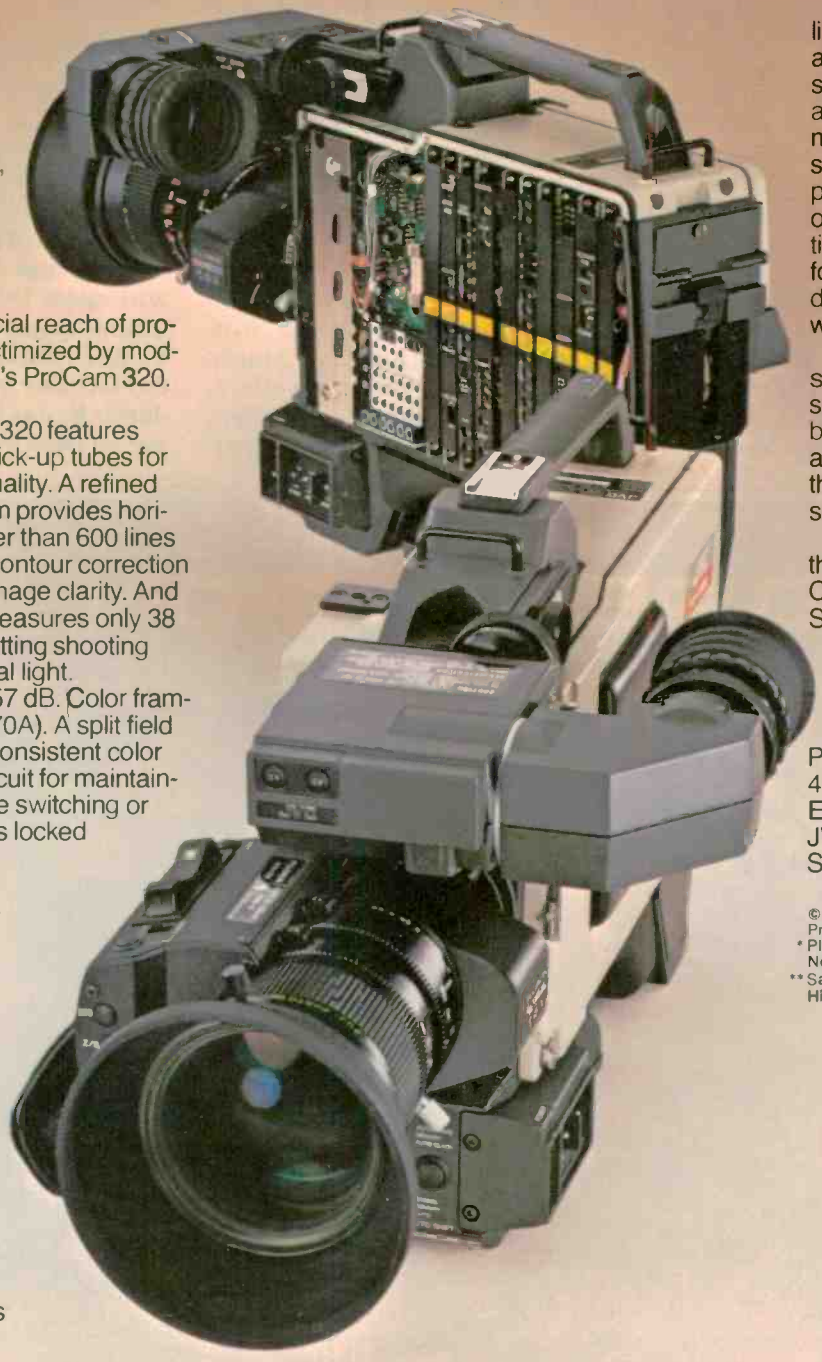

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In what is believed to be the largest radio group sale on record, **Metromedia will sell** nine of its 11 radio stations to an investor group and Morgan Stanley & Co. for a reported $285 million. The deal includes stations in New York, Philadelphia, Los Angeles, Washington, Detroit, Dallas, and Tampa-St. Petersburg, plus the Texas State Networks....**NAB has asked the FCC** to preempt state or local regulations that restrict broadcast or communications services by imposing limits on RF radiation. The association said that absent such a policy, states or localities could interfere with established interstate broadcasting and communication services.

Intraband channel exchanges between public and commercial stations in the same market will be permitted under a recent FCC ruling. The decision allows public stations to raise funds by exchanging a more favorable channel position for a less favorable slot, plus a cash payment. Only UHF-UHF or VHF-VHF swaps are permitted by the new rule....The **FCC has deleted three policies** it called "outdated," including those covering fraudulent billing practices, network clipping, and combination ad rates and joint sales practices. The Commission stated that the public interest is not served by retaining these rules, some of which come under the jurisdiction of other government agencies.

Country music is the second most popular radio format in the U.S. and has seen a dramatic rise in listenership, according to a study conducted for the Academy of Country Music by Landsman-Webster Enterprises. The study found country fans loyal and affluent, with significant percentages of homeowners, urban dwellers, and college graduates....Winners of NAB's recent **AM stereo promotion** contest are KALL, Salt Lake City, UT; KANE, New Iberia, LA; KSO, Des Moines, IA; KXKW, Lafayette, LA; KYSM, N. Mankato, MN; and WVLK, Lexington, KY. Each station will receive $500.

NBC has named New York City contractor Morse/Diesel construction manager for the **new NBC Building,** to be constructed at Cityfront Center. The 35-story structure is to be completed by 1988....**SMPTE has moved** from its Scarsdale, NY, offices to larger headquarters. The Society is now located at 595 W. Hartsdale Ave., White Plains, NY, 10607, telephone (914) 761-1100.

SMPTE's 128th Technical Conference and Equipment Exhibit will **span two weeks** this year, commencing on Friday, October 24 and running through Wednesday October 29 at the newly built Jacob K. Javits Convention Center in New York City.

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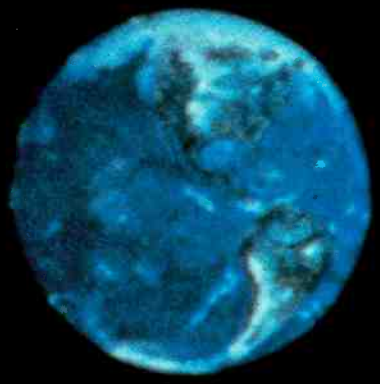

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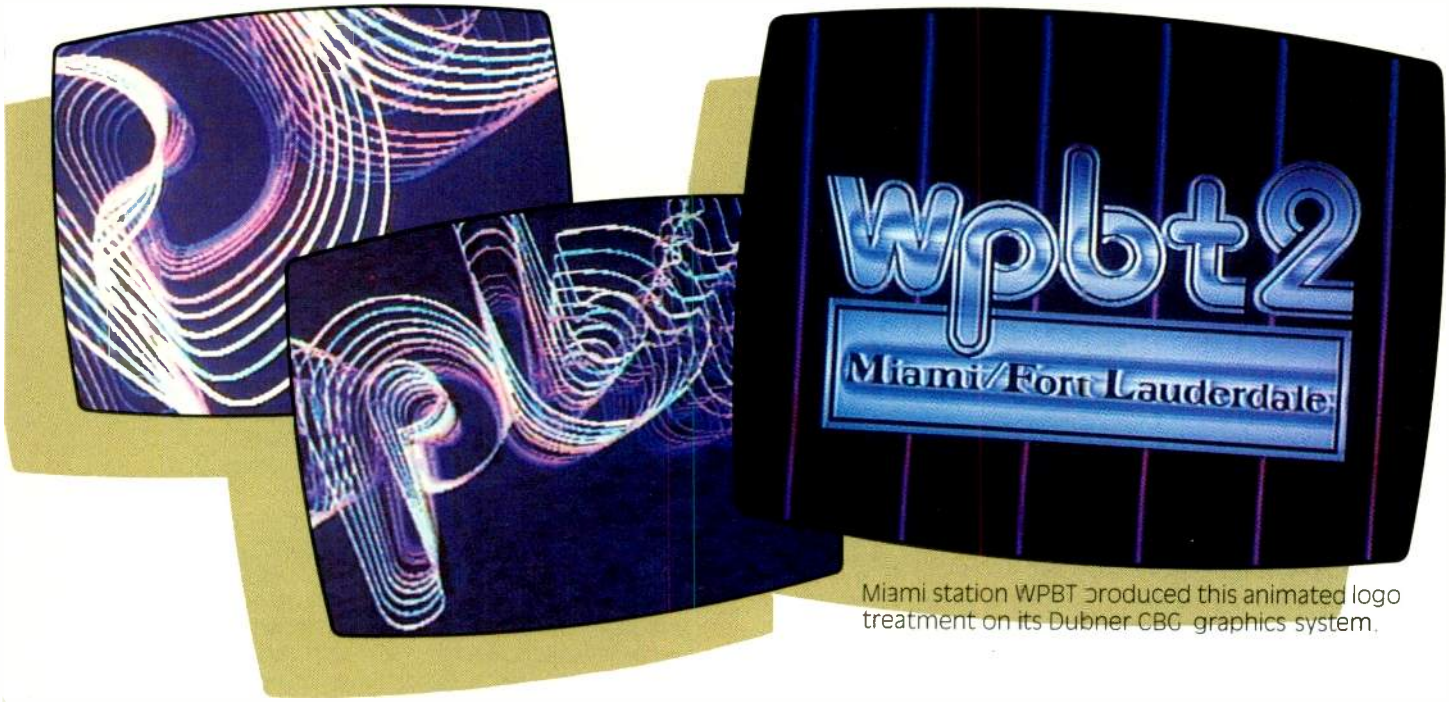


Miami station WPBT produced this animated logo treatment on its Dubner CBG graphics system.

Graphics Build Station Identity

Coordination, consistency, and commitment can ensure a unique graphic image.

By Eva J. Blinder

Few things more effectively set a station apart from the competition than distinctive graphics. This simple truth, long recognized at the networks and in the major markets, is rapidly filtering down even to the smallest markets as the range of television graphics broadens to come into the reach of almost every station. Stations across the country are responding to the competitive pressure—from cable and network TV as well as from the station down the block—by purchasing newly affordable and infinitely more capable paint and animation systems. Even those stations not yet ready to make a full commitment to graphics are striving to get the most out of character generators and special effects devices.

Making effective use of a unique graphics look, however, takes careful forethought and planning. A cleverly designed movie open, for example, may spark recognition among regular viewers; picked up for print advertising, it can extend its effectiveness into print and outdoor advertising. Does the station have a distinctive on-air logo? Carrying it through a variety of on- and off-air promotions makes the most of it and reinforces viewer and advertiser awareness.

A prime example of such a well-thought-out, consistent approach to station graphics is found at WHAS-TV in Louisville, KY. The station's in-house capabilities, as described by art director Cathy Galvin, are extensive and flexible due to the presence of an in-house production company and the lack of union restrictions on personnel.

"We're kind of unusual," Galvin relates. Within the art department itself are a Thomson-CSF Vidifont Graphics 5 with Vidifex and Graphics Store paint software. The station is a beta test site for Ampex's AVA-3 art system

and ESS-3 still store, also located in the art department. In addition, art boasts a two-channel ADO with Concentrator and Infinity software packages on the way.

"We have no switcher in the art department," Galvin continues, "but we're a nonunion station, so we have access to anything in the building," including the Grass Valley Group 1600 in the control room. A just-purchased Ampex AVC switcher with an ADO 2000 on-air effects system will also go into the control room. At press time, some hardware and software had already been delivered for a VPR-3 Type C VTR intended to interface with the AVA-3.

WHAS's capabilities extend even beyond the art department and control room, however. Louisville Productions, the station's own production facility, has a Sony edit suite with three one-inch VTRs, plus additional Sony one-inch decks in the tape room.

Complementing the impressive array of equipment is a staff of five: four electronic graphics designers, including Galvin, plus a print designer.

Artists at WHAS have been able to colorize and reuse the perspective grid background in this image with the Layout mode of the AVA-3.

Much of their image-building efforts are directed toward news, according to Galvin. The station recently completed a redesign of its entire news look using the AVA-3, which has been online for about six months.

"The first thing we did were all the lower-third supers," she explains. "After that, we went into basic backgrounds [for stock averages, etc.], and then we did the over-the-shoulder key insert backgrounds." Galvin found the AVA-3's Layout mode especially useful in this work. Layout allows the user to build a graphic frame and store all its elements in a database for later recall. Recalled elements may be recolored, resized, and repositioned rapidly.

"It's an incredible time saver," Galvin states. "For news, we have a perspective grid background that took about five hours to make. It was very complicated. But once it was stored away as a database, we were able to recall it and recolorize the whole thing for different backgrounds." The recolorizing is accomplished in a matter of minutes, she adds.

Sending a Message Straight from the Art

By Hugh Aldersey-Williams

By designing everything from its signature broadcast graphics right down to the internal memo paper, WDIV has created for itself a distinctive image in its home area of Detroit. Every aspect of the station that the public might see— its new broadcast facilities, its mobile production capability, its letters, even its Christmas cards—has been carefully designed as part of an integrated scheme.

It doesn't stop there. The station, one of the Post-Newsweek group, needs a strong image to meet more than the immediate market needs of Detroit viewers. WDIV has a large commitment to sports coverage and mobile production. The strong graphics of its brochures, calendars, and rate cards are also designed to market these services effectively.

WDIV's design director, Jim Houff, explains how his station's approach started. "The look stemmed from our basic promotional slogan—Go 4 It." (WDIV is channel 4 in Detroit.) That catchphrase was dreamt up by broadcast station promotion specialists, Klein& in Los Angeles. It aims to capture the energetic street language of WDIV's city. The logo had to match the slogan for its originality and impact.

Different graphic styles are used for on-air graphics and animation, but the diverse looks are integrated convincingly to form a powerful station image. "For everything that goes out of here, whether it's on- or off-air, we attempt to pull it all together with a vocabulary, a stylistic approach," says Houff.

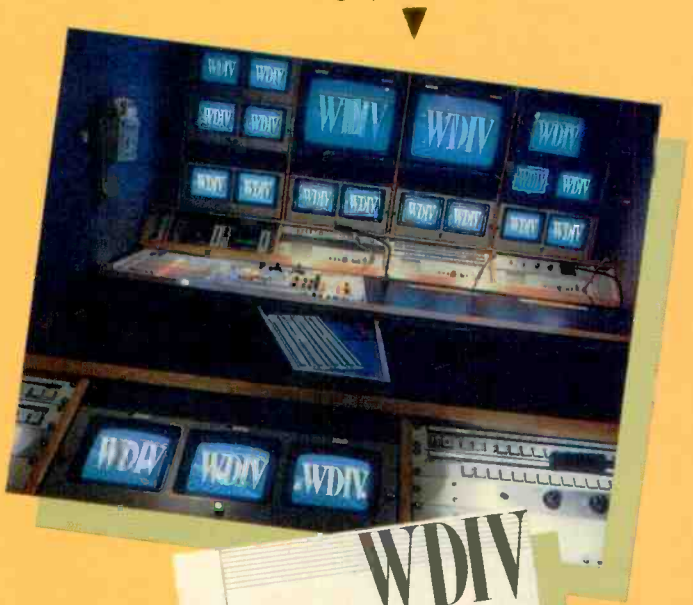
"From what I can see around the country, we probably push it further than most people. Our approach is a little more individual," Houff says. It is not an approach for the faint-hearted. A strong and talented art department and art direction is needed, together with good support from management. Both these features are present at WDIV, Houff claims. Houff himself has a bachelor's degree in advertising and a master of fine arts degree from Michigan-based Cranbrook, one of America's leading design schools.

To television station managers, Houff says: "Don't be afraid to innovate. I think the general population is more visually aware than a lot of broadcast managers give them credit for. The TV audience is accustomed to seeing new things." A good start to tidying up a station's graphics would be to make use of the Broadcast Designers' Association's employment service, he suggests.

Managers often feel that TV is not the place to invent new imagery, Houff says. He counters that visual ideas introduced on TV become absorbed more quickly than those from magazines and billboards. "It is the most visual medium that exists."

The "Go 4 It" logo is rendered in almost graffiti-like lettering on brochures and vans that find their way onto the streets and into people's homes.

A more formal computer graphics format is also used, with the station letters shown full-screen in a stylish serifed typeface. These graphics were created entirely in-house using the WDIV Quantel Paintbox. The paintbox, says Houff, is used all day long for video design, much of which is news graphics.



The slick air-brushed look for the animated station identification sequence was made by Cranston/Csuri Productions in Columbus, OH, using a penciled storyboard developed in-house by the WDIV design team.

Attention to detail is one of the factors that contributes to a successful station image. WDIV's brochures and letterheads show an innovative approach to design as much as its broadcast graphics. Station printed graphics combine a number of ideas, some drawn from current design trends in other fields, to create a contemporary look unusual among broadcasters.

Working two shifts, the graphics crew produces about 25 news graphics each day for WHAS's three newscasts. To ensure consistency, the backgrounds currently in use are input into all equipment to be quickly available to the artists.

Promos and IDs are separated according to application. News promos follow the station's news look while entertainment promos have their own image. Last year, Galvin says, the station opted not to buy the CBS affiliate package and produced its own 10-second animation at The Post Group in August.

"We decided to do our own so we could stress our own logo," she explains. The complex animation was produced using The Post Group's Bosch FGS-4000 animation system, a Quantel Mirage, three channels of ADO, an Aurora videographics system, and seven one-inch VTRs rolling simultaneously. Since completing the animation, Galvin adds, "We've spun it off into movie opens and combined it with some of our graphic capabilities here for a very consistent on-air look." It has also been used as an ID run before newscasts.

WHAS recently redesigned its entire news image using the in-house capabilities of its Ampex AVA-3 paint system and ESS-3 still store.

Print promotion at WHAS also reflects the on-air look—"Very much so," Galvin asserts. Often, in fact, the on-air look follows the print campaign.

"Once a logo's been established, that logo is used," Galvin explains, "so the goal is to make the logo applicable for both" print and on-air. For the Kentucky Derby, for example, a logo was designed first by the station's print artist. It was tested in the AVA-3 for its appropriateness for on-air use and became the theme for both on-air and print. In addition to logos, type styles and even colors are carefully matched to make the station's print and on-air images coincide.

Clearly, Galvin and her staff are sticklers for consistency. But consistency alone is not enough to ensure success, she cautions.

"A big question is consistency," she concedes. "But above and beyond that, in a station's approach to on-air and print graphics, there has to be an understanding that people in markets 25 and up are exposed every day to what the networks and cable are doing. Stations have to respond to a more sophisticated audience in terms of their perception of graphics. They have to be more careful of what they're doing on air and how they're combining it with print—providing you have the equipment to do it. That should be the ultimate goal: to look at yourself not as the local station but as a communicator."

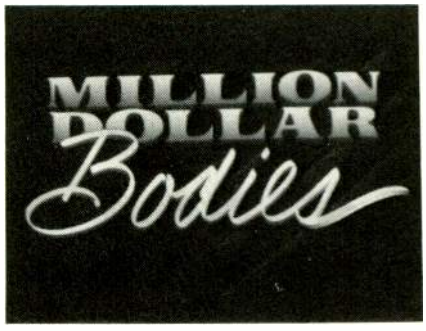
All-out image

In the highly competitive San Francisco market, top-drawer graphics are a survival must, and a full-blown in-house graphics operation is essential to win in the ratings. Stations such as KRON (profiled in the September 1985 *BM/E*) and KPIX have made a mission out of sophisticated graphic images.

At KPIX, art director Mike Bittner heads a 10-person graphics department, four of whose members are devoted to print work. Of the six electronic graphics artists, five work on news and the sixth on programming and promotion.

"It's very much a group effort," Bittner asserts. "We have a senior designer, Janet Utech, who works closely with me and supervises all our print work. I try to watch over all the on-air." Creative services director Ron Crowe oversees the department. "He generates all requests for graphics for *TV Guide* ads and on-air promotion," Bittner adds. "We try to start creating a 'look' at the earliest possible stage, so we sit down and think long-term enough to get consistency. He [Crowe] is very adamant about that."

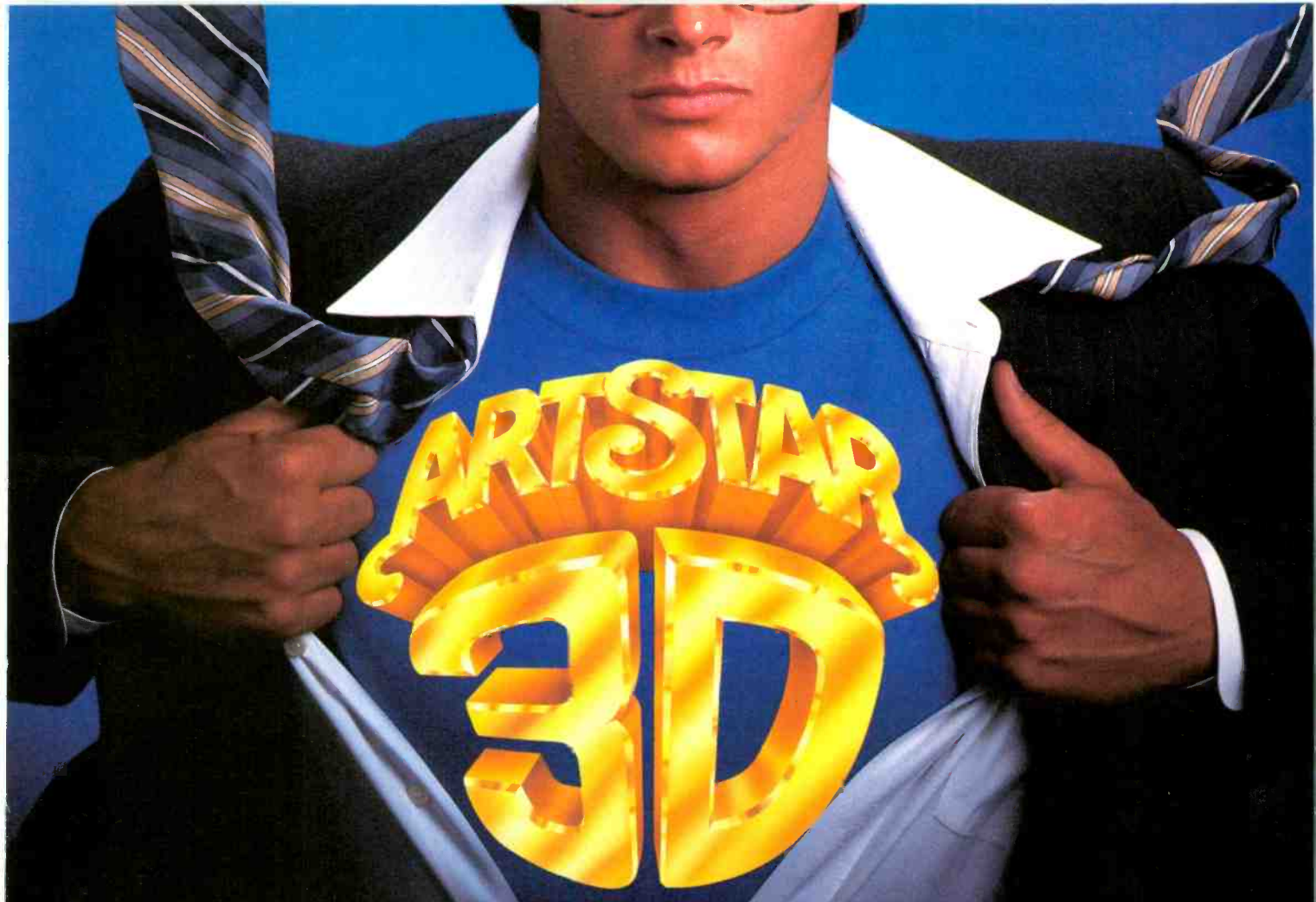
To acheive the quality such commitment demands, KPIX has invested in a raft of high-quality graphics equipment for its graphics department since its January 1984 inception: two Aurora 125 videographics systems, a Quantel still store, a Grass Valley Group 100 production switcher, and a Chyron 4100 character generation. The department also has an older Telemation CG and a Sony BVU-800 U-matic recorder.



One example of the kind of work KPIX does in-house on its two Aurora 125 videographics systems, which are capable of real-time, multiple frame animation.

"Most of the ¾-inch work is for news," Bittner explains. "Anything for programming or promotion we do in conjunction with our post-production facility, which is all one-inch." The post-production suite also has an NEC E-Flex for effects and will shortly add an Ampex ADO. All the graphics department equipment can feed to the post-production facility when needed.

"It's a very joint effort," Bittner continues. "Mike Walter, our primary editor in post-production, does most of the promotion stuff. We'll often sit down and talk a job through with him first. He's a very creative person. He also understands the paint systems well enough that he can suggest things



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we haven't thought of."

One thing the station has lacked until now is 3D animation capability, although Bittner, speaking before NAB, said KPIX planned to look at 3D animation equipment at the show. The station has bought outside animation for some of its promotional work and recently used a local company, Illusion Studios, for a couple of projects. With its Cubicomp Picture Maker 3D animation system, Illusion has been able to fill KPIX's outside animation needs economically.

"They're great because we often have one-time-only projects with low budgets," says Bittner. "Illusion is a small company with low overhead, so we can find the monies for animation at a low cost. The operator is very good, and he can do sophisticated things with the equipment. It mimics a lot of what we paid tens of thousands [of dollars] for before; now we can get it for thousands."

The open for KPIX's Saturday evening community affairs program, *Pacific Currents*, was produced at Illusion. Bittner's staff then combined the Cubicomp animation from Illusion with keyed-in Aurora backgrounds to update the open for bumpers. In addition, Illusion recently finished a title piece for a KPIX children's show, *For Kids' Sake*. This flexibility to combine in- and out-of-house work has been a great boost for KPIX's graphic image.

Divide and conquer

In Phoenix, AZ, station KTSP divides its on-air look into news and nonnews image. Graphic designer Tod Ailts, who reports to creative services director Donna Vogt, is responsible for "everything other than news"—graphic tags, IDs, show opens, and the like—while the news director has a large say in the station's news image. Vogt is responsible for print as well as on-air promotion and oversees two artists who do all KTSP's print work in-house.

"We try to stay consistent," Ailts says. "We've gotten together on many occasions and traded type faces, etc. If I'm producing a graphic, for example an image piece for a day-in, day-out news segment, we try to utilize it in all our on-air promotions. I think we've made a pretty good effort in that area."

The station decided a couple of years back to develop its own unique graphic look rather than buying the CBS affiliate package.

"For news, we have been using the *CBS Evening News* font style," Ailts explains, "but in promotion, we have developed our own look. Now we're experimenting with a couple of different ideas as far as on-air public service graphics are concerned." One of Ailts's current

KPIX went out of house for this title piece for *For Kids' Sake*, a children's show. It was produced on a Cubicomp animation system at Illusion Studios.

projects is ugrading a KTSP public service graphics image called "In Touch with Our Community."

Ailts works in KTSP's graphic compose room, which has user areas for the station's ColorGraphics ArtStar II art/paint system and Chyron 4100 character generator. (The station also uses ColorGraphics' LiveLine IV for weather graphics.) The room also has a Crosspoint Latch production switcher, a terminal for the Quantel still store, and a monochrome digititizing camera. In addition, the station routing system goes into the graphics compose room to give artists access to virtually any station source. The one area in which Ailts sees a lack, at the moment, is in digital effects.

"We're somewhat limited with dynamic perspective moves since we have no ADO or FGS," he points out. "Our 'squeeze' is a Quantel 5000 with no perspective capability." Nevertheless, the station has been satisfied with the work it has produced in-house on the ArtStar, occasionally married with Quantel 5000 effects.

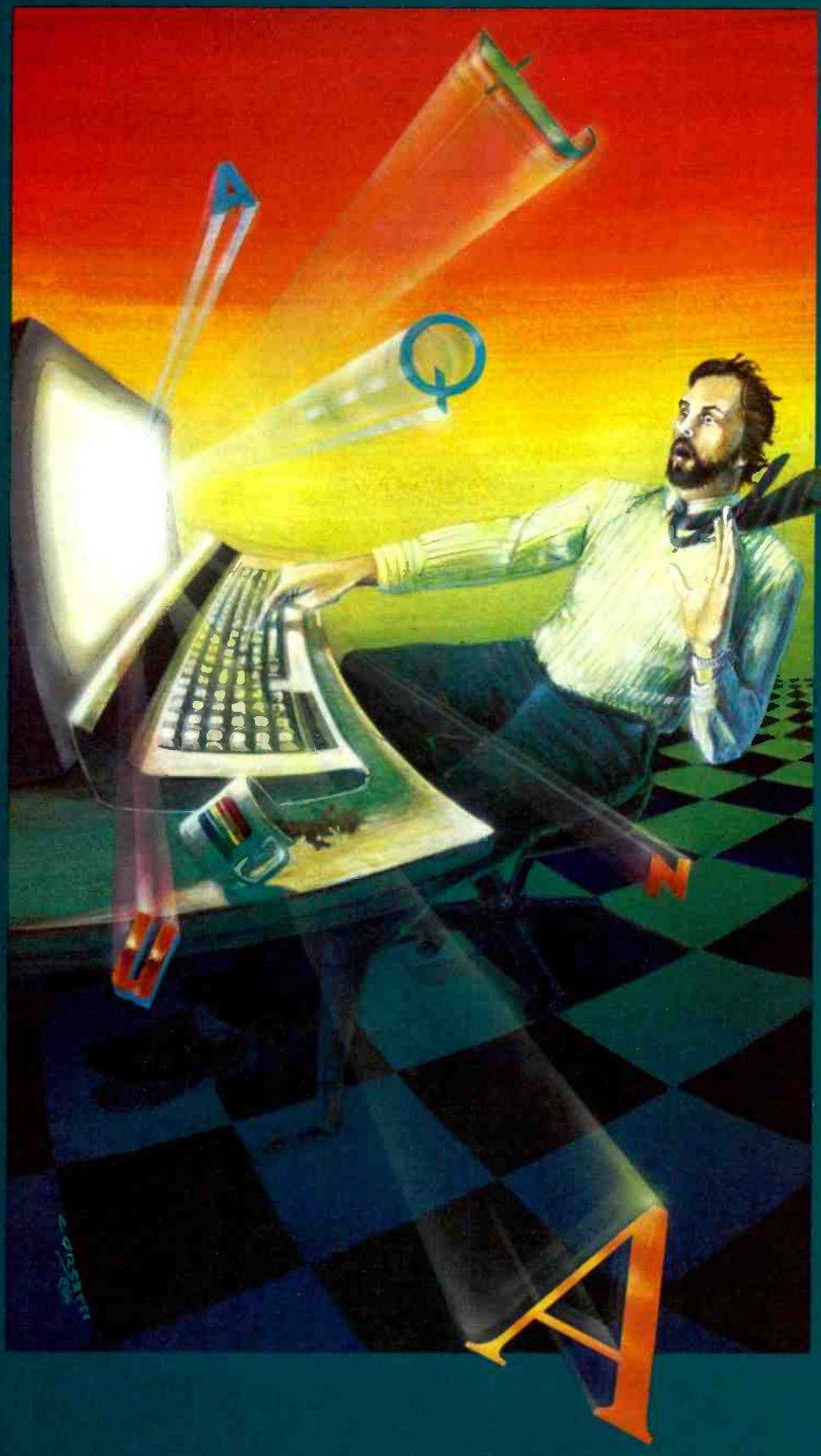
Out-of-house graphics are also purchased for certain applications. An interesting example of how KTSP has combined outside-produced graphics with its own work is a recently produced open for the station's Friday midnight movie. Because movies are an important part of the station's programming (Ailts estimates KTSP airs four or five a week), about a year back the graphics department purchased a movie package from Cranston-Csuri that consists of two basic opens with color scheme variations. That package served as the basis for the movie open, which was completed by Ailts on the ArtStar.

"I was asked a couple of weeks ago to produce the open for the Friday movie," Ailts explains. "It consists of eight or nine neon signs that will be flying across the screen toward the viewer, a very urban look, with *Miami Vice*-type music. It was a lot of work and a lot of fun—we've really pushed neon to the limit." Ailts estimates that 90 percent of the work was done on the ArtStar II, with Quantel effects added to make the signs "fly."

Low-budget creativity

Even with the graphic resources of a KPIX or WHAS, a station needs creativity and commitment to produce an image viewers will remember. But what if equipment resources are limited? Creativity itself then becomes the station's most valuable asset.

Such is the case at KTVF, a small station in the small market of Fairbanks, AK. Although the station has no budget for outside graphics production, and in-house graphics hardware is limited to a Quanta Q-8 single-channel character generator system, graphics producer Forrest Gibson has managed to create a unique look for his station by combining the Q-8's capabilities with imagination.



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"I see what the big boys can do, and I try to recreate it with what we've got," Gibson says of his one-man graphics operation. Using only the Q-8, Gibson has created neon-type lettering, drop shadows, gradated backgrounds, translucence, and what he calls "Paintbox-type effects," using the single-channel Q-8 as a background generator. The IDs and promos he has produced in this way have caused notice not only among viewers but also among the competition.

"The station across the street thought we got them from CBS," Gibson boasts, referring to a graphic ID series he has produced on the Q-8. "Someone else thought we did it on a Dubner. We've been able to do a lot with what we have, a lot more than would probably be expected from a station in the two hundredth market.

"Some of it looks pretty comparable to stations in the larger markets," he continues. "It leaves the other commercial station [in Fairbanks] in the dust. They have an aging character generator and only ¾-inch recorders, so they can't do multiple generations." Resources are limited at KTVF, too, but the station boosts graphics quality by producing everything on quad. For ease of use, Gibson notes, the Q-8 has been downstreamed over the production switcher in such a way that the quad machine goes through it. Two Ampex VPR-2Bs are available as occasional still-frame sources, but they are usually devoted to on-air work.

A recently produced graphic ID series, based on the station's "The One to Watch" slogan, consists of open-ended IDs ranging from three to 12 seconds in length, with either continuous motion or motion in the first five seconds. Starting with a basic idea, Gibson has come up with special versions for holidays such as Christmas and Valentine's Day. Each ID took about two hours, he says.

"The way I work, I'll come up with an idea and I'll just save it" on the Q-8's eight-inch floppy disk, Gibson explains. "Then when I need something, I'll look through the disk and use what I've got." The storage method streamlines his work and allows him to save his inspirations.

Before installing the Q-8 about a year and a half ago, KTVF relied on conventional keyed-in art cards for on-air graphics. Gibson feels that the Quanta system, relatively simple though it is, has made an enormous difference in the station's on-air image.

Going outside

Up in Rochester, NY, WUHF-TV is in the relatively unusual situation of going out of house for almost all of its graphic promotion needs. According to production

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manager Mark Phillips, "We actually don't do too much in-house. Our graphics capability is limited to a 3M D8800 character generator with no paint capabilities. For video graphics, we usually go out of house, but we pretty much stay here in Rochester because there are several good facilities."

One local production house that has had a hand in WUHF's image is Telesis, which recently completed a treatment of the Channel 31 logo for the station's fall campaign on the facility's Artronics Studio Computer graphics system. Phillips says the Telesis logo is the beginning of "a whole new station image thing" that will continue development throughout 1986.

"Sometime in 1986, we are going to be revamping the whole 31 logo to make our image more upscale and sophisticated," Phillips continues. Besides Telesis, WUHF has talked to several local and out-of-town graphics facilities, including Cranston-Csuri in Columbus, OH, and a new Rochester company, CGI Inc., which has a Bosch FGS-4000.

"We're just tossing it out to various people now," explains Phillips. "The first step is a new logo. That will sort of dovetail into a whole campaign with print and promotion."

Another local facility, PCI, has done ADO treatments of some of WUHF's animations for recent promotions. According to Phillips, the station used PCI's facilities to update a five-year-old movie intro that animates the word "special."

"We added perspective on the ADO and had it fly in on-screen," Phillips explains. WUHF also went to PCI for an ADO open for the five local Redwing baseball games it airs each year.

For print graphics, Channel 31 goes out of house as well, using local art studios. Print and outdoor ads are coordinated with the on-air look by the promotion department and general manager, with input from Phillips and the freelance print artists.

Public image

Concern about graphics, of course, is not limited to commercial stations. Especially with the current funding squeeze, public stations worry about ratings and image too. A good example of what graphics can do for a noncommercial station is found in Miami, FL, at WPBT, where graphic design manager Jeff Huff supervises the station's national as well as local image.

The staff consists of two electronic designers, a senior designer who does most of the station's on-air animation and still graphics and an another animator who works with WPBT's Dubner CBG graphics system, and two print designers, one of whom is responsible for print advertising and one

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	have now/ on order	within 3 mos.	within 6 mos.	within 12 mos.
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Art/Paint system over $30,000	☐	☐	☐	☐
3D modeling system under $30,000	☐	☐	☐	☐
3D modeling system over $30,000	☐	☐	☐	☐
Digital effects—1 channel	☐	☐	☐	☐
2 channels	☐	☐	☐	☐
3+ channels	☐	☐	☐	☐
Effects rotation and perspective	☐	☐	☐	☐
3D image manipulator	☐	☐	☐	☐
Digital still store	☐	☐	☐	☐
Digital animation recorder	☐	☐	☐	☐
VTR animation recorder	☐	☐	☐	☐
Analog effects package	☐	☐	☐	☐
Character generator w/graphics	☐	☐	☐	☐
Text-only character generator	☐	☐	☐	☐
Weather graphics system	☐	☐	☐	☐
Typography-grade graphics system	☐	☐	☐	☐

2. Does this equipment expenditure represent a:

☐ Replacement ☐ Expansion ☐ Upgrade

3. Do you have a separate graphics production department? ☐ Yes ☐ No

If yes, does this department serve all graphics needs within the station?

☐ Yes ☐ No

What departments have individual graphics capabilities?

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☐ Weather ☐ Promotion

4. Which graphics or effects advertisements in this issue created the greatest interest for you? _____

_____

5. About yourself: Do you work at a:

☐ TV station ☐ Radio network
☐ TV network ☐ Production company
☐ Radio station ☐ Post-production facility
☐ Other (specify) _____

Are you a:

☐ Chief Engineer ☐ Engineer ☐ General manager
☐ Production manager ☐ Operations manager ☐ Other (specify) _____

Do you:

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for the local insert to *Dial Magazine*, the PBS program guide. (The station has its own in-house print shop with two presses, employing a full-time printer.)

Huff, who has been with WPBT for a decade, has seen the development of the graphics department over the past five or six years from humble beginnings to its present state.

"The attitude of the administration is very important to any design people," he notes, "And they backed us 100 percent from the very start.

"We're still not as sophisticated as we'd like to be, but we seem to be able to get the equipment we can afford at the time and make it look like the equipment we would like to have."

Presently, the station's equipment complement offers plenty of leeway for the creative staff. The Quantel still store, Ampex production switcher, and NEC E-Flex

WPBT uses its logo as the basis for special-occasion IDs, such as this one. It was produced in-house using the station's Ampex switcher and camera cards.

were all in place before the most recent addition, the Dubner CBG.

"The Dubner added a great deal to our look," says Huff. "The combination of that equipment, plus camera cards, are what we currently use to get a sophisticated, network-type look. We feel we do compete with the 'big three' in terms of our graphic images.

"Of course, there are things they can do that we can't, but that doesn't mean we can't try to get a better look." Evidently, the BDA agreed with Huff about WPBT's graphic efforts, awarding the station a Gold Award a couple of years back for one of its *Nightly Business Report* opens.

"We were very happy about that," Huff notes. "It not only proved we could compete, it proved we could be winners." WPBT has not gone out-of-house for graphics since producing a film animation logo at Edstan Studios in New York a few years back.

"We have stayed in-house since then," says Huff. "We decided that we were going to be in the television business and we were going to use video. The station has used its current logo for many years and has no plans to change it.

"I'd like to redesign it, but we've got a damn good local image, and I think it's because it's consistent," Huff states. **BM/E**

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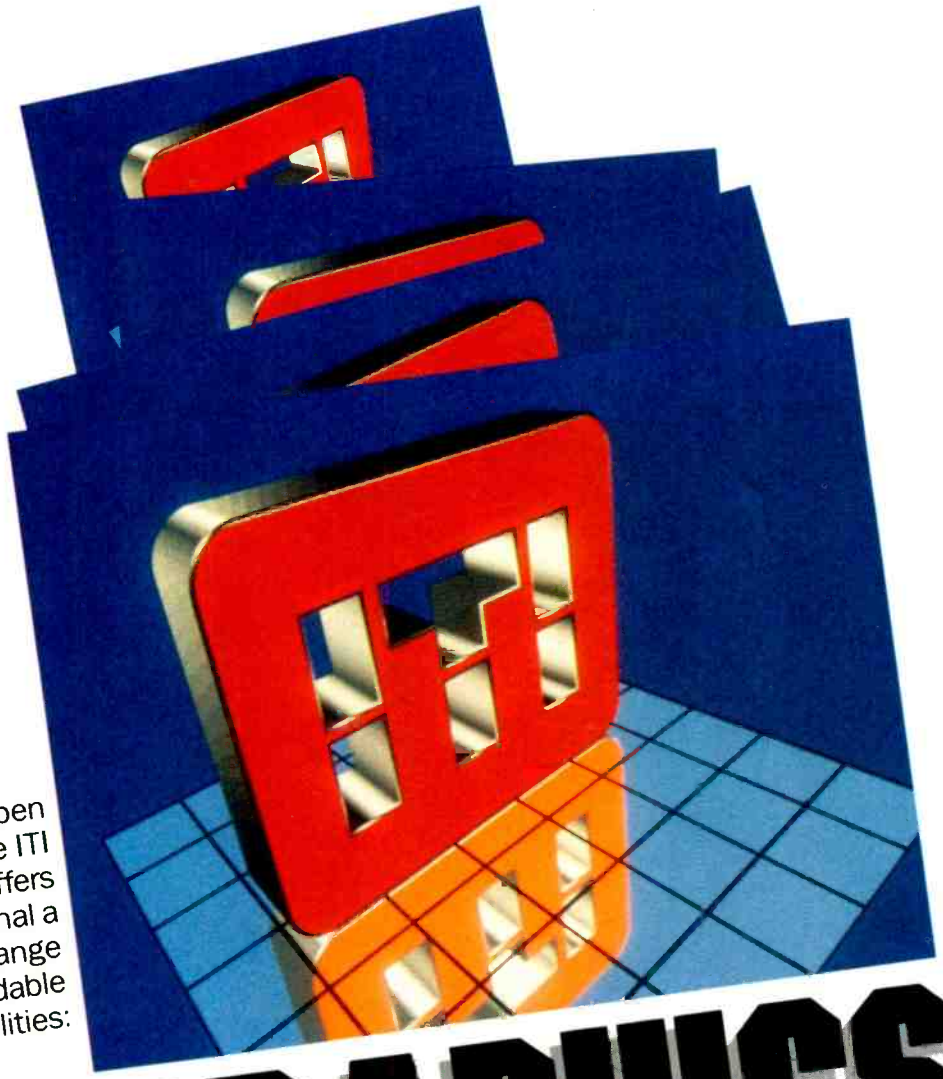

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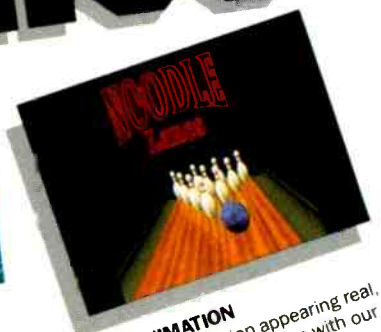

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"We have a concept at Taft that is somewhat different from most. We look at routing systems for more than distribution from point to point. We try to use the system creatively, and we use it for quality control as well as switching diversity. We believe we are on the leading edge of technology, and we wanted equipment that best reflected that.

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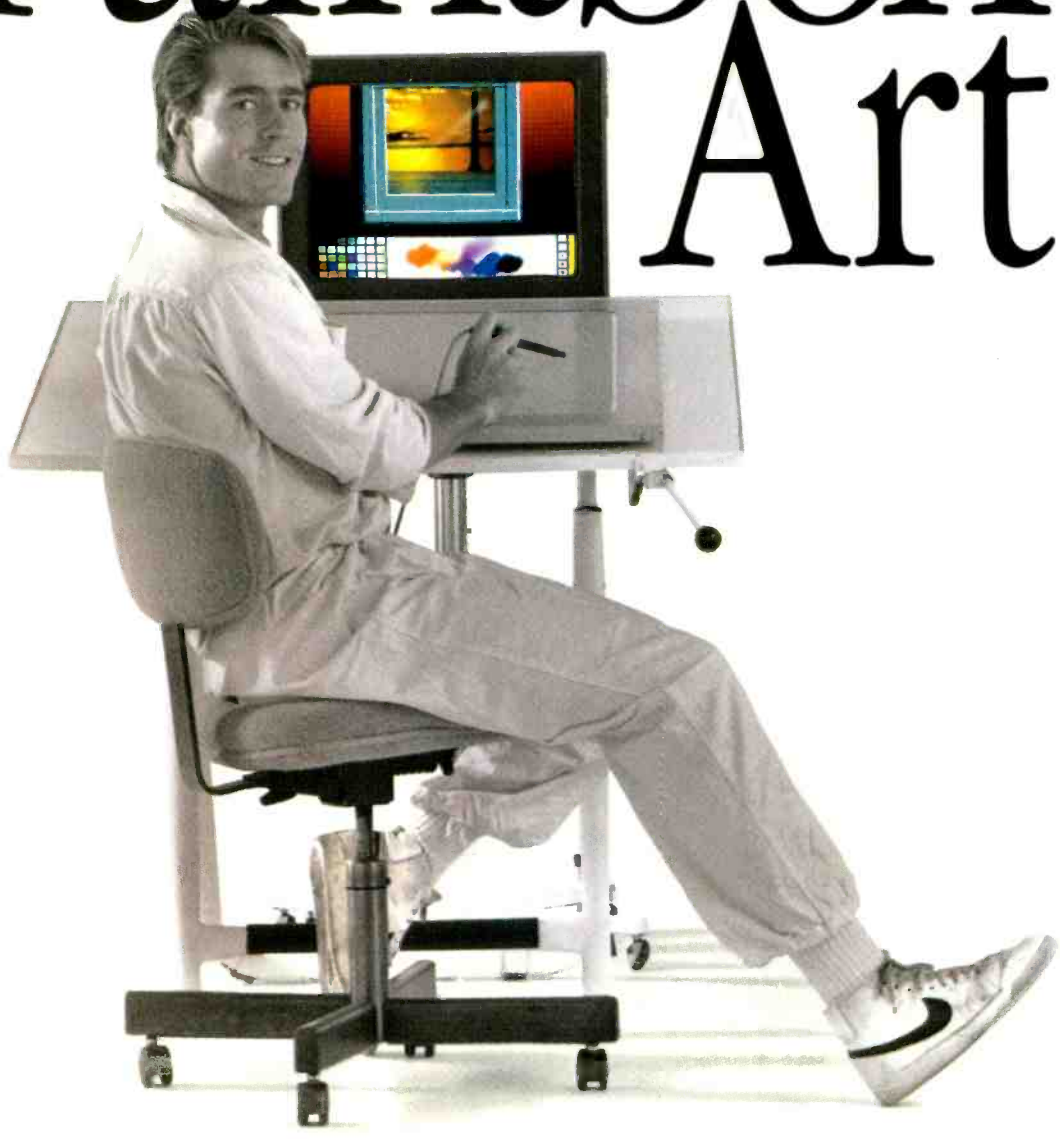

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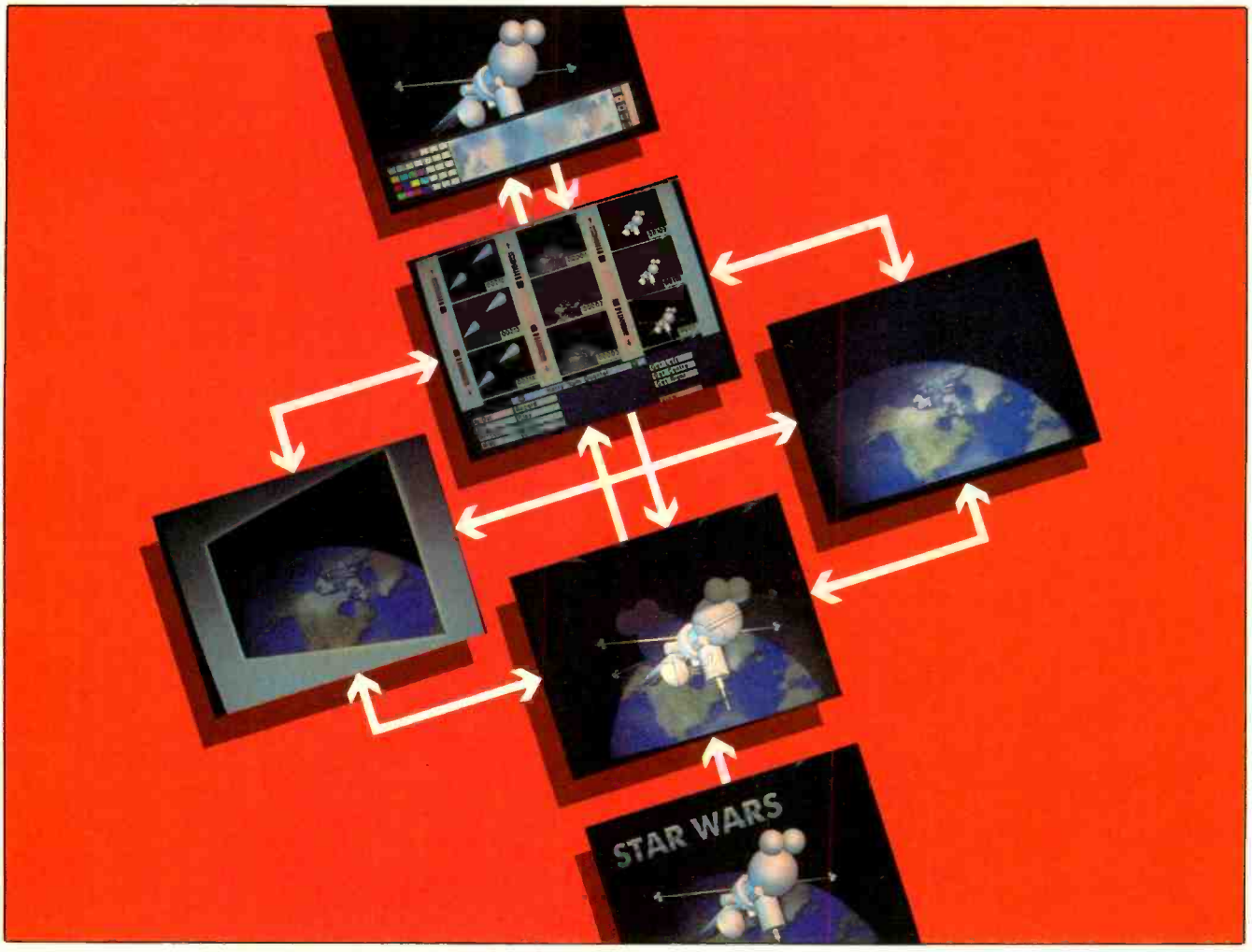

NBC News' Special Production Group simulates "Star Wars," a 30-second animation utilizing the Silicon Graphics IRIS Work Station configured with the Quantel Harry, Quantel Paintbox, Quantel 6030 Still Store, and Quantel Cypher.

NBC News Graphics Enter Third Dimension

With their extensive resources, the networks set the electronic graphics tastes of U.S. viewers.

Special to BM/E Magazine

Just as high fashion filters down to shape taste in off-the-rack clothes, the most sophisticated television graphics create a standard by which all others are measured. Viewers used to 3D animation are far less likely to be impressed by static art cards. Local stations, therefore, must carefully watch graphic developments in commercials, cable, and network television. Viewers may not know which shows or commercials originate at their local station and which at the net, but they can readily pick out graphics that don't measure up to network level.

Among the electronic graphics

Editor's Note:
This story was prepared by freelance writer Michael Miller with cooperation from NBC News.

tastesetters today is NBC News, whose Special Production Group is responsible for the basic design concepts, or visual identity, linking all NBC News programs. At the same time, its duties include creating sophisticated electronic animations requiring a week to two months of production time.

The group was responsible for concept, art direction, and production supervision of the "Liberty" animation used in title sequences, program elements, and end credits for *NBC Nightly News, NBC News at Sunrise, Today*, and *NBC News Digest*. That production was done with physical models, traditional artwork, and 35 mm film.

But while the "Liberty" work was in production, other members of the group were developing a sophisticated electronic opening sequence for *Main Street*, a news program for young people. The component video compositing techniques developed for *Main Street* by Special Production Group engineers Ken Eyring and Bryan Hopkins were so innovative that they won a company-wide engineering award for their work.

The group also designed a distinctive NBC News typeface and "super" style. Its members have to work closely with scenic designers to make sure the NBC News "look" is carried into all parts of the network's news programs. But the Special Production Group also is believed to be the only full-time network production group currently developing true, three-dimensional, computer-generated animations for regular program use.

Explains Robert Brandel, director of special production, "We're not involved in day-to-day graphics production. My group is responsible for long-term projects."

The Special Production Group has a mandate from NBC to develop new digital production techniques and to teach other designers (and producers and directors) throughout the network news division how to use them.

"The Special Production Group is on the leading edge," asserts

Paintbox frames of the earth are given perspective via 3D image manipulation.

Dave Schmerler, general manager of editorial and production services, "and it's part of what we believe is the most sophisticated broadcast graphics area anywhere."

The group's staff of 10 designers and engineers has crossed the binary boundaries of sophisticated computer modeling, digital processing, and manipulation devices to refine hardware and software for NBC's news graphics requirements.

When asked about the philosophy behind the look of NBC News, Schmerler responds, "TV is a transitory medium, and the objective of a news program is to convey information, that is, substance. There's very little time to make an impression on the viewer, so the most important element in visual design is to make the message clear. If the viewer doesn't get the message, you've wasted your time. But we don't think that's a design limitation."

Digital animation

When NBC News began upgrading its graphics technology in 1983, the "device of choice" was the Quantel Paintbox.

The NBC News graphics production area has expanded from one modest room to a facility that soon will occupy half a floor of NBC's Rockefeller Center headquarters. The Special Production Group and the daily graphics production staff share 14 Paintboxes, along with four Quantel Cypher caption generators with animation capability and five Quantel 6030 digital still stores.

To create animated graphics, NBC News also uses two Grass Valley Group 300 production switchers, four channels of Ampex ADO, four Ampex VPR-3 VTRs with Zeus TBCs, an Abekas A-62 digital disk recorder, and a Grass Valley Model 51 edit controller.

For three-dimensional animations, NBC News is using three Cubicomp PictureMaker graphics workstations and two Silicon Graphics IRIS workstations with Wavefront Technologies 3D modeling software. (Silicon Graphics, a manufacturer of real-time 3D animation workstations, is based in Mountain View, CA, and sells largely to the CAD/CAM market.) The Silicon Graphics/Wavefront work is part of a research and development project undertaken jointly by the Special Production Group and the NBC Operations and Technical Services Computer Imaging Laboratory.

A major objective is to keep as much production as possible in the digital domain. NBC News is installing a Quantel central library system that will digitally connect all of its Paintboxes, still stores, and a Quantel Harry digital cel recorder.

The Harry is the latest addition to the graphics production area. Brandel believes that it conceivably could replace an entire analog tape production room.

"The Harry's digital processing offers a very clean way to composite images since you have control of individual pixels," he says. "Its random-access capabilities make it a very efficient animation and editing device. It will become a perfect complement to the anticipated digital tape machines."

Brandel was impressed by the Harry's efficiency when it was first put to the test. A 30-second promo was cut and composited on it in about 40 minutes, a process that usually would take two to three times as long.

The Harry was interfaced to the Silicon Graphics IRIS by Tom Alfieri, Christine Barton, and An-

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Steve Giangrasso, graphic design engineer, composites Rail Gun animation in the Quantel Harry digital cel recorder.

drew Siegel of the Computer Imaging Lab. David Rabinowitz, director of the Imaging Lab, says the interface was a function of the video format, machine control, and the intercommunication among the devices.

With the technology in place, the Special Production Group, working with the Computer Imaging Laboratory, began developing a library of 3D animations illustrating the Pentagon's Strategic Defense Initiative program, colloquially knows as "Star Wars." Since the department could not justify a development project strictly for its educational value, it had to choose a subject that was conducive to on-air use. The Strategic Defense Initiative was a natural. It was chosen for 3D modeling because, according to Schmerler, "The weapons are composed of 'primitives,' basic geometric shapes, which when motion-scripted, can be used on-air in a very versatile way."

The first 3D model of a kinetic energy weapon, the Rail Gun, was designed from an artist's rendering supplied by the U.S. Department of Defense. The shape of the Rail Gun was constructed of circles, cones, and rectangles.

With the Wavefront software, the scale of a primitive can be changed along the *x*, *y*, or *z* axis and elongated or shrunk to obtain different polygonal shapes. Therefore, the largest sphere of the Rail Gun was modeled and then modified for the design of its smaller components.

Once the shape was modeled, its components were stored in a preview file for motion scripting. Each element of the image was assigned to different channels to determine how it was to be manipulated, whether for *x*, *y*, *z* translation or rotation. One element could require as many as nine channels for roll, pitch, and yaw movements.

The motion script for the Rail Gun model was developed by "parenting" its component parts. The large sphere, or parent, determines the hierarchical movement of the smaller components. The gun's solar panel, for example, can pivot independently of the parent while also moving along with it.

Once the relationships among the Rail Gun components were established, the motion was scripted by entering key frame positions that were interpolated by the Silicon Graphics IRIS's central processing unit.

The next step involved scripting the lights. Wavefront software provides an almost unlimited number of light sources, which can travel around or remain stationary in relation to the object, colorizing and highlighting its three-dimensional shape.

Rendering the completed animation took 10 minutes or more per frame, due to the complex digital computations required by antialiasing and multiple light sources.

3D models in motion

The entire 30-second "Star Wars" animation was composed of 3D models of the Rail Gun, missiles, battle mirrors, relay mirrors, warheads, and lasers. The Cypher was used to generate logos on weapons and titling. A star field and rotating earth were rendered on the Paintbox as back-

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ground for Harry keys. All of the matte reels and object reels were input to the Harry for compositing. Laser explosions drawn on the Paintbox were also animated in the Harry. Highlighted glows and softened edges were generated on the Paintbox, while the cels were stored and layered within the Harry.

"To manage the available library space in the Harry, cross dissolves were completed in steps," recalls Steve Giangrosso, graphic design engineer on the project.

The projected air date for the "Star Wars" animation is late spring, and elements of it will be reedited and used whenever NBC News needs to illustrate the Star Wars program.

Automating news graphics

The Special Production Group was created in 1984 by Tom Wolzien, vice president, editorial and production services, to develop an automated, state-of-the-art display system for the NBC News election-night special program. The system worked so well that the group was expanded and made permanent.

Work on automated graphics display systems is still going on at NBC. The Special Production Group and the Computer Imaging Laboratory are hoping to improve the 1984 system for the 1986 election night. The NBC election system is real-time and data-driven. In 1984, it consisted of eight Paintboxes controlled by two DEC VAX-11/750 computers.

An ad hoc committee within NBC News was set up by Wolzien to find ways to apply the lessons learned in development of the display system to daily program production. Wolzien says it is too early to talk about the committee's progress, but he is eager to use computer technology to diminish the amount of routine work needed to produce news programs.

"What's important is the purpose you use the technology for, not technology for its own sake," Wolzien says. **BM/E**

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Mexico promises the best World Cup soccer in history—with a major dividend for Mexican TV.

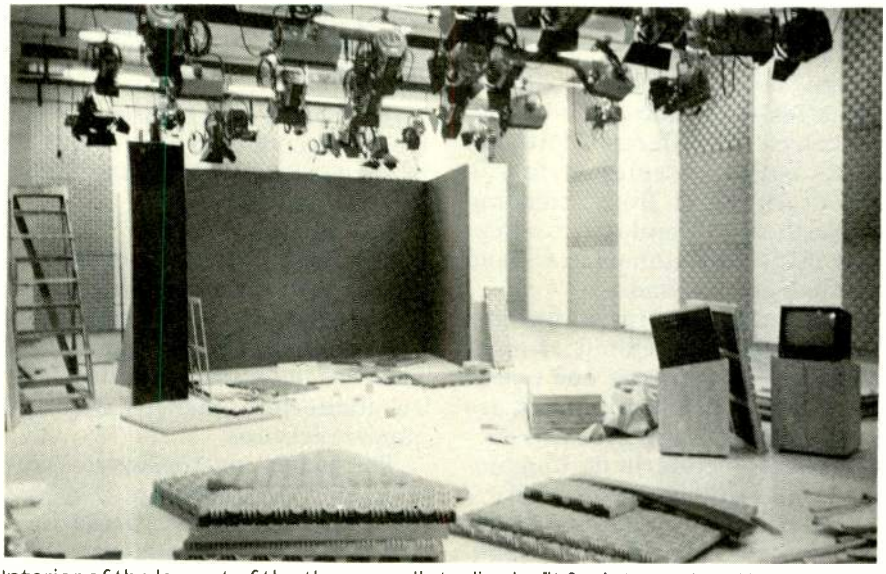
By Frank Murray

Nine billion viewers—that's the size of the audience that Mexican broadcasters estimate will be watching the thirteenth World Cup Soccer Games, the quadrennial world soccer playoffs being held this year in Mexico starting May 31.

For a full month, fans in 150 nations around the globe will be glued to their television sets as teams from 24 nations—the world's best soccer teams—compete in a total of 52 games in 12 stadiums throughout Mexico. The games will culminate on June 29 with the final match for the World Cup to be held in Mexico City's giant Azteca Stadium.

The host broadcaster is Telemexico '86, a joint venture of Channel 13 of Imevision, the government-owned television network complex, and Televisa S.A., the privately owned broadcast giant, which operates two national networks in Mexico and two local/regional networks in Mexico City, the nation's capital, and supplies live and recorded programming throughout the Spanish-speaking world.

Televisa is the principal purchaser of the more than $50 million in equipment being acquired for the games. After the end of the World Cup, the gear will be used to upgrade Televisa's broadcast facilities in Mexico City—a move anticipated happily by the company's engineering officials.



Interior of the largest of the three small studios built for international broadcasters at the CIR. All photos were taken during construction in February.

As is the case with any televised world class sports event, a tremendous responsibility falls onto the host nation and, by default, onto the host broadcaster to offer pictures to the world that are flawlessly engineered and visually exciting. In Mexico's case, the challenge is not only to improve on the games that were held in Spain four years ago but to compete visually with ABC's coverage of the Los Angeles Olympics in 1984.

That task has been made even more difficult, however, as a side effect of "el temblor," the cataclysmic earthquake and aftershocks that first struck Mexico on September 19. Despite the devastation, technical planning and construction of new facilities for the games have continued virtually without delay.

(As a result of the quake, 87 people were killed, and a television tower, a theater, and two five-story office buildings housing Televisa's executive offices, news departments, and main power substation were all destroyed.)

In a glass-walled office, a temporary complex necessary because of quake damage, plans for the World Cup were described by Victor Rojas, head of production for Telemexico and technical advisor to the president of Televisa, and

About the Author:
Frank Murray is a freelance writer specializing in broadcast technology.

Jorge Pickering, in charge of all digital devices for the games and technical coordinator of special events for Televisa.

Incoming and outgoing signals

The games are being played at 12 stadiums in Mexico: three in Mexico City and the rest in locations ranging from 75 to 950 km from the capital. Satellite transmissions via Mexico's Morelos I satellite will bring broadcast signals from nine outside venues to the Centro International de Radiodiffusion (CIR), the international broadcast center in Mexico City. In-town matches will be relayed to the CIR over microwave.

Each stadium will provide a "clean" or universal feed with international graphics. In addition, as many as six different additional feeds could be relayed to the broadcast center from attending consortiums. (Morelos I can support up to 24 channels in C-band and four in Ku-band.)

For outgoing transmissions, Intelsat imposes a limit of eight signals: six to Europe and two to the Pacific. All satellite feeds are in the hands of the Mexican government's Secretaria de Communicaciones y Transportes (SCT).

Seven broadcast unions covering nearly 120 separate broadcasters worldwide have made licensing arrangements with FIFA, the international soccer organization, to relay signals from Mexico: OTI, ASDU, ABU, EBU, OIRT, URTNA, and NAMBA. Canada's CBC and NBC from the U.S. are making separate arrangements. Mexico will receive its coverage from the Latin American OTI consortium, and both the government and Televisa networks will carry the games in their country, according to Rojas, a veteran of seven World Cup broadcasts.

The CIR

The CIR is located at San Angel, another Televisa-owned broadcast facility in Mexico City, located roughly 20 minutes driving time away from Chapultepec. A four-

One of the 18 one-inch edit bays within the master control complex of the CIR. All are equipped with Ampex VPR-6 VTRs.

story building constructed for a reported $10 million, it will house all international broadcast activities including offices, engineering facilities, a cafeteria seating 600, an auditorium, and a variety of support services.

The games' master control complex, for example, designed by Pye TVT, has been constructed in a portion of one of two massive 1200 square meter floating-foundation production stages built by Televisa for large-scale productions. It will house the master control room, telephone switching room, various support rooms, 18 edit bays, and three small broadcast studios, each with its own control room. The computer floor, removable panel ceiling, and floor-to-ceiling orange-painted metal walls all are temporary.

Ruesga noted that the CIR was built in slightly more than seven months, with construction beginning shortly before the earthquake. The structure is located in an area that was unaffected by the earthquake. In preparation for any power emergency, however, a 2000 kW generator is on site as a backup in case the outside 7000 kW power supply should fail.

Huge equipment order

Virtually all equipment acquired by Telemexico has been purchased by Televisa, which plans to use it subsequently in both its Chapultepec and San Angel facilities. While the master systems supplier was the now-defunct Pye TVT organization from England, with an estimated $50 million order covering all production aspects, Ampex Corp.'s Audio-Video Systems Division (AVSD) also supplied huge amounts of equipment. The $11.9 million order represents the largest international order in Ampex's history.

Via two separate contracts—one through Pye, the other direct from Ampex—Televisa is purchasing 137 Ampex VTRs including 56 VPR-6s, 38 VPR-3s, and 43 VPR-5s, plus eight channels of Ampex ADO digital effects and an AVA-3 graphics art system. The company is also supplying 20 Ampex TBC-80 time base correctors and 12 Chyron IV character generator/graphics systems.

Ampex videotape will also be the sole videotape used by Telemexico.

For the games, a combination of VPR-3s and VPR-6s will be used at the venues, while VPR-6s will be used at the CIR, two in each edit bay. The VPR-5s will be the portable VTR rented exclusively by Telemexico to the visiting broadcasters.

Innovative coverage

In producing the games, Telemexico will be offering a multicamera approach to televising soccer that is somewhat radical for the world of international soccer. Also innovative will be the use of on-air digital effects, such as Ampex ADO effects, during broadcasts, although Televisa demonstrated the use of ADO successfully to Europeans through international transmission of some soccer matches this year.

"We think the way the world does *futbol* [soccer], including the English, is a little bit dull," Rojas said. "When you don't have a very good game, you can't dress it with

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lots of [graphics]. But you can do it with lots of cameras."

Rojas noted that soccer moves virtually with the speed of jai alai, and it is played in two 45-minute periods with no time out. There is no time for extended replays or other visual elements. There is also no time for commercials—the reason most often cited for the virtual blackout of soccer on American commercial television networks, although NBC is planning to air the World Cup finals. (Spanish-speaking viewers in the U.S. can watch more complete coverage on SIN, however.)

As a result of the time problems, camera coverage must be precise, and replays must be extremely swift and well-coordinated in the booth.

While traditional FIFA-competition soccer has been produced with four cameras—two at center court and one at each end zone—Telemexico will offer 10-camera coverage: three at center court (for wide-angle, medium, and tight shots), one roving camera, two at each penalty area, one at each end zone, and two reverse-angle cameras watching the penalty area from the other side of the court.

"We've been rehearsing this way of televising games for a year and a half," Rojas said.

Broadcast booths for each stadium will be handled in two different ways. For six far-off venues, 12-camera "containers," a Televisa exclusive according to Rojas, have been built from two 32-foot diesel trailers bolted lengthwise with the common walls removed. The two container halves will be transported separately, assembled on site, and remain there throughout the games. "While most trucks expand the production room," Rojas commented, "this expands the whole production area."

Other remote coverage will be directed from 12-camera mobile trucks.

Graphics

For graphics, according to Pickering, the AVA-3 art system will be used to create the generic art package for the international on-air look. That package, in turn, will be sent to each of the venues for their games. Players' names, game statistics, and other character generation needs will be filled by Chyron IVs.

In addition, Telemexico will create a one-minute prepackaged beauty shot of each venue, produced on the AVA-3, a Bosch FGS-4000, and Quantel Mirage, that will be offered to broadcasters for preshow use or for feature capsules.

Pickering is also addressing the problem of how to bring instant replays into the fast-moving game. Every time a replay is used,

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a special symbol will be keyed onto the picture identifying either a normal replay or a reverse-angle replay. Three replays are possible following each goal: from center court, from behind the goal, and a center-court shot. Graphics will be preproduced for fouls, goals, and other game points, then the actual replays will be inserted on the air with single-channel ADOs.

For the semifinals, four ADOs will be reconfigured into two-channel on-air systems. And for the finals, a four-channel on-air ADO system will be assembled. Pickering is hopeful it will be linked to the new Infinity 3D effects package for the ADO, marking the first time ever that the combined package will have been used live on the air for sports.

"Telemexico is planning to have the best World Cup ever seen," said Pickering. At the last World Cup in Europe, graphics and character generation were conservative and nondigital, he indicated. But Mexico's coverage will be lively and colorful. "I believe [Televisa was] the first company in the world to use digital equipment for live coverage, even before the States," he continued. "Remember that we Mexicans are Latins. We're very aggressive and not so taken with whether it fails or whether it doesn't."

For camera coverage of each game, Philips LDK-6s will provide principal coverage at nine camera positions, and a triaxed portable LDK-614 will be the roving camera. Two LDK-6s will also be placed in a separate studio for pre- and post-game commentaries.

Ross switchers are being used throughout the venues, modified by Televisa to enable Ampex VTRs to record the output from each row of buses, which, in turn, each control three cameras. The ensuing output becomes the source for instant replays. Also attached to each VTR will be a Chyron VP-1 CG, which will generate the appropriate replay/reverse replay signal. This degree of flexibility will allow assistant producers immediately to spot which shots are good replays and will help cut the time needed to fit the shots into the tight window allowed by the pace of soccer.

After the games are over

Following the World Cup, the equipment will be used by Televisa in upgrading its facilities to state-of-the-art gear. Aside from the Ampex equipment, Telemexico/Televisa purchased 96 Philips LDK-6 and 47 LDK-614 cameras and 12 Ross switchers, plus assorted audio and lighting equipment.

In addition, a Philips 64x72 routing switcher being used in the CIR control room will be divided into three separate units and used at Televisa. **BM/E**

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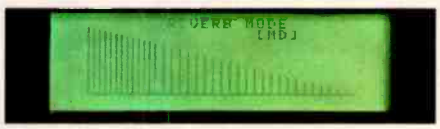

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"REVERB TIME" display mode showing difference in reverb time in each of four frequency bands.

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AM Stereo: Where Do We Go from Here?

A new push for AM stereo has begun as part of the overall effort to improve AM's sound.

By Judith Gross

Slides of AM stations that have gone stereo are part of the multimedia presentation the NAB is using to promote stereo.

It's been four years since the FCC decided to let broadcasters decide for themselves which AM stereo standard to adopt, and the case is still far from being closed. While Motorola and Kahn Communications each vow to fight to the finish, the NAB has taken the cause upon its own shoulders, with promotions aimed at getting stations to go stereo —regardless of what standard is chosen. With contests and a multimedia presentation to spur AM stereo's growth, conversions are slow but steady.

There are currently about 400 to 450 AM stereo stations in this country. Motorola claims that 285 stations are broadcasting with the C-Quam system, Leonard Kahn says that 100 stations are using his exciter, and there are still a number of stations on the Harris system, although Harris adopted the C-Quam pilot tone two years ago.

In addition, there are some 30 manufacturers, including several large car makers such as GM, Ford, and Chrysler, that make C-Quam–only AM stereo radios. Sony and Sansui make multisystem radios. However, despite the availability of IC chips to decode both systems, few receiver manufacturers have greeted the idea of marketing multisystem AM stereo radios with enthusiasm. Reasons for the lack of movement on the multisystem front have varied from the idea that a multisystem receiver compromises the sound of both AM stereo systems to the contention by some manufacturers that it would be more expensive to produce.

But now, a new development on

KYSM, Mankato, MN, underwent an entire identity change to help promote its AM stereo sound, which helped earn the station an award from the NAB.

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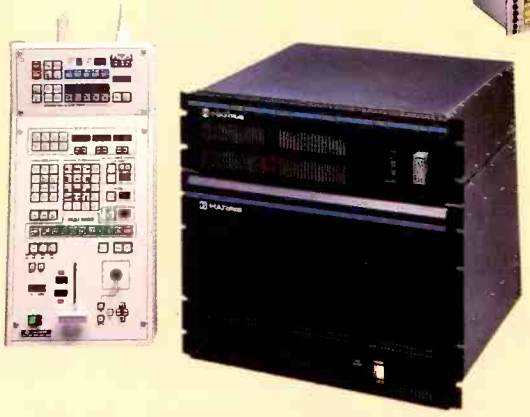

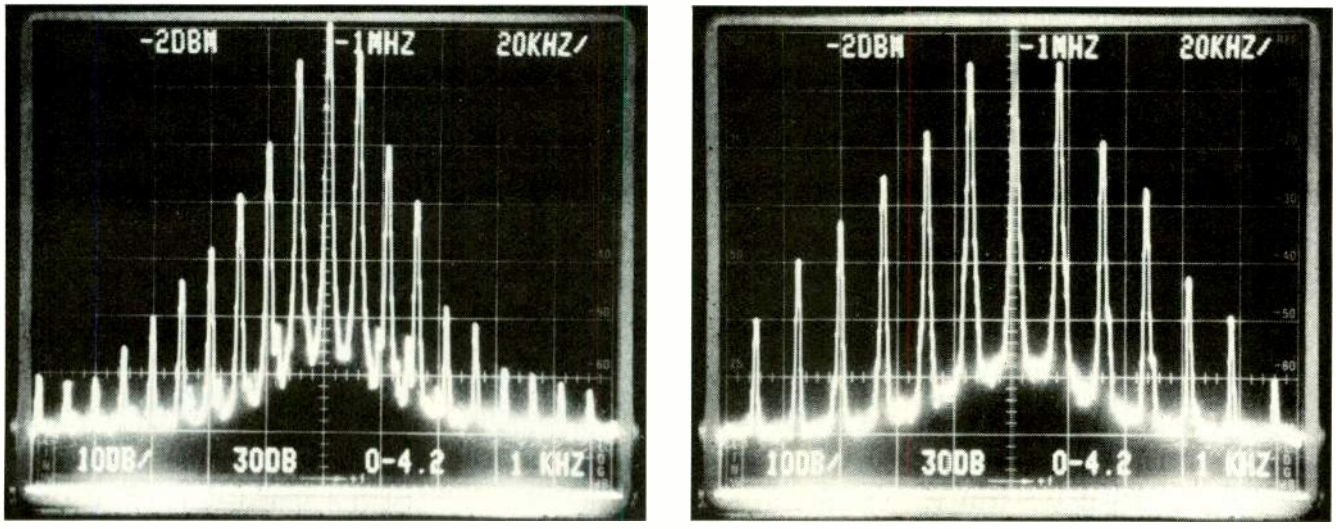

Actual photos of spectrum analyzer measurements that Kahn says show splatter from a station using a C-Quam exciter. The vertical spacing is in 10 dB steps; the horizontal spacing in 20 kHz steps. The photo at left was taken at a 10 kHz modulation frequency; the one at right at 15 kHz modulation frequency.

the battlefront has thrown a curve to the standards war. It involves a filing by Kahn Communications before the FCC alleging that the C-Quam system causes splatter and violates what is probably the most fundamental FCC regulation in existence: the occupied bandwidth rule.

A question of interference?

According to Kahn's background information included in the filing, which was in the hands of the FCC in mid-March, he decided to investigate Motorola's AM stereo type acceptance in response to a complaint filed against the Kahn exciter in February. In an unusual twist, the complaint against Kahn was brought not by a broadcaster or industry manufacturer as might be expected, but according to Kahn, by a trade publication. The complaint involved the legality of using Kahn's STR-84 AM stereo exciter with external audio processors.

Kahn explains that the matter was resolved with word from the FCC to him that the use of processing equipment has no bearing on the "validity of the equipment authorization." No changes or action were required, but Kahn began to look more closely at Motorola's type acceptance.

The FCC's occupied bandwidth rule covers "all possible conditions of program modulation" and requires a station to limit its transmission to avoid causing adjacent channel interference. A station's signal must be 25 dB down between 15 and 30 kHz from the carrier; 35 dB down between 30 and 75 kHz; and after 75 kHz from the carrier $43 + 10\log_{10}$ of the power in watts or 80dB, whichever is less. (for a 1 kW station, it would be 73 dB down). These rules apply to the L+R and L-R channels as well as the separate L and R channels.

According to Kahn, two C-Quam stations that took measurements while their exciters were on the air failed to meet the FCC's requirements and were likely to be causing interference as a result. Kahn has promised the stations he would not reveal their identities, since violating the occupied bandwidth rule is considered a serious infraction of FCC rules—one of which no station would want to be accused. One station was using a Motorola C-Quam exciter, according to Kahn, and the other was using a Delta C-Quam exciter. Kahn says one of the stations has since switched over to the Kahn exciter.

According to photos of a spectrum analyzer included in the filing, the station with the Motorola exciter was about 20 dB down at 15 kHz, not 25 dB as required. Between 30 and 75 kHz, the station was as much as 29 dB down when it should have been 35 dB, and past 75 kHz, the station was 60 dB down instead of the 73 to 80 dB that would have resulted from the equation covering that part of the spectrum. The tests' results shown in the filing were of the left channel at 75 percent modulation, first at 10 kHz fidelity and then at 15 kHz. And Kahn observes that it is common for stations to be transmitting even higher, up to 100 percent modulation and to 15 kHz, and notes that with the addition of processing and preemphasis, modulation beyond 100 percent also occurs.

Kahn has asked the FCC to review the matter and perform its own tests. He notes that original type acceptance tests done by Motorola limited modulation to 75 percent and only went as far as 5 kHz.

Kahn's complaint in many ways seems reminiscent of the one filed by Motorola that led to Harris having its AM stereo exciter type acceptance revoked by the commission in 1983. But the complaint against Harris involved only distortion, while violation of the spectrum occupancy rules is generally a much more serious matter. Yet Harris' problems with its exciter were a contributing factor to the company's decision to switch to the C-Quam pilot tone.

The controversy surrounding Kahn's filing heated up at last month's NAB convention. The FCC rejected Kahn's complaint in

a letter explaining that for AM stereo type acceptance, the commission "has not required compliance with occupied bandwidth limits, L or R, only using single test tones higher than 7.5 kHz, nor modulation percentages higher than 50 percent." Motorola's tests were in compliance at those amounts.

The commission also pointed out that Kahn's measurements were made with a single continuous tone higher than 7.5 kHz at 85 percent modulation, and admitted awareness that such test conditions could generate sidebands exceeding occupied bandwidth limits.

"In view of this," the letter to Kahn stated, "the commission utilized four-tone test data in comparing the various known systems for occupied bandwidth." Motorola's tests for type acceptance were done with the these four-tone tests.

But Kahn is not ready to give up. He sent another letter to the FCC asking for action and received a letter in reply saying the matter would be given further review.

Mototorala representatives at the convention stated emphatically that there are no type acceptance problems—and no splatter problems—with the C-Quam exciter and that Kahn's complaint is "a sham."

But the battle rages, with Kahn determined to fuel the controversy in the minds of broadcasters, and especially among makers of AM stereo radios, most of whom have committed themselves to C-Quam.

"There are C-Quam stations who have told me they want to go off the system because of splatter problems," says Kahn. And of the AM stereo battle, he says, "I figure it's over with. Haven't the receiver manufacturers had enough?"

Why stereo, why now

"The standards war is over; it's history, when you look at the large number of Motorola-only receivers on the market," says Ron Frizzell, president and GM of AM stereo station WLAM and WKZS-FM, both in Maine, who is clearly in disagreement with Kahn.

KANE, New Iberia, LA, was one of six stations to win the NAB's AM stereo promotion contest with its stereo demonstrations.

Two years ago, Frizzell began to put together a modest slide show promoting stereo. The show grew to become a multimedia presentation that the NAB has been using to promote AM stereo to state broadcasters associations and other groups.

Frizzell thinks that the well-worn argument by broadcasters that "there are no receivers out there" is an obsolete one, however. "The public is getting hundreds of thousands of AM stereo radios pushed on them," Frizzell maintains, "and broadcasters don't know they're out there."

Frizzell also observes that many new cars bought today automatically include an AM stereo receiver, often unbeknown to the buyer.

"The answer is: it's happening. In cars, it's very fast, but in the home receiver market more slowly," Frizzell says.

Frizzell also has arguments in favor of AM stereo that go beyond the parity-with-FM or better-overall-audio issues.One is that the more AM stations there are broadcasting in stereo, the more radio manufacturers will see the potential and begin marketing receivers. Many radio manufacturers have already expressed a commitment to better fidelity AM receivers in the ongoing discussion of preemphasis use.

Another argument in favor of AM, according to Frizzell, is to give the station's sales staff one more thing to sell and to feel good about.

Promotion success stories

One other thing the NAB has done to promote AM stereo is to hold a contest for the best station promotions. The winners were selected for overall efforts in promoting AM stereo rather than any one specific promotion. There were six winners: WVLK, Lexington, KY; KANE in New Iberia and KXKW in Lafayette, both Louisiana; KYSM, North Mankato, MN; KSO, Des Moines, IA; and KALL, Salt Lake City.

Promotions ranged from jingles and IDs promoting stereo to giveaways of AM stereo receivers and demonstrations of the sound in electronics dealers stores. KSO gave away Sony and Sherwood radios and had car dealers hang tags on new car models promptimg consumers to "ask about AM stereo." Program director Jarrett Day says the station also went on-air to dispel some myths about AM by explaining the advantages of AM's sound over distances.

KYSM changed its entire identity, on converting, to "12-3-0 stereo" and tightened its AC format at the same time. GM George Genz says AM stereo giveaways and educating local electronics

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dealers has been a part of the promotional process.

KANE decided to hold a "sellabration" upon going stereo, reports president and GM Art Suberbielle. The sales staff brought Sony AM stereo receivers to their clients, inviting them to listen to the station first in mono, then in stereo.

Contest winners received $500 and recognition at the radio luncheon at this year's NAB show.

Preparing for stereo

In the time that AM stereo has been struggling for acceptance, engineers have had a chance to observe the conversion process and its results at some stations to see what kinds of preparation and adjustments are needed once a station decides to go stereo. In an effort to avoid each stations' having to "reinvent the wheel," the NAB offered the benefits of some technical expertise at this year's engineering sessions.

James Stanley, of Stanley Broadcast Engineering, an engineering consultant, discussed the three main areas that may need some upgrades when the conversion to stereo is made.

Stanley says that mono phasing problems, particularly in STLs, often arise when the extra link is added to accommodate stereo transmission. Problems arise particulary if a dual audio STL is used instead of a composite STL.

Another area to look at when converting to stereo is the studio. Stanley warns of problems such as vertical rumble in old turntables, which is cancelled out by the summing of two signals in mono, but which shows up clearly in stereo. Stanley says replacement of old rim-drive turntables may be the answer.

And finally, the transmitter needs to be checked for dried-out filter capacitors, worn-out tubes, and mismatches between the transmitter and antenna system.

"If your transmitter has a flat frequency response, low harmonic distortion, and good S/N ratio, generally all qualities desirable for mono, then you'll be okay."

IPM

One other problem that has plagued transmitters in the past but becomes more obvious when the conversion to stereo is made is IPM—incidental phase modulation.

Don Bordonaro, CE of WFTQ/WAAF, Worcester, MA, says the problem is caused by poor neutralization at the transmitter. If a transmitter is not properly neutralized, interelectrode capacitance between the tube and its grid will cause the tube to oscillate. The oscillation creates sidebands that interfere with stereo and mono.

"You don't see it on the normal modulation monitor, which is set to ignore all the IPM sidebands because they cancel each other out," Bordonaro notes. "But with a real radio, the tuned circuits keep some of the sidebands out, and it

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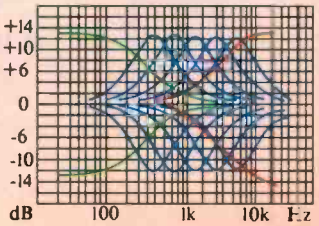

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affects the signal, in mono or stereo."

IPM resembles FM, and Bordonaro explains that the existence of the problem is "like FM coming out of your AM signal." He adds that the problem is worse in AM stereo because the stereo information is transmitted through phase modulation of the carrier. Therefore, AM stereo receivers are tuned to pick up phase modulation, and IPM comes through "quite blatantly."

Interestingly, the two AM stereo systems are affected by IPM quite differently. In the C-Quam system, the IPM is in phase with the system, but in the Kahn system, it's 90 degrees out of phase and will therefore not show up as severely.

Bordonaro recommends a spectrum analyzer to identify any IPM that might exist, which will show up as sidebands.

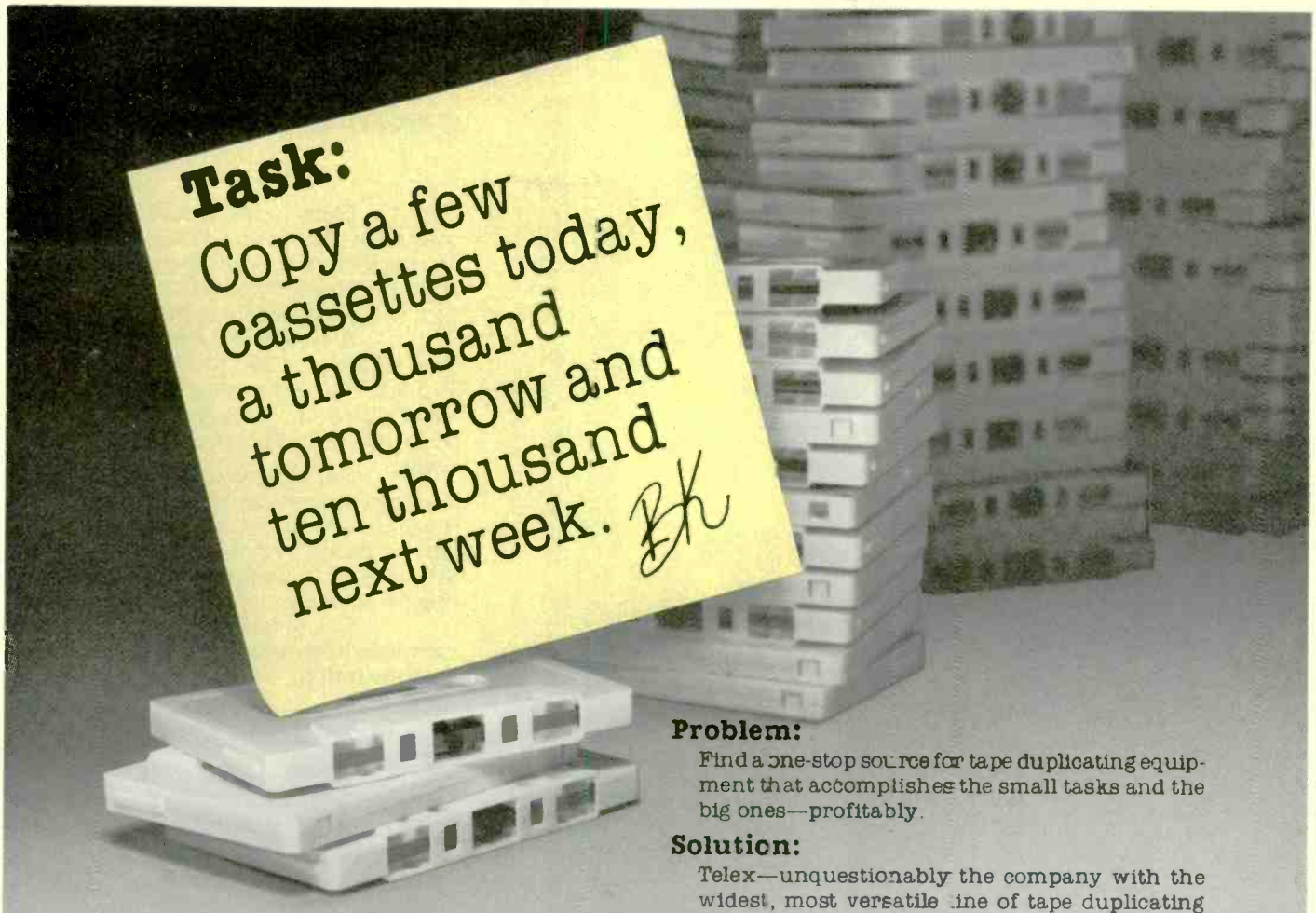
But the easiest method, according to Bordonaro, is simply to get an AM stereo mod monitor that looks at phase modulation as an integral part of the stereo.

The problem existed long before AM stereo, Bordonaro notes, but was never as noticeable. "This is just one more thing you can do to help AM sound better," he says.

Road to the future

Clearly, with the extra attention to upgrading a station's equipment for stereo conversion and remedies for problems such as IPM, AM broadcasters have the "how" of converting to stereo and improving their overall sound. With receiver manufacturers eager to make better fidelity AM radios, success stories of stations who have increased ratings points and advertising dollars, and car manufacturers who are behind the concept of AM stereo, they would also seem to have the "why" of going stereo.

The only remaining question is the "when," and as the standards battle recedes from the forefront of the AM stereo issue, the NAB, along with stations that have already made the conversion, are trying hard to get more stations to answer that question with a resounding "now." **BM/E**



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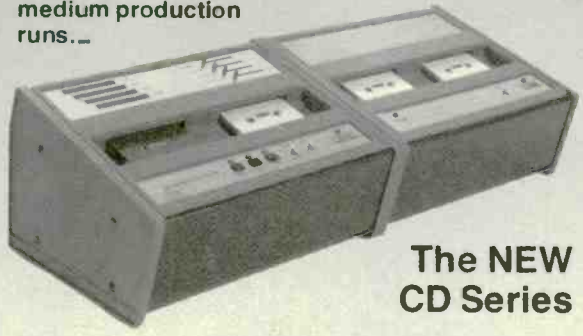

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MTS Clinic: Pick-Up, Recording, and Mixing

BM/E asks experts in the field of stereo TV production to reveal their tried and tested techniques.

Stereo TV has entered its second phase. With an estimated one-sixth of all stations equipped for stereo sound, many of them independents and public stations who must create their own programming, stereo techniques are about to change TV audio production methods.

The change will be a mixed blessing. On the positive side, it will cause video production people to pay more attention to audio quality, to the good of the viewer. But many audio engineers and technicians, even those with years of experience mixing and recording sound for TV, will have to undergo a learning process as they find that their old methods are no longer adequate for the new, higher fidelity sound.

To provide some insight into techniques for stereo TV production, we questioned five audio people who are working actively in stereo TV production and have developed a measure of expertise in the areas of miking, recording, and mixing specifically for stereo.

The participants were

- Terry Skelton, audio training specialist at NBC, who designed the audio course for stereo now taught to NBC personnel involved in the production of stereo shows.
- Jim Mancini, audio supervisor, and
- Al Skierkiewicz, engineer in maintenance and design group, both of WTTW, Chicago, which was the first station to broadcast TV stereo. WTTW started doing stereo in 1972 to 73, simulcasting PBS shows, and first broadcast a stereo TV signal in October of 1983 on the Telesonics System. The station switched to the BTSC system in August of 1984 after the FCC protected that system.
- Ron Estes, audio engineer/mixer for NBC, *The Tonight Show*, the first network show ever broadcast in stereo. Estes began experimenting with TV stereo sound about four years ago.
- Robert Liftin, owner and president of Regent Sound Studios, whose experience with stereo goes back to the beginnings of stereo recordings in the 1950s. He is a sound consultant for *Saturday Night Live*, which is broadcast in stereo, and he was part of a panel discussion on MTS at this year's NAB engineering sessions.

Terry Skelton, Audio Training Specialist, NBC

Robert Liftin, Owner and President, Regent Sound Studios

BM/E: *What criteria can be used to define "good" quality stereo sound?*

Skelton: We basically talk about three different types of stereo for TV. True stereo gives localization accurately across left or right and maybe as to height. You could also have localization front to back. It gives accurate imaging, that is, sounds won't emanate from loudspeakers but from the "source." It should impart a feeling of realism, a "you are there" sensation. A live event recorded in stereo can most easily fall into this category. Created stereo or spatial effect is

make believe, i.e., movies and sitcoms.

For "good" stereo, the audio image should match the visual image as to left and right, location, and image size: what you hear should match what you see. It requires a high fidelity signal and good frequency and phase response.

Skierkiewicz: We define "good" stereo as a good frequency response, low distortion, and a good S/N ratio. The same as you would for mono TV sound.

Typically, we look for 50 dB or greater S/N, flat response to 15 kHz, distortion under 1 percent or better, and we'd like separation to at least 25 dB, hopefully 30 or 35 dB.

Estes: Some of the criteria are the same as for mono or high fidelity: full frequency response, low noise, and for good stereo, I'd like to see 30 dB separation. It should not have a hole in the center like the ping-pong effect heard in the early days of stereo recording.

Liftin: The most important component is the accurate reproduction of stereo sound in terms of dynamic range, S/N ratio, frequency response, and lack of distortion. The relative balance, on the other hand, is a matter of taste, it's not a question of quality.

BM/E: *In what ways is TV stereo similar to/different from other types of stereo sound?*

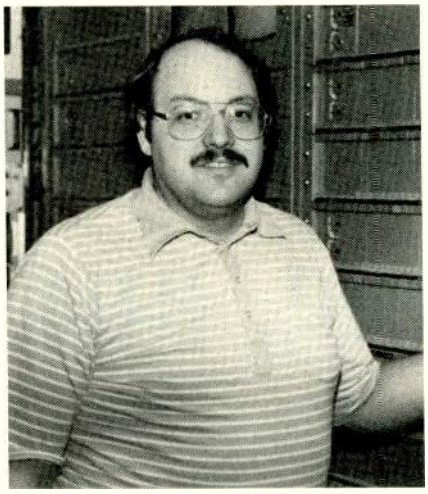
Skelton: There's a considerable difference in stereo for TV, movies, radio, and records.

For records, the image is not really important because you have nothing to compare it to visually, it's a matter of "did you enjoy the sound?"

As soon as you put a picture to it, the image matters a lot. You have to ask "is the right on the right, the left on the left, does it match what you're seeing?"

Skierkiewicz: TV stereo is similar to FM stereo in the type of modulation scheme and the way it's handled in most plants. The differences are esoteric things which involve the marriage of visual and audio.

Estes: TV stereo is very similar in the initial recording to records and films; the main difference is the



Al Skierkiewicz, Engineer, Maintanence and Design Group, WTTW

modulation process. We have to go through STLs to get to the transmitter, and we have 75 μs preemphasis to deal with. There are so many more things in the audio chain than in records or films. If those devices are set incorrectly, you will get too much compression and pumping. An awful lot of what I do is focused on this.

BM/E: *How important is the mono part, the L+R, of the TV signal?*

Skelton: Mono is still very important to us because something like 98 percent of the audience is still listening in mono.

Some shows immediately switched to stereo monitoring, and that left the mono audience to fend for itself. We've gotten shows which have gone all the way to air without being listened to in mono. If a real bad mistake is made, and the left is completely out of polarity with the right, the stereo can be heard but, in mono, the L and R can completely cancel each other out.

Skierkiewicz: Mono compatibility is a very strong concern of ours, so we have sum (L+R) monitors virtually every place in the plant, machines, master control . . . anywhere we need them.

Estes: Obviously it's very important; monitoring in the studio must be done with the idea that most people are listening in mono, with the ultimate problem that if the poles are reversed, you lose the mono entirely. It happened recently with a top network show produced out of house, not by the network. The sound effects were out of polarity and disappeared in mono.

Unfortunatley, there was no chance to correct it and no chance to review it before hand.

I have a setup in the studio for listening in mono, and I also have a phase scope at the output of the system. We could use them at tape machines also, and people have to look at the phase scope on everything; this goes for outside production as well.

BM/E: *What parts of a production should be miked specifically for stereo?*

Skelton: The NBC recommended format is dialog in mono, music in stereo, ambience in stereo, and sound effects in stereo or mono, depending on the way it's negotiated with the producer.

Mancini: It depends on the production. In a music show, the audience can be stereo, and you could use two channels on some instruments. If it's classical music with an orchestra, everything needs to be miked in stereo.

We mic everything, but not specifically for left and right; we achieve stereo in the mix. In general, we probably put out a couple of extra mics than if we were doing it in mono, and we mic everything for stereo, even if it's going to end up in mono, because it does sound better.

Estes: We more or less agreed around here that panning of dialog would be centered, but the one exception is during the Carson monologue. Ed MacMahon is on the left channel, Doc Severinson is on the right, and Carson's mic is centered on two channels. Ed and Doc's mic levels are slightly down, and you can still hear them in mono.

Other dialog on the show is centered, and music is miked for stereo. I mic the band as if you were looking at them, with 27 mics on the band alone. Some go left, some go right, some are center, and I use even more mics when there are musical groups as guests. Vocalists are centered with backup singers panned slightly left and right.

Liftin: I think you have to mic the audience for stereo. That's a necessity because audience reactions are different, and you can end up

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with a "lopsided" house. So coincident mics on the audience are the way to go. The orchestra should also be miked for stereo. I've found close miking is good.

For dialog and comedy, I see miking it in mono, unless you have a taped show with lots of time and want to take the time to do it in stereo. I believe in stereo sound effects because they give great ambience. If you have an effect on the right, it's good to hear it from the right, but you have to worry about hard left or hard right. Research done on stereo shows that 1 ½ dB up on one channel will move the sound over to that channel to the listener. Three dB will move it over twice as much, and 6 dB louder on one side would be okay also.

BM/E: *What miking techniques are needed to get stereo sound, and what about x-y versus m-s miking?*

Skelton: You always need two mics if you're going to have true stereo. You should use coincident miking: two mics located as close together as possible and aimed in different directions.

The x-y angle depends on what you're miking and the microphones you use. Too close gives build-up in center, while too far apart will leave a "hole" in the center. You need a directional mic, usually cardiod because omnidirectional mics would both pick up the same sound and there wouldn't be any stereo.

The m-s technique combines a cardiod with an bidirectional, m-s stands for mid-side, with the cardioid straight and the bi-directional mic facing to the side. Miking with m-s requires matrixing in order to produce a left-facing signal and right-facing channel. The matrixing takes some m, adds it to some s, takes some m, and then subtracts it from some s to get stereo sound.

One advantage of m-s is that it allows you to remotely control the stereo spread, whereas with x-y you must physically move the microphones. Generally, we feel that the audio phase match on most videotape formats is not enough to warrant the m-s technique.

Both techniques are mono compatible but m-s is not mono identical. In m-s, the side-facing mic gets cancelled out, and material off to the side that you may have heard in stereo would be cancelled out in mono.

Mancini: For stereo, we use two mics, even three, depending on what kind of microphone is in use. It also depends on the type of material. For music, we use two mics: one for left, one for right, but with a piano we might add more for the highs and lows. For singers, we would use one mic centered on two channels, and the background singers would be miked left and right and panned.

Jim Mancini, Audio Supervisor, WTTW

Estes: We use both x-y and m-s techniques. Generally, we'll center one mic to two channels and add close miking for small musical groups, back miking for larger groups. For singing groups, I've used the m-s technique. It gives an ambience and is very compatible in mono. I've used x-y in pianos, and in sports it's good to use x-y.

Liftin: Sum and difference (m-s) miking is preferred because if there was a phase reversal, you would lose the stereo effect but not the signal. In x-y, you would lose the signal. Most people are using x-y. I would use both; x-y for picking up a string section, for example, because dimensional aspects sound better to me there. I use m-s for lead vocals on recording. For TV, I would use m-s for live sound effects to give you the spatial characteristics.

BM/E: *Is there a special type of mic that should be used?*

Skelton: An x-y mic is basically two elements in one case. An m-s mic is also in one case. You can also use two separate coincident mics for the same effect. We generally use two mics in an x-y configuration primarily because of the available hardware.

No special type of mic is needed for stereo, except the frequency response should be flat throughout its included angle. This means that some mics that were thought acceptable for mono are not going to be adequate for stereo.

Obviously, if you are making up a stereo pair, the two mics should be identical.

Mancini: We use one specific pair of x-y mics hung high back in a live concert house for ambience but we don't depend just on them, we have other mics too, and every situation is different.

Estes: Each circumstance dictates the use. I like the sound of condensers over dynamics because they have a good transient response. They have a clarity that helps them get through the audio chain.

Liftin: All mics are fine for stereo; the flattest is omnidirectional. You basically want a flat response and defined pattern, and frequency response has to be flat even in the pickup area.

BM/E: *What about the "bleeding" of sound from one mic to the other?*

Skelton: In coincident miking, the amount of stereo separation is limited because of their proximity. In the more "spaced" technique, there is some distance between them, and there could be a phase problem in the mono.

Skierkiewicz: The worst situation has been during live pickup on a small stage where you can't spread out too much. In a situation like that, you do as much as you can with mic placement, or use a more directional mic.

Estes: You can get a phase problem or comb filtering as the same sound gets into two mics. The comb filtering effect can give you dips in the frequency response, and that's why I use tight miking as much as possible to get rid of those effects.

Liftin: Sometimes it's good and sometimes it's bad. "Bleeding" can

be good because it gives you your difference information, and you get the spatial relationship. But if it changes the frequency response of the item that is being miked, it's no good. It's a case for the audio mixer to make a value judgment. Bleeding has occurred in drumbeat, and mixers have gone as far as putting "gates" in mics to prevent it. On the other hand, overhead mics that bleed will give a spatial or dimensional aspect.

BM/E: *What is the best positioning of mics to provide the full stereo image or spatial characteristics of the sound?*

Skelton: We make a lot of compromises; TV producers don't necessarily want accurate sounds. They may want it to sound louder, funnier. Sitcom producers especially want their audiences to sound a certain way.

Estes: I think you should use as few mics as possible, and keep as many as low as possible to get rid of acoustic phase distortion. Because I mike very tightly, I have to use artifical reverb; the tight miking doesn't have the full spatial effect. I use reverb units on the band and vocalist to give back some of the spatial effect, and one of the nice things about m-s miking is you can adjust the ambience of the side mike through the matrix, but it won't work for rock and roll and jazz bands.

Liftin: If you go for individual miking, then you must electronically pan the sound to give the spatial characteristics. In *Live From 8H* (a former NBC concert series), we hung mics overhead for the spatial characteristics but we did use close-miking also for the reeds and panned it in the mix to give added emphasis.

BM/E: *Which videotape format provides the optimum recording tracks for TV stereo?*

Skelton: Most TV stereo production uses one-inch type C.

The optimum is VHS hi-fi because the type of system gives very low noise, very high frequency response, and phase match from machines, but the video quality leaves more to be desired. The other optimum format is digital.

Skierkiewicz: No videotape format really provides the optimum recording for good stereo because most tape formats are not designed for good S/N ratio. We have separate record and play heads on audio recorders, but in video, that's not possible. We use one-inch tape because it's less costly than two-inch quad and is better for storage. With ¾-inch there are even greater S/N problems with the video, and the frequency response is not as good on ¾. You have wider audio tracks on one-inch, also one inch has higher writing speed, and you get a higher frequency response the higher the speed. Generally, we don't feel ¾- or ½-inch is a viable playback medium for video.

Estes: We have a de facto standard for TV stereo, and it's one-inch type C. Two-inch only had one audio track, one inch has two tracks plus a time code track. The frequency response is not too bad with one-inch.

Ron Estes, Audio Engineer/Mixer, NBC *The Tonight Show*

Liftin: Unfortunately there is not an optimum tape. The problem on VTR is that it's limited in terms of dynamic range, and wow and flutter is also a problem. Also a problem is the phase on the VTRs—the heads don't always line up with the stereo tracks, and the result is that when you play it back mono, you lose the top. The best right now is one-inch type C; with two-inch quad the S/N ratio is not ideal; ¾-inch tracks are too small, and ½-inch is also a problem. Beta hi-fi is quite good.

BM/E: *How about recording audio separately on an ATR with timecode and synching it to the video?*

Skelton: Do it whenever possible.

Also, if you're doing a typical sitcom using five VTRs, take the one with the best audio, not just the one that goes along with the best video you got.

Skierkiewicz: We use timecoded tape recorded from ATRs. If we're going to mix it down and sweeten it, it's the best way to do it. We have also used synched ATRs on air with simulcasts, but we eventually found that the chance for getting out of synch was too great.

If there's going to be a lot of post and we need very high quality sound, we would prefer to do it on audio tape and work on it in post production; but if not that much attention need be paid, then we'll do it straight to one inch.

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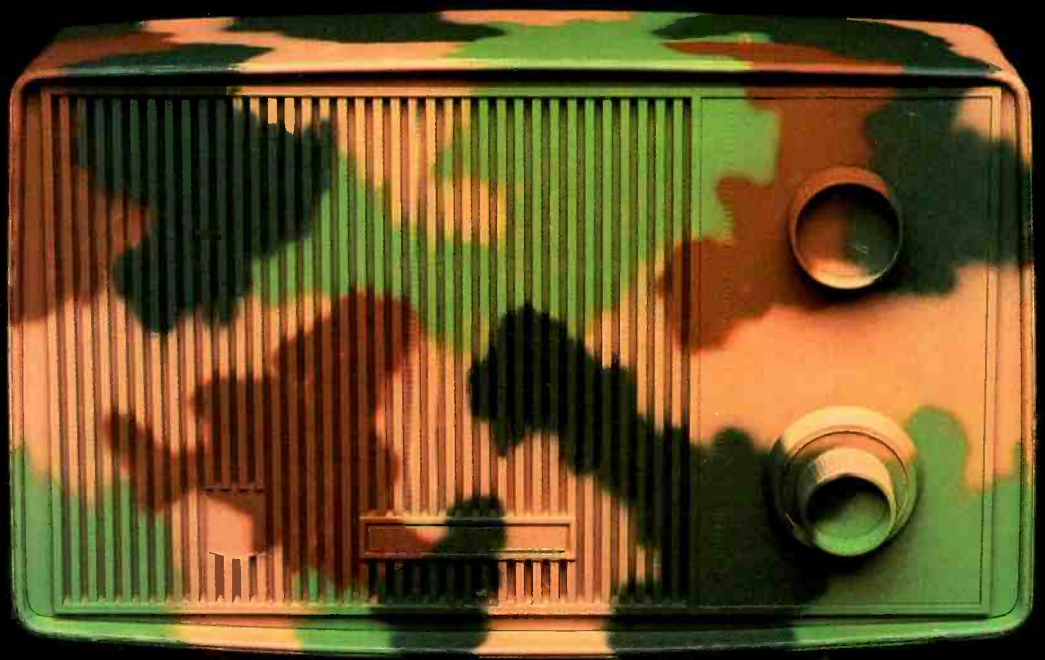

BM/E: *What about digital recording methods, both digital audio and the emerging digital video?*

Skelton: The new digital VTRs solve some problems, mainly the need for more audio channels. You could have up to eight channels of audio, and with four for redundancy, there would be four useable channels. You also wouldn't suffer generation loss, and you'd have no phase problems that are created with head alignment from machine to machine. You would probably not need noise reduction systems, which are expensive and add to alignment problems.

Skierkiewicz: If you are recording for another medium, say to transfer to a record, certainly you would want to start off with the top-most quality. But for video with the BTSC system, there are too many limitations that would counter-balance the improvements you could get from digital recording.

Estes: I think in a few years there will be digital VTRs with four digital audio tracks, plus timecode. This will be especially good for multiple generations. We've done some experiments with dbx digital recording on ¾-inch, also with Sony digital two-tracks.

Liftin: I think the DASH record tracks on the analog video VTRs are the first use of digital we'll see for stereo TV. DASH multitrack machines are excellent, the PCM also.

I also think what will have an effect are other types of digital storage systems, especially hard disk storage. We use the Compusonics 2002. We've used it to lay in the music on an animated series. The benefit is you get instant access, and there are no reels to worry about. Right now, such a system is being used for effects but eventually you could use it for the entire audio. I'm not saying it will replace reel-to-reel, but we've made a commitment to digital.

BM/E: *How about multitrack recording on ATRs for TV stereo?*

Skelton: You should use it if you can, because it gives you extra tracks, plus you can experiment with miking by trying it different ways on different tracks and selecting the best sound or mix.

Skierkiewicz: Virtually all of our large-scale shows are done on multitrack. We use 24 tracks with timecode on one track.

Estes: In our time frame, there's no way to do it, but on a show with a large orchestra that will be mixed later in post, it's a good idea. It gives you the ability to go back and make adjustments, as to the level and other things. NBC uses Solid State Logic boards, which have a 32-output buss that can give you the benefits of simultaneous 24-track recording.

Liftin: It's especially good for stereo, but you have to watch for phase distortions. With good ma-

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chines, you can get good stereo; you have to line up the azimuth.

BM/E: *How should L and R be recorded on videotape tracks?*

Skelton: The proposed standard is track one is the left and track two is the right, but you should still identify the channel at the head of every tape.

Skierkiewicz: We record left on one, right on track two, and time code on three. And all our audio is recorded on Dolby A noise reduction.

Estes: Left on one, Right on two, timecode on three, that's become our standard.

BM/E: *What is the suggested stereo mix for different types of shows with respect to such elements as music, audience, ambience, sound effects, dialog, and sweetening?*

Mancini: Each show is a different mix from a viewer's perspective. We hard pan the audience, and, since we're mixing for stereo, we watch the hard panning for the mono. We center the dialog. For listening on a TV screen, I wouldn't do hard left or hard right, to avoid the ping-pong effect. I would pan slightly left and slightly right. Where you mix is going to depend on where it is from the audience perspective.

Skierkiewicz: For dialog, it may be more pleasant to mix it as a mono show and send it through the synthesizer; this gives the spatial effect without localizing it, and it's a lot easier to mix in mono on a live show.

Estes: I always mix the dialog center, except in the monolog as I described before. The music is full stereo with as good a balance and dispersion of the sound as possible, and the audience reaction panned left, left center, right center, and right, which eliminates a "hole" in the center of the audience. The audience goes into a separate applause mixer and then to my stereo fader on the board; it's like a premixer.

BM/E: *What kind and how much panning do you recommend?*

Skelton: We say no panning for localization of sound effects because it appears to be distracting, plus there are the limitations of two channels. When you start panning, sound tends to jump from one speaker to the other instead of a smooth pan: that is center-channel pull.

Estes: It's up to each circumstance. We center all the dialog unless it's the off-screen voices during the monolog. I don't pan voices at all, other than background singers. The reason is that to pan to different shots can get confusing, especially in a reverse-shot situation. Also, some video machines might be recording isolated shots, and that wouldn't correspond with the audio. Generally, stereo should have a nice spread across and not have a "hole" in the center.

Liftin: I usually don't do that much panning. The exception was that for NBC's Sixtieth Anniversary show we used a lot for the production numbers, such as tap dancing. I do pan where I feel it's necessary, but I try to avoid panning.

Right now with stereo TV, you have to expect some ping-pong, some exaggeration; it will calm down in a few years. Right now, I am doing hard left and right splits because I don't want to be too subtle, I want the audience to hear the stereo.

BM/E: *How much separation is desirable in the mix?*

Skelton: Technically, we would like as much separation as possible; we want as little crosstalk as we can get. But from a production standpoint, you want the sound to match the scene, and it will be a function of how much space you want between the two channels to match the picture.

Mancini: When you mix for the proper separation, try to put yourself into the audience and mix from that point of view. Hard left and right doesn't have to be done just for the sake of stereo. It's also important to be at show rehearsals beforehand so you know what you're miking and mixing.

Estes: The separation depends on the situation. When Ed and Doc are left and right, there's a lot of separation; it's what sounds best overall. The system approach is to have as much separation as possible; but with the mixing approach you have to use judgment. **BM/E**

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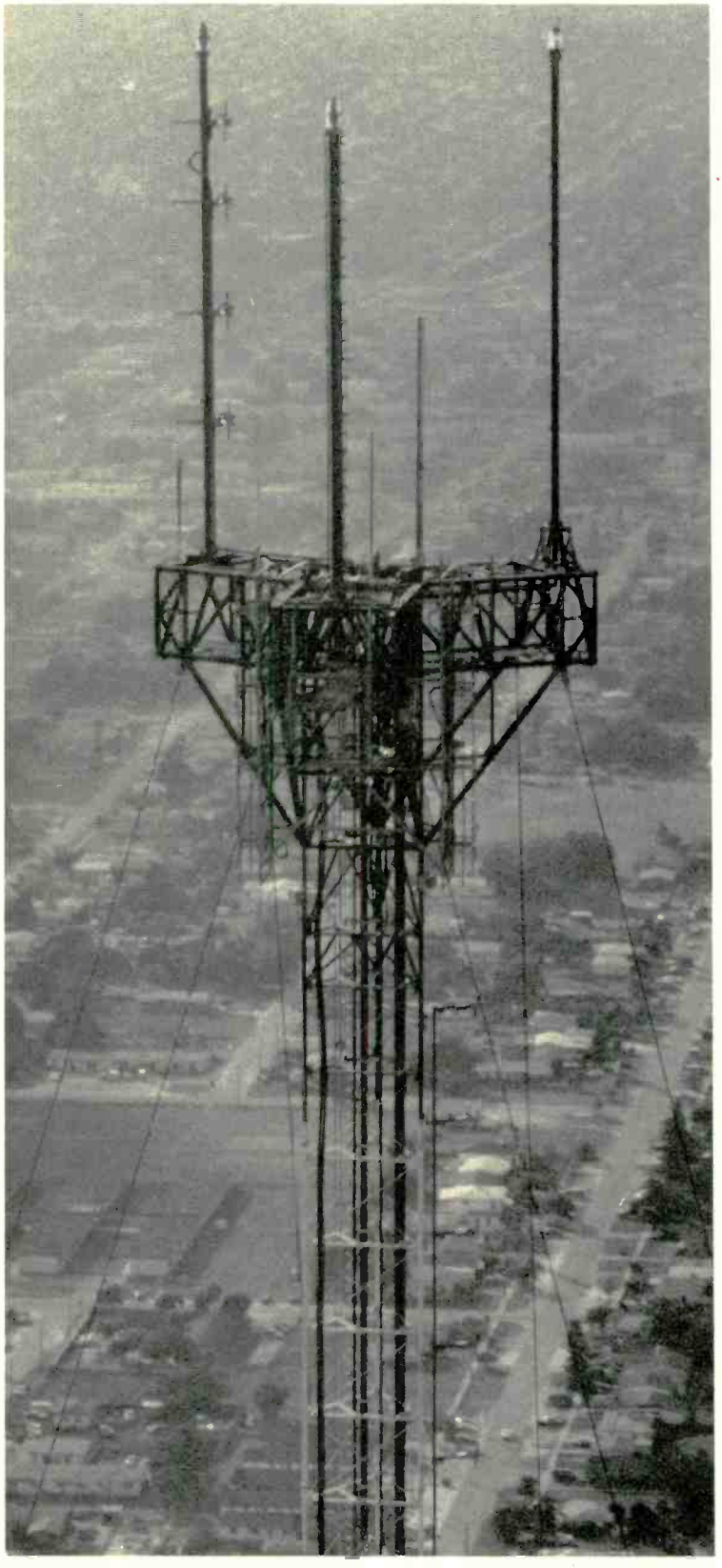

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Getting the Most out of Your ERP

Many factors determine the effective radiated power of an antenna, and a number of regulations govern it.

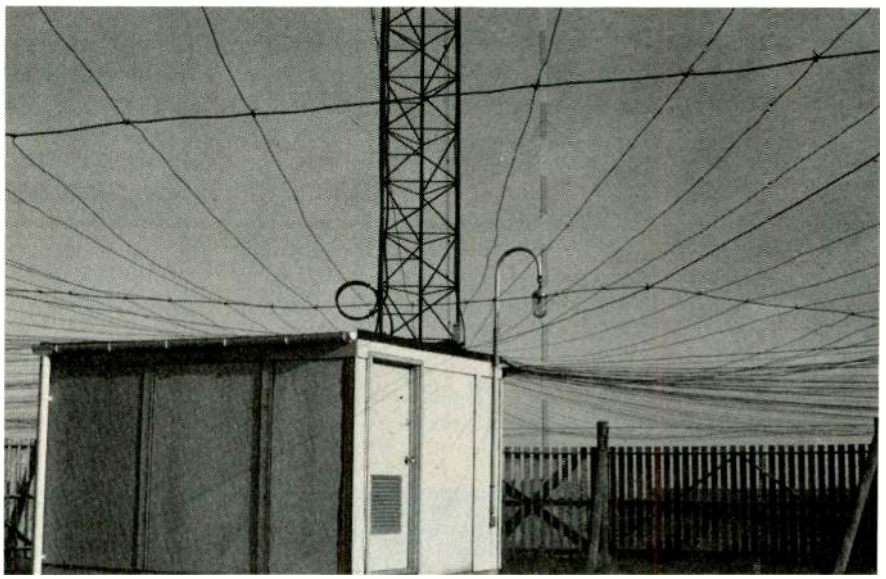
By Hugh Aldersey-Williams

Part I

The dictionary definition of the effective radiated power (ERP) of an antenna is that it is the product of the antenna input power and the antenna gain. The licensed ERP is an average of this multiplication taken over each direction in the horizontal plane.

The two parts of this article that follow describe how to maximize your antenna's effective radiated power for greater broadcast station impact while maintaining compliance with the various guidelines and regulations in the field. The first part, by Ronald Rackley, describes the case for AM, of particular interest currently with the effort to improve the quality of AM broadcasts. The second part, by Ogden Prestholdt, covers FM and TV antenna ERP issues.

This introduction to both parts takes a brief look at recent moves by those in positions to set guidelines and make or abolish rules. Among the regulatory changes outlined in recent months by the FCC are some in the area of effective power definition and measurement.



Antenna sites must meet FCC and EPA requirements as well as reaching their maximum audience (this AM tower photograph courtesy LeBlanc and Dick Communications).

Fundamental differences in broadcast systems at different frequencies have different FCC regulations, different requirements for the broadcaster and engineer to satisfy the service area, and different problems with RFI and nonionizing radiation.

When looking at transmission facilities, broadcast systems can be divided into three classes, identified by their operating frequency because of its effect on antenna systems and propagation. The ranges are about 300 to 3000 kHz, 3000 to 30,000 kHz, and 30 MHz to 1000 MHz.

The first group, medium frequency, used in AM broadcasting, is generally characterized by vertical antennas erected over a conductivity-enhancing ground system. Propagation differs radically between day and night. The second range, at high frequency, is not used in the U.S. The third group, VHF and part of the UHF spectrum, is characterized by multi-element antennas at high elevations (tens or hundreds of wavelengths above ground).

FM radio and TV signal propagation in this range is comparatively stable and is generally limited to the radio horizon.

Relaxing AM rules

The FCC has recognized the need to make it easier for AM stations to set up and go into operation. To this end, the commission last October relaxed its proof of performance requirements for antennas and its specifications for antenna monitor sampling systems. In the same month, the Commission also issued a notice clarifying its position on providing nondiscrete power levels for AM stations.

The FCC's elimination of the requirement that AM stations file power levels at fixed values is intended to make it easier for new AM applicants to operate. The new rules give a single value to cover both the nominal power and the antenna input power. Future applications must merely state the actual power supplied to the antenna.

For a new station proposing to use a nondirectional antenna, or an existing station making changes to such an antenna, the power is to be calculated directly from the proposed radiation using an FCC formula and antenna height and ground system data.

New directional antenna systems will have their power levels assigned, taking into account their pattern RMS values developed assuming a loss of one ohm per tower. In cases where losses can be shown to be greater than this or where an antenna system is found not to perform to its intended level, the license application can be amended to take these factors into account. Although unfamiliar power levels will begin to appear on station licenses, there should be no losses in service.

Radiation levels

While trying to make compliance requirements as simple as possible for broadcasters, the FCC must also ensure that antenna sites pose no safety hazard in their day-to-day operation. The requirement is contained in the National Environment Policy Act and became effective at the beginning of this year. The FCC's William Hassinger points out that the NEPA is directed more at government agencies than at the public. The FCC, he says, would ensure that NEPA requirements were met mainly at times of licensing.

The long wavelengths used for AM radio and the tower heights for television broadcasts reduce their likelihood of high ground level RF radiations. FM antennas are most at risk of causing excess RF radiation. Nonetheless, both the FCC and the NAB in its guide to FCC radiation regulation compliance say they expect the vast majority of antennas, whether FM, AM, or TV, to be in compliance.

FM antennas are most likely to infringe the radiation guidelines for a number of reasons. For one, their radiation is in that part of the spectrum to which the body is sensitive. Another factor is the short towers used by FM stations and their proximity to populated areas.

Although VHF TV operates at similar frequencies to FM, VHF towers are less likely to give rise to radiation problems. This is because TV stations can afford to build taller towers and prefer to build away from buildings, which can cause ghosting and shadow effects on a broadcast picture.

More fencing

One alleged site of excessive RF radiation posing a health threat to nearby residents was at the Cougar Mountain site outside Seattle. Here, 10 FM stations share seven towers on a 12-acre site that also contains a TV tower and a number of other communications antennas.

An Environmental Protection Agency and FCC study last May concluded some extra fencing was required around some of the towers, although radiation levels did not exceed ANSI guidelines. There was, in addition, some reradiation from metal playground equipment and in homes in the area that also fell below the ANSI level but exceeded some other guidlines.

"The outcome is that, first, there was no immediate threat to anybody; second, there were apparently no high radiation levels created outside the property; third, they did find some high radiation levels inside the fenced areas and near some of the FM stations outside the fenced areas," says William Hassinger at the FCC. The Commission requested that "suitable barriers" be erected and signposted.

Improving fencing is a way to combat high radiation levels for existing antenna sites where there is sufficient surrounding land to permit the expansion. Otherwise, the station's power level might be reduced. For new stations, building a taller tower would help. There is a conflict here, however, that needs to be considered in some areas. While the FCC clearly favors taller towers to reduce ground radiation levels, the Federal Aviation Authority and local zoning rules can impose restrictions on height for their own reasons. **BM/E**

AM

By Ronald D. Rackley

It is more important than ever that AM broadcasters get the best performance possible from their antenna systems. In recent years, the industry has been pushing to improve AM receiver performance by broadening receivable bandwidth. Unfortunately, wider receiver bandwidth means increased sensitivity to noise and interference. In addition, ambient noise levels in the AM band are now higher than ever due to recent proliferation of electrical devices responsible for unwanted noise. This means that an AM signal must be strong in order to be competitive with FM

About the Author:
Rackley is a partner at duTriel-Rackley Consulting Engineers in Washington, DC.

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Another major factor in the competitiveness of AM with FM is that AM coverage changes from day to night due to the levels of incoming interference, if not further due to different antenna patterns day and night. In order to be more effective, the AM broadcaster must strive to provide an optimum signal. This may necessitate directional antenna pattern redesign and/or transmitter site relocation taking into the account the area of desired service.

Assuming that studio facilities are state-of-the-art and capable of meeting rigid audio noise and distortion specifications, we must look to the AM transmitter plant for signal improvement. Both modulation and far-field signal level are important for quality over-the-air sound. Modulation is primarily a function of the transmitter's design and condition as well as the effectiveness of the audio processing systems employed, although appropriate antenna system bandwidth is a prerequisite for proper modulation. In any event, the finest audio processing and transmitting equipment available could be employed with unsatisfactory results if the antenna system cannot accept the high fidelity signal from the transmitter and radiate it to areas where the potential listeners can receive it.

Antenna characteristics

AM transmitting antennas have some important characteristics that are of relatively little concern in other broadcast services. For instance, 20 kHz bandwidth (±10 kHz) for a 1000 kHz carrier in the AM band represents 2 percent of the carrier frequency, while the 200 kHz channel width at 100 MHz in the FM band represents only 0.2 percent of the carrier frequency, making antenna bandwidth considerations much more important for AM transmitting antennas than for FM transmitting antennas. A wide bandwidth is essential for a high fidelity over-the-air sound.

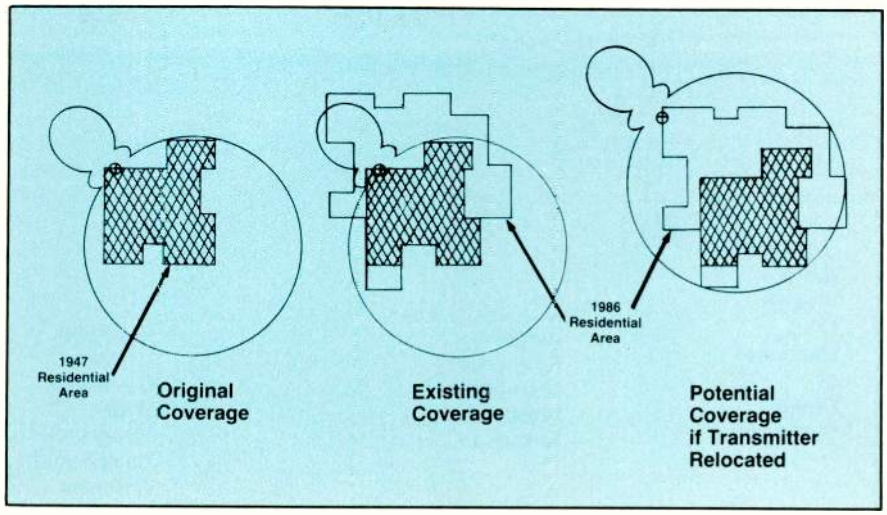

Figure 1: Relocation of a transmitter to cover areas of urban expansion.

Modern FM antennas generally pose no bandwidth problems. But many AM stations are broadcasting with antenna systems that restrict their audio performance, sometimes severely. There are many AM directional antennas of high gain, end-fire design (with the major lobe along and nulls normal to the tower line) and nondirectional antennas with folded (skirt wire) shunt feed that exhibit very poor bandwidth characteristics. Older AM stations often operate with such antenna systems that were designed before bandwidth was a major consideration and that have received very little attention since. It is common to see racks full of expensive radio gadgetry at such stations, when a few thousand dollars spent on refurbishing and modifying the antenna systems would go a very long way toward eliminating the muddy sound that has defied audio processing efforts.

Another important consideration is the coverage produced by directional antenna patterns. FM direction antennas are not permitted by the FCC rules to have minima deeper than 15 dB (17.8 percent) below the maximum pattern radiation, while many AM stations employ directional antennas with much deeper nulls. This makes AM site location relative to the desired market very important in order that service might be optimized for a given directional antenna pattern. Many older AM stations with directional antennas have become victims of urban expansion, as residential areas have developed where there were only fields at the time the stations went on the air (see Figure 1).

Within the last year, the FCC has abandoned the old system of assigning discrete power levels for AM stations. In the past, all AM stations were licensed for discrete power levels—250, 500, 1000 W and so forth. A station, meeting all applicable interference constraints and operating with a two-tower directional antenna system with 2000 W power, but which would have had to add an additional tower to achieve the next higher allowable power level of 2500 W, was required to operate at 1000 W if it was impractical to install the three-tower system. Under the new rules, such a station can apply to double its power to 2000 W with the two-tower system.

Improving coverage

Many older AM directional antennas were designed in a day before computer optimization became possible and have nulls that were placed more for computational convenience than for protection to other stations. Many in-line AM arrays, for instance, have nulls symmetrical about the tower line while the signal need only be reduced on one side in order to avoid causing interference to other stations. If there is a substantial residential area in the di-

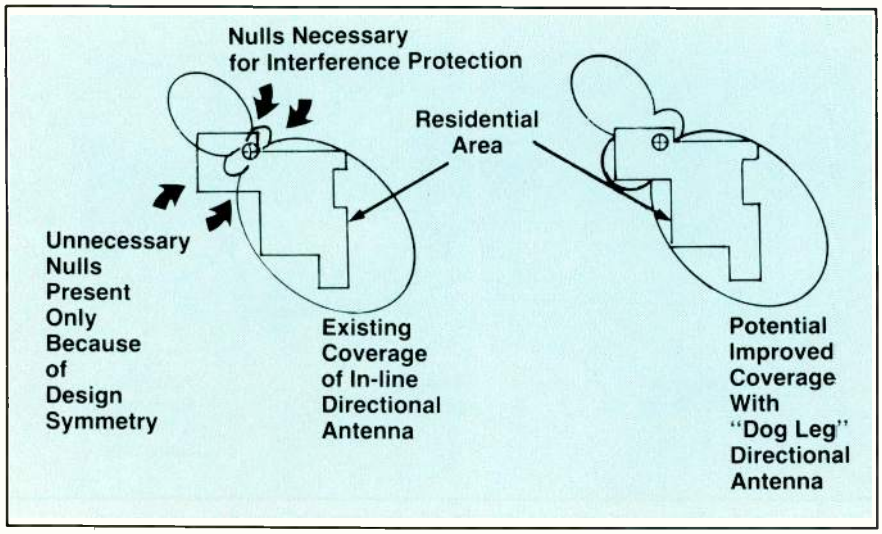

Figure 2: Repositioning nulls to improve area coverage.

rections of the unneeded nulls, improvement in coverage might be possible with a slight modification of the directional antenna design by moving one or more of the towers slightly (see Figure 2). Additionally, changes in allocation standards negotiated in recent international agreements make it possible for many stations operating on foreign clear channels to make antenna system changes that result in improved coverage.

Until recent years, AM broadcasters were required to locate their transmitters so as to provide 25 mV/m coverage to the business districts of their cities of license. In recognition of the trend toward urbanization, the FCC now requires only that 5 mV/m or, at night, interference-free service be rendered to the entire community of license. This change makes it possible for many existing stations, particularly those using directional antennas, to relocate their transmitter sites and realize an overall improvement in coverage to residential areas. There are instances where stations have realized a monetary profit from such a move, because of the value of the real estate at the abandoned sites.

An AM broadcaster who is serious about improving service can take a two-pronged approach both by examining the existing antenna system for improvement and by examining allocation considerations, in the light of recent rule changes, with an eye toward coverage improvement by making changes in the antenna pattern, power level, and transmitter location.

Station engineers should be encouraged by management to better understand their antenna systems by attending engineering sessions and seminars offered by the radio trade assocations. AM broadcasters must make every effort to take advantage of changes in available technology and in the FCC rules and policies concerning antenna systems if their signals are going to have a chance of competing effectively with those of FM stations. **BM/E**

FM & TV

By Ogden Prestholdt

FM broadcast and, indeed, all VHF and UHF broadcast systems are allocated on the basis of effective radiated power (ERP) and antenna height above average terrain. The concept differs from the allocation procedure for AM or standard broadcast, which is based on transmitter power. In FM broadcast, antenna gain referred to the gain of a half-wavelength dipole is used in ERP calculations.

Antennas for the VHF and part of the UHF spectrum are multielement systems (or multiwavelength apertures) erected at high elevations. Propagation is limited to the radio horizon (similar to line-of-sight distances). Thus, the pertinent radiation from the antenna is that at the vertical angle directed toward the chosen receiving antenna.

Allocations

In Docket 80-90, the FCC restructured the allocation system to require that all stations make optimum use of their allotments and, thereby, permit the maximum use of each channel. The power levels and antenna heights required by this allocation system are outlined in Table 1.

Site

The full impact of the effective height of a VHF antenna may not be universally understood. Figure 1 was constructed from the FCC's propagation curves using antenna heights with height ratios of 2:1 and includes the maximum height for each class of station before the power height interchange comes into play.

Note that in the 10- to 50-mile range, doubling the antenna height gives the equivalent of a four-fold power increase. This dramatically illustrates that, for most of the service area, height and power have similar effects on coverage. It is thus necessary to choose the highest site available without shadowing major populated areas.

The choice of tower height and antenna mount (pole, side mount, panel and so on) depends on the site. In the simplest case, the antenna system will consist of a tow-

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Prestholdt is an independent consultant and a retired partner of A.D. Ring and Associates.

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Table 1: FCC Docket 80-90 Allocations

Station Class	Operating Constants	
	Minimum ERP (kW)	Maximum ERP (kW)/height (m)
A	0.10	3/100
B1	3.00	25/100
B	25.00	50/150
C2	3.00	50/150
C1	50.00	100/299
C	100.00	100/600

er built for the specific antenna. The broadcaster has the choice of a simple multibay antenna mounted on a pole, a small cross-section tower on top of the supporting tower, or a panel antenna mounted on the faces of the basic tower. Even in this simple case, care should be taken to choose the correct antenna design parameters.

If the site is to be a tall tower with multiple antennas, the choice must be made between side mounting of simple multibay antennas or the use of panel antennas. Side-mounted antennas always show substantial noncircularity from such support structures. The antenna choice here may depend on the shape of the desired coverage. However, the only certain way to get good omnidirectional coverage from an FM antenna mounted on a tower section whose face dimension exceeds three feet is to use a panel antenna whose reflecting screens enclose the tower.

In the case of a building-top or mountaintop antenna, it is important to consider antenna gain in conjunction with clearance of more than the first Fresnel zone in the immediate foreground of the antenna. That is, the building roof or mountaintop must not project into the first (or better, the second) Fresnel zone if full benefit of the antenna gain is to be received.

In the case of mountain sites, it is also important to consider whether the site is mountain-top or mountainside. In the latter case, care must be taken to avoid reflections from the mountain area behind the site, either by locating the site a sufficient distance from reflecting areas of the mountain or by the use of a directional antenna.

Urban signals

FCC rules specify a city-grade signal level of 70 dBu for FM broadcast. Experience both in television and FM broadcast has established that these levels are not sufficient to provide the saturation of service desired in a broadcast system. It has been found that median field strength of 90 to 95 dBu should be provided to the entire principal city for good FM service. This is 20 dB higher than the FCC's city grade and represents 100 times the power. This is an important consideration.

When considering the minimum field strength requirement, it is important also to be aware of the maximum limits. First, the median level should not exceed 100 dBu since at this level, and in the presence of other signals, most receivers begin to generate very objectionable third-order intermodulation products. This can result in poor service to your area as well as to those of other stations.

Excessive radiation

Another requirement has recently become important in choosing antennas for broadcast service. This is the limitation of excessive nonionizing radiation as detailed in FCC Docket No. 79-144, which adopted the ANSI standard. This requirement is further detailed in the FCC OST Bulletin No. 65, October 1985. Briefly, this action requires the FM broadcaster to limit radiated fields to 100 $\mu W/cm^2$ wherever they may impact people.

With respect to antenna design, this regulation places a limit on downward radiation as well as on radiation at angles below the horizon where it can illuminate nearby people. Thus, this new requirement casts a different light on beam-tilt, null-fill, and downward radiation.

In the instance of building-top or mountaintop sites, there is the further requirement for radiation limits toward other buildings or occupied areas in the mountainous region.

Horizontal antenna pattern

The selection of the horizontal pattern is critical. The first principle is that the FCC specifies a maximum ERP for each class of station. If the antenna is designed to be nondirectional, the RMS (av-

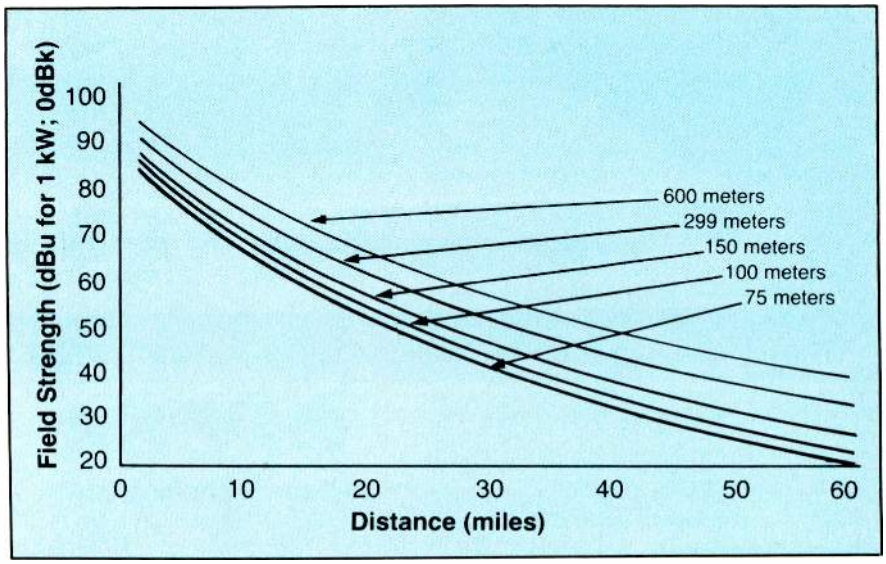

Figure 1: Antenna field strength against distance from antenna of various FCC allocation heights.

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erage power) of the actual horizontal pattern is permitted to reach the authorized maximum. Since most antennas are not perfectly circular in their horizontal pattern, this permits slightly higher field strengths in some directions and slightly lower ones in others. It is conventional to take advantage of this when choosing an orientation for a nondirectional antenna.

When specifying a directional antenna, the maximum radiation in any direction can not exceed the authorized maximum. Thus, an antenna that has a slightly noncircular horizontal pattern could operate with a slightly higher ERP if it could be called nondirectional rather than directional. Accordingly, greater coverage can never be obtained using a directional antenna unless suppression in some direction is required because of allocation criteria. In some mountainous sites, the requirement to reduce reflections from the mountain may require a directional antenna in order to minimize multipath effects. This may outweigh the slight loss in field strength resulting from the directional antenna.

FCC rules also limit the maximum suppression of directional antennas to 15 dB and the rate of change of gain to 2 dB for each 10 degrees of azimuth.

Vertical antenna pattern

The use of antenna gain leads directly to the choice of the vertical pattern. The pertinent antenna factors are antenna gain, beam tilt, null fill, careful choice of an antenna element with clean vertical and horizontal patterns, a good broadband impedance characteristic, a good broadband feed system, and a mounting arrangement that does not significantly alter the horizontal and vertical patterns of the element.

In considering maximum antenna gain, it is possible to draw on TV experience. The video bandwidth in our television system is nominally 4 MHz, or 20 times the spectrum assigned to each FM station. This means that antenna and propagation bandwidth are much more critical for TV than for FM. VHF television can successfully use antenna gains of 10 to 20 times that of the reference half-wavelength dipole.

There is, of course, a direct tradeoff between antenna gain and antenna input power (or transmitter power) since ERP is the product of the two. With good antennas, and within certain limits, it is generally desirable to increase antenna gain rather than transmitter power rating. Class A stations will frequently find that only limited antenna gain is necessary because minimum power transmitters are sufficient. In any case, for similar antennas with slightly different rated gains, there is no advantage in choosing the antenna with the higher rated gain since its input power must be lower.

A high-quality FM antenna must start with a well-designed antenna element. It must have a

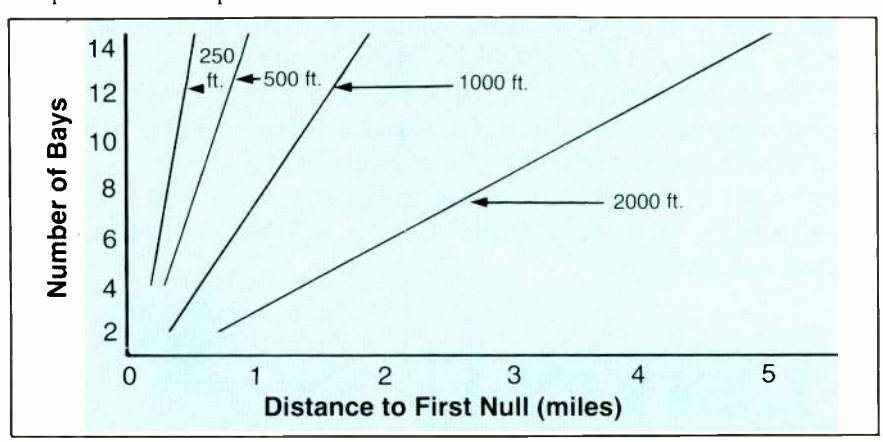

Figure 2. Null location for multibay antennas.

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Minimum Object Distance: 11"

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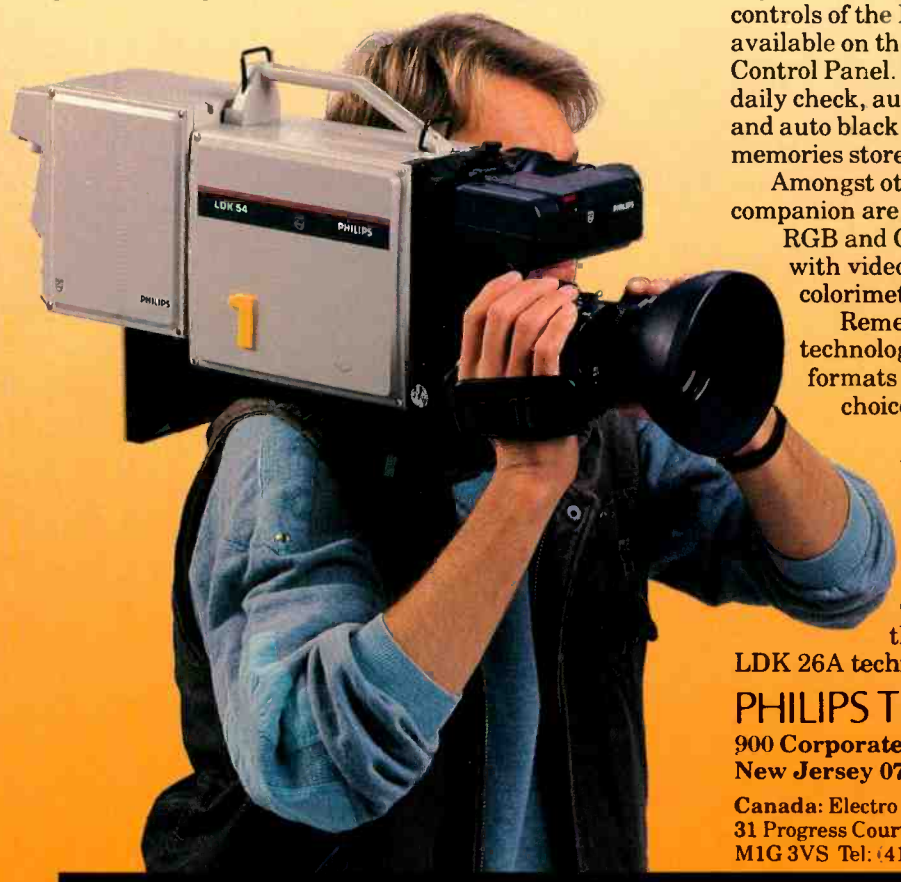

Amongst other outstanding features of the companion are: diascope in the camera head, wide band RGB and CVBS outputs, instantaneous ENG use with video recorder connection and superb matching colorimetry to the LDK 6A and LDK 26A.

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good circular horizontal pattern for both the horizontally and vertically (if used) polarized signal(s). It should also have a good impedance bandwidth characteristic and a clean vertical pattern that is symmetrical for all azimuths and drops to a very low value toward the zenith and nadir with a good axial ratio of the two polarizations.

Figure 2 shows the approximate location of the first null in the multibay antennas that use the typical one-wavelength bay separation. In any installation where there is significant population in the area of the first null, null fill must be considered. In general, for heights above 500 feet, null fill should be used. For lower heights and higher gain antennas, a careful study should be made to determine the need for null fill. The null fill should be such that the median field strength is maintained in the 90 to 95 dBu range.

At closer distances than those of concern for null-fill control of the vertical pattern, it is important to meet the nonionizing radiation limit. A simple calculation will provide an estimate of the maximum permissible downward radiation. If the sum of these four numbers exceeds 145.8 dBu, then specific steps must be taken. The numbers are 102.8 dBu (radiation per kW), 6 dB (reflected signal), xdB (sum of horizontal polarization and vertical polarization ERP in dB), and ydB. (20 log |5280/antenna height in feet|).

This example is the worst case considering a poor antenna. More accurate calculations utilizing actual antenna performance and other factors can demonstrate compliance. If not, changes will have to be made. For very tall towers and high gain antennas, the filling of other nulls should be considered.

For high-gain antennas, the feed system should also be considered. Some antennas are end-fed, some are center-fed and some are parallel-fed. For best performance, parallel feed gives the best control of pattern shape and bandwidth. **BM/E**

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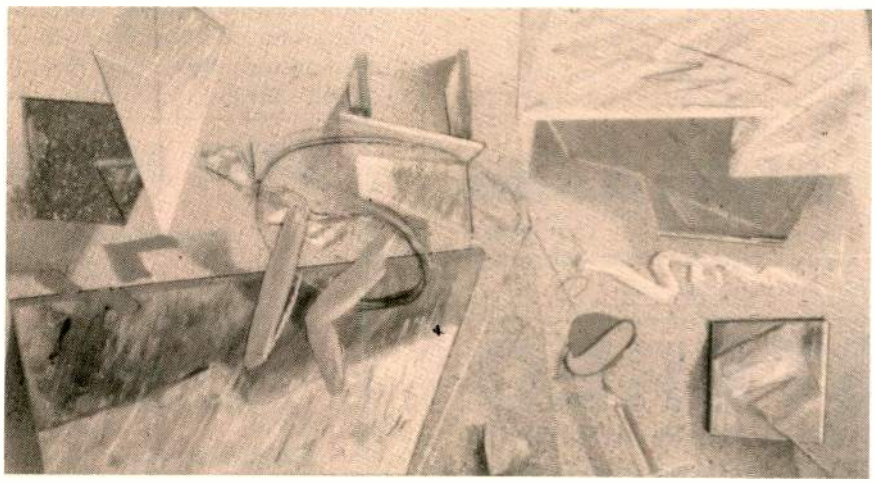
Circle 163 on Reader Service Card

Promotion, Production Highlighted at BDA and NATPE



One of two graphic images judged Best of Show at last year's BDA Seminar, "Knock Knock Nickolodeon," was produced via traditional cel animation at Colossal Pictures by John Hays (animator) and Lidia Przyluska (illustrator).

The latest news on promotion, production, and graphics awaits broadcast managers at two upcoming shows.

By Eva J. Blinder

What's the last word in electronic graphics? On-air and print promotion? Local program production? Broadcast managers can bring themselves up to the minute on all these issues at a pair of intense and rewarding meetings, both scheduled for next month: the annual seminar of the Broadcast Designers' Association and Broadcast Promotion and Marketing Executives, June 11-15, at the Loew's Anatole Hotel in Dallas; and the second annual NATPE Production Conference and Exhibition, June 19 to 22, at the Adam's Mark Hotel in St. Louis.

The BPME/BDA seminar combines a full schedule of BPME promotion and marketing workshops with an exciting BDA agenda featuring both electronic and print design. Gene Jankowski, president of the CBS Broadcast Group, will deliver the keynote address. BPME workshops will offer image-building and promotional ideas tailored for commercial stations, independents, and public broadcasting outlets.

The BDA program (see accompanying box) will be enhanced by a series of continuous hands-on workshops meeting all day, every day of the convention, on Ampex AVA, Aurora, Bosch, ColorGraphics ArtStar, and Quantel paint systems; Chyron, Dubner, and Thomson-CSF Vidifont character generators; and Grass Valley Group switchers.

A total of around 70 exhibitors are expected to take booth space at the BDA/BPME seminar. Some of those planning to exhibit as of press time included Abekas Video Systems, Ampex Corp., Animation House Inc., Apple Computers, ColorGraphics, Cranston-Csuri Productions, Dallas Post-

Production Center, Image West, Pinnacle Productions, Quantel, Renaissance Productions, The Post Group, and Z-Axis.

The ins and outs of in-house production will be explored in detail at the NATPE Production Conference, which should be a big draw for production managers, promotion managers, and marketing managers alike. Workshops will cover all aspects of the production operation, including such vital areas as client relations and interdepartmental relationships.

Companies exhibiting their goods and services will include Ampex, ColorGraphics Systems, Bill Daniels Co., Digital Systems, Eastman Kodak, Grass Valley Group, Hitachi, IDC Services, Innervision Productions, JVC, KWGN/Remotes, LaClede Communications, Library of Special Effects (Darino), Lowel-Light Manufacturing, NEC, Panasonic, Phillips TV Systems, Plastic Reel Corp. of America, Ryan and Friends, Sony, Soundtrack Music, 3M Co., VTS Music, and Z-Axis. **BM/E**

BDA HIGHLIGHTS

Wednesday, June 11
Registration
BDA Elections
Seminar Grand Opening Reception

Thursday, June 12
Update on Computer Graphics
Rodney Stock
Electronic Paint Systems for Television
AVA, Aurora, ArtStar, Quantel, Chyron
"Dangerous in the Wrong Hands"
Harry Marks speaks out on design technology
Animation with Standard Tools
Joe Negri, KMGH-TV, Denver
Advanced Computer Graphics Panel
Robert Abel & Assoc., Pacific Data Images, Cranston-Csuri

Friday, June 13
Grass Valley Workshop
Billy Pittard, KCBS-TV, Los Angeles
The All-Electronic Design Department: A Development in the Making
Judy Rosenfeld, KRON-TV, San Francisco
International Design
Hal Donner, TV Globo, Brazil
BDA Luncheon
Frank Thomas, former Disney animation supervisor
"Extending the Boundaries"
Design Symposium
Woody Pirtle, Ivan Chemayeff, Debra Sussman, April Greiman
Boston in Print
WCVB, WGBH, WBZ, WNEV, WSBK
Storyboards
BDA Cocktail Party, Awards Presentation, and Buffet Gala

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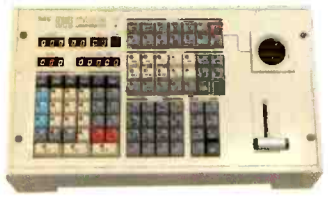

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Saturday, June 14

International Production House Film Show
Robert Abel, Harry Marks
Packaging Graphic Identity for Television News Scenic Design
Hugh Raisky, Ron Baldwin, Jim Day
Logo Development and Implementation
Landor & Associates
Computer Storyboard Workshop
Chyron, Vidifont, Dubner Workshops
"Creating a Winning Team": Art Directors and Promotion Directors Panel Discussion

NATPE HIGHLIGHTS

Thursday, June 19

Workshops, 3:00 to 4:30 p.m.:
Set Design
Special Effects—Getting the Most from What You Have

Friday, June 20

General Session, 9:00 to 10:30 a.m.:
The Effective Communicator
Workshops, 10:45 a.m. to Noon:
How to Communicate Creative Ideas
Other Side of Leadership
Interdepartmental Relationships
Client Relations
Luncheon, 12:15 to 1:30 p.m.:
Speaker: Lucie Salhany, Paramount Domestic Television and Video Programming
Workshops, 1:45 to 300 p.m.:
Repeat of Thursday p.m. and Friday a.m. sessions
3:30 to 5:00 p.m.:
Producing Remotes

Saturday, June 21

Workshops, 8:30 to 10:00 a.m. (repeated 10:15 to 11:45 a.m.):
Producing Cost-Effective Graphics
Producing for Home Video
Preparing for Post-Production
Producing Stereo
Into the Land of 3D
Testing Your Program Ideas
General Session, Noon to 1:30 p.m.:
Luncheon
Workshops, 1:45 to 3:00 p.m.:
Moving to a Program Director
Selling Your Production Facility
Broadcast TV Meets Business TV
Cost-Effective Producing
Lighting Seminar, 1:45 to 5:30 p.m.:
Innervision Productions/Imero Fiorentino Assoc.

Sunday, June 22

Rap Sessions, 9:00 to 10:00 a.m.:
Markets 1-50
Markets 51-210
Brunch, 10:15 to 11:45 a.m.:
Iris Hall of Fame Awards; Kukla, Fran and Ollie Show; Sally Jessy Raphael Show

Improper Channels

By Harry Cole, FCC Counsel

So you think you can speak your piece to any Commissioner (or FCC staff member), any time you want, about anything you want, right? After all, they're government workers—you pay their salary, right? And the First Amendment gives you the absolute right to seek redress of your grievances, right? So when you find yourself in a situation where you think the Washington, DC, bureaucrats could use a little straightening out, you can just give them a call or drop them a line to get things squared away, right? WRONG. As it turns out, there are a number of rigid restrictions on this kind of communication, and if you are not careful, you could get yourself into some hot water fast.

It's my ex parte

The primary restrictions on contacts with FCC personnel are found in the Commission's rules governing *"ex parte* presentations." The term *"ex parte"* is a legalism (as you may have gathered from its distinctive Latin flavor) that means "one-sided." The *ex parte* rules simply require that, in certain types of "restricted" proceedings, one participating party cannot contact decisionmaking people within the Commission to discuss the merits of the proceeding unless all other participating parties are advised of the contact and permitted to throw in their comments as well. The whole idea is rooted in standard notions of fundamental fairness: if the Commission is going to decide a matter, the basis for its decision should be clearly set forth on the record, and all affected parties should be given a fair opportunity to contribute to that record. Conversely, deals cut in private, outside the glare of the public eye, tend to undermine the public's confidence in the fairness of the decisionmaking process.

Just in case you think this is all just an abstract matter unlikely ever to affect you, we offer an illustration. A couple of years ago, a daytime-only AM licensee in the Midwest filed for a new FM station in its community of license. A competing application was filed by people from outside the community. At the time the AM licensee's application was filed, there was talk of a "daytimer preference" to be awarded to AM daytime-only licensees seeking FM construction permits, but as of that time the Commission had taken no action relative to such a preference. (The daytimer preference has, of course, since been adopted.) One of the AM licensee's owners wrote numerous letters to various members of Congress and other elected officials asking for help in the fight against the competing applicant. Her letters included such statements as "|the FCC is| trying to tell me that some fellow from Maryland can apply for a license and take it away from local ownership . . . well, I don't think he should be allowed to take our business away from us . . . so you see, I need help!"

As a result of these efforts, a number of the elected officials and other community representatives sent letters to the Commission on behalf of the AM licensee's FM application. Many of the letters were delivered to Chairman Fowler's office. No copies of the letters were sent to the competing applicant by the AM licensee or by the authors of the letters. Their existence surfaced, however, and an issue was included in the proceeding to determine whether the letters consitituted improper *ex parte* contacts. The AM licensee argued that its letters were only intended to secure support for the general proposition of a "daytimer's preference" in FM proceedings. The competing applicant ultimately dismissed its application in return for $50,000, leaving the AM licensee alone in the proceeding with nothing between it and a grant. Nevertheless, in a decision last February, the presiding administrative law judge denied the AM licensee's FM application because of the *ex parte* communications.

Now admittedly, the facts and circumstances involved in this case were somewhat extreme, and the presiding judge does not seem to have completely believed the AM licensee's story. The bottom line in the case, however, is that an applicant could have secured an FM construction permit. Instead, because of *ex parte* contacts, it lost $50,000 (paid to its competitor to dismiss its application), had its FM application denied, and has possibly jeopardized its AM license.

With the foregoing in mind, let's take a quick look at the specifics of the *ex parte* rules, so that you can get a sense of what kinds of conduct are acceptable and what kinds aren't. That way, ideally, you won't make the same mistakes that others have made before you.

Rule review

The following definitions are included in the Commission's rules:

Presentation: Any communication going to the merits or outcome of a proceeding.

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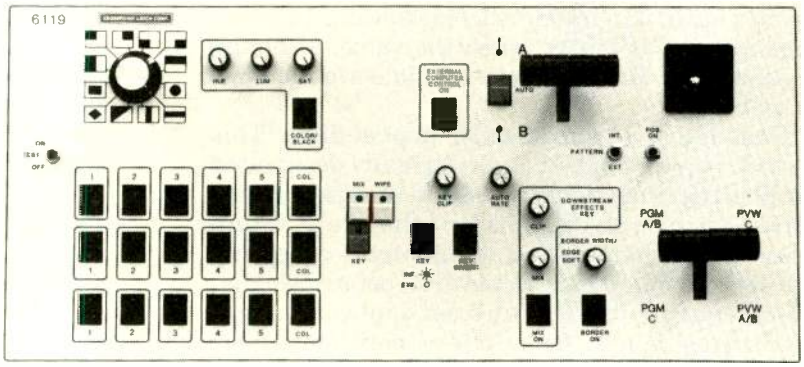
The small size of the 6119 is deceiving. The unique panel arrangement of this powerful switcher, allows a "fade up" of the Downstream key over another key, and permits the second fader arm to double as a Master Fade to Black. The fact that the switcher does so much simultaneously, permits a reduction in the number of tape generations during editing sessions. Fewer generations means a higher quality recording. The switcher can "fade in" a downstream matte key over an effect between two inputs, and dissolve the entire combination to a fourth signal.

The 6119 is a powerful compact Production switcher. The second Fader arm doubles from a fade to Black, to a mix from a bordered wipe or key, to another source.

The auto mode produces smooth wipes and mixes which can also be triggered from an editor. (GPI) Standard Feature PRICE $2690.



The addition of the 6800 stereo audio follow mixer transforms the 6119 into a small **MASTER CONTROL SWITCHER.**

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The Internal Sync generator has four black burst outputs, and genlock with automatic changeover.

As a **POST-PRODUCTION SWITCHER** the 6119 can be fully controlled from the keyboard of an editor using current protocols. It has a serial input (RS232 or RS422) and has even parallel inputs for certain editors. (This parallel input feature is very cost effective).

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- TWO FADER ARMS
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Ex parte presentation: Any written presentation, made to decisionmaking personnel by another person, which is not served on the parties to the proceeding; or any oral presentation, made to decisionmanking personnel by any other person, without advance notice to the parties to the proceeding and opportunity for them to be present.

Decisionmaking personnel: In restricted adjudicatory proceedings, these include the Commissioners and their personal office staffs, the Review Board and its staff, the Administrative Law Judges and their staff, the General Counsel and his/her staff, the Chief Scientist and his/her staff, and the Chief of the Office of Plans and Policy and his/her staff. (In restricted rulemaking proceedings, the list is pretty much the same, although certain Mass Media Bureau officials are included as well.)

Restricted adjudicuative proceeding: This includes proceedings that are formally designated for hearing (including renewal hearings, comparative hearings, revocations, and the like). Certain proceedings that *may* be designated for hearing are also considered restricted even before designation. For example, if you file an application for a new station, and someone files a petition to deny that application, your application automatically becomes a "restricted adjudicative proceeding" (for purposes of the *ex parte* rules) the day the petition is filed. Similarly, if a competing application is filed, the proceeding becomes restricted on the day the FCC issues a public notice reflecting the filing of the application.

Restricted rulemaking proceeding: Any informal rulemaking proceeding that, in the Commission's judgment, involves "competing claims to a valuable privilege." Such proceedings become restricted on the day the notice of proposed rulemaking is issued. Note that even nonrestricted informal rulemakings—i.e., proceedings that do not necessarily involve "competing claims to a valuable privilege"—become restricted from the time the Commission issues a notice (commonly referred to as a "Sunshine Agenda") that it is prepared to considered a draft order disposing of the proceeding. It remains restricted until the Commission finally acts on the draft order. Most broadcast-related rulemaking proceedings, including most proceedings involving channel allotments, are nonrestricted informal proceedings.

Bearing the definition of these various terms in mind, let's look at what you can and can't do. In general, *ex parte* presentations are prohibited in all restricted proceedings (whether adjudicative or rulemaking). While there are some very narrow exceptions to this, it is normally best to assume that any presentation you may wish to make to a decisionmaking person is forbidden under the rules (certainly it is best to assume this until you have had an opportunity to consult with knowledgeable communications counsel.) This means that, before you attempt to contact any decisionmaking personnel, you should first determine whether or not the proceeding about which you wish to contact them is restricted. Some are pretty obvious: comparative proceedings, rulemakings that the FCC has already formally declared to be restricted, etc. Others may not be. For example, if (as was the case in the example described earlier in this article) you are involved in a comparative proceeding, you should be careful not to transgress the *ex parte* rules by filing comments in an unrelated, albeit directly relevant, unrestricted rulemaking proceeding.

A subtlety that apparently escapes some is the fact that the rules will not let you accomplish indirectly that which you cannot accomplish directly. Stated another way, if you cannot make a particular *ex parte* presentation, you cannot ask somebody else (say, your favorite senator or congressperson) to do it for you. This is especially important to focus on since elected officials tend to be eager to please their constituents. Thus, if you happen to vent your spleen, in writing, about a particular restricted proceeding to your senator, you should not be surprised if someone in your senator's office upon receipt of your letter, figures the best thing to do is to contact the FCC's Chairman on your behalf. Once the contact with any decisionmaking person is made, the *ex parte* presentation has occured, and if it is determined that you solicited the contact, it can be held against you. Indeed, that turned out to be the primary problem encountered by the woman in the example described above.

Approved communication

Notwithstanding all of the foregoing, there are some types of presentations that can be made to decisionmaking persons without fear of violating the *ex parte* rules. These include status checks relative to the substantive matters at issue in such proceedings. Thus, for example, if you are one of several competing applicants for one of the 80 to 90 FM channels, and if, after your application has been on file for 12 to 15 months without any sign of progress, you begin to wonder what has happened to it, you can certainly call the Commission to inquire about is status. But if you do so, you should be very careful to ask only about the status (questions like, "when it is likely to be designated for hearing"), and you should avoid altogether any questions about, say, what you chances of winning might be.

The *ex parte* rules are something of an anomaly. They are intended to guarantee everyone an absolutely equal opportunity to succeed on their own respective merits, with the decision being based solely on matters of record. No one could reasonably quarrel with such a proposition.

As always, if you want further details about the *ex parte* rules or if you have a particular question, contact your communications counsel. **BM/E**

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PAL Video Corrector from ICM

The VC-2000P PAL Video Corrector from ICM can be used for half-inch and ¾-inch videotape editing and duplicating. Automatic regeneration of all synchronizing signals will correct many picture instabilities such as jitter, bending, and rolling.

Video, color, and black level adjustment allow precise control over picture values and permit scene-to-scene matching. A separate control gives a professional fade-to-black. Image enhancement and noise reduction controls provide dramatic picture improvement and aid in preventing tape duplicate generation loss.

Additional features include zebra stripe video level indicator, built-in distribution amps (four video and four stereo audio outputs), and rackmounting hardware. A "Bypass-Operate" switch allows instant comparison of processed and unprocessed signals. A "Stabilize" switch automatically removes copyguard encoding when activated, and an "Indicate" switch activates a zebra stripe 100 percent peak video indicator.

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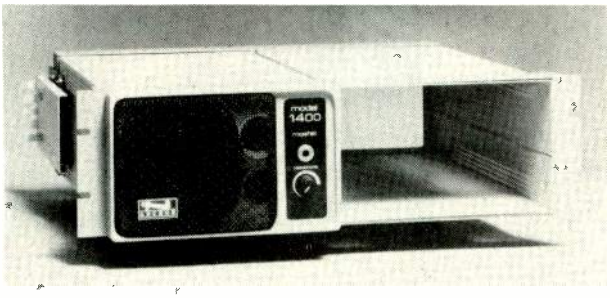


Anchor Audio has Powered Speaker

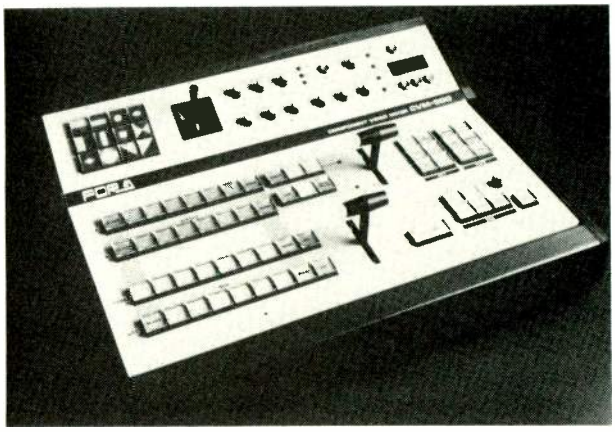
The AN-1400, new from Anchor Audio, is a powered speaker that fits into a Tektronics side-by-side rack.

The unit has a 50 W power MOSFET amplifier and a dc servo bias control. It features a 600 ohm transformer isolated, balanced XLR input, a front-mounted headphone jack with speaker interrupt, and is designed not to created interference with nearby waveform or video monitors.

Frequency response is 70 Hz to 14 kHz, +/−4 dB. Total harmonic distortion is less than 0.15 percent (at rated power) from 40 kHz to 15 kHz. Maximum SPL at one meter is 100 dB. The AN-1400 input and equalization stages use the latest low noise, high slew rate and ultra-low distortion OP-amps.

Other features of the AN-1400 include high thermal stability, wide power bandwidth, and virtually immeasurable distortion within the audible frequency range.

Circle 251 on Reader Service Card



For-A Video Mixer

For-A has announced the availability of the CVM-500 component post-production video switcher, which permits a full range of professional functions and special effects to be implemented with component signal processing.

The CVM-500, which features six inputs plus black and color background, reduces edge noise to an absolute minimum during keying, matting, and addition of wipe effects. A high-resolution picture is possible at all times because of component VTR and component camera inputs that require no decoding or encoding prior to processing.

The unit is suited for multiple source editing, graphics and character generator insertion, mix effects between sources, title and graphics colorizing, background generation, and downstream keying. One of its most important features relates to chromakeying. Since outputs from component processing VTRs can be used as key sources with the CVM-500 switcher, better transition edges are achieved than are possible using a decoded NTSC VTR source as is the case with composite switcher interfaces.

The unit, which is priced at $17,900, can be used with two new For-A options: the EXKEY component chromakey (CCK-500), and the EXTROL effects memory and editor interface with 40 register memory.

Circle 252 on Reader Service Card

Ron Schiller CD Software

Ron Schiller Associates has introduced CD music cataloging and on-air player software that can control and access "off the shelf" CDs.

The CD Filer System works with Phillips LHH 2000 and Sony CDP 3000 professional CD players

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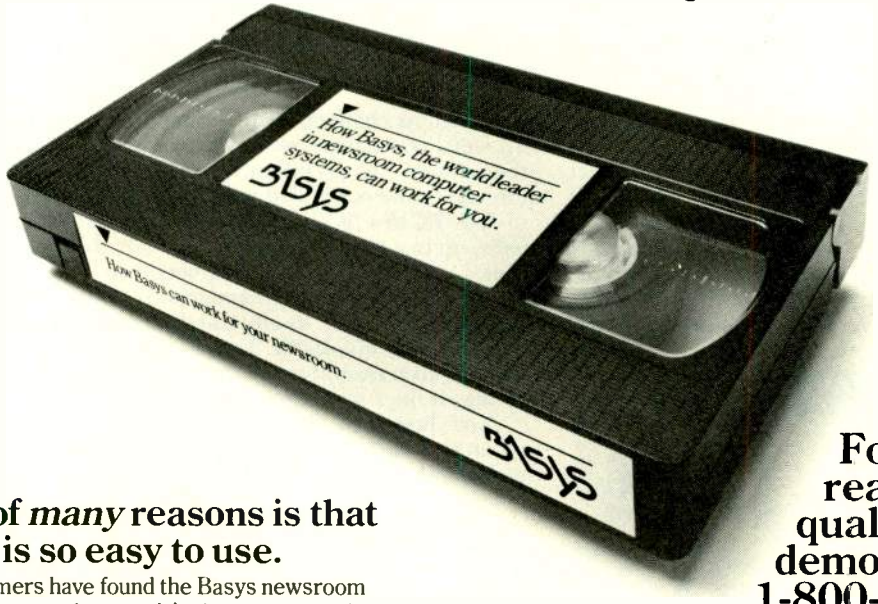

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with a computer interface option. It allows for the entering of data and the creation of customized database files, as well as the sequencing and random access of discs.

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Belar Stereo TV Monitors

Two new stereo TV aural monitors have been introduced by Belar Electronics Lab.

The TVM-210 BTSC Reference Monitor is designed to operate in conjunction with the Belar TVM-100 TV Aural Monitor or other precision wideband demodulators. It can be used for set-up, test, and measurement of stereo TV systems and provides accurately decoded left and right channel outputs. Two auto-ranging VU meters allow measurement of total modulation, channel separation, S/N, L+R and L-R modulation pilot level, and 2 H rejection level.

The TVM-220 BTSC Program Monitor, used with the TVM-210, provides full-time monitoring of L+R and composite signal modulation levels. Both functions include digitally selectable peak indicators along with fixed 100 percent peak modulation indicators.

Circle 254 on Reader Service Card

Cassette Mixer from Fostex Multitrack

Fostex Corp. has introduced a new multitrack cassette/mixer that features six inputs and an independent stereo buss. Model 260 has four mic or line inputs and two additional line inputs for tape returns or for stereo effects returns during mixdown. In addition, each channel features a straight-line fader, mute button, trim control over a 50 dB range, parametric EQ, track assign direct or to the independent buss, two aux send controls, and monmix pan and gain controls.

Other features include switchable LED bar graph meters, automatic monitor switching, automatic stop with two-position memory, and top-panel patch points.

Model 260 operates at a tape speed of 3 ¾ ips and retails for $995.

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Best Show on Wheels. The New Video 20 Pedestal System.

When you and your EFP camera are on the go, get maximum portability plus studio comfort with the Video 20 Pedestal System from Sachtler. A pneumatically supported center column with its pressurized balance system provides multiple load capabilities for smooth and precise on air movement. The steerable dolly assures equally smooth and precise tracking. Also, the Video 20 Pedestal can be combined with the Sachtler Semi-Dolly or used as a stable, stationary unit. For lightweight portability and professional results, the Video 20 Pedestal System proves itself a champion in action. Everywhere. Every time. Of course all Video 20 Pedestal System combinations come with Sachtler's guaranteed leakproof fluid heads for the ultimate in smooth, precise shooting.

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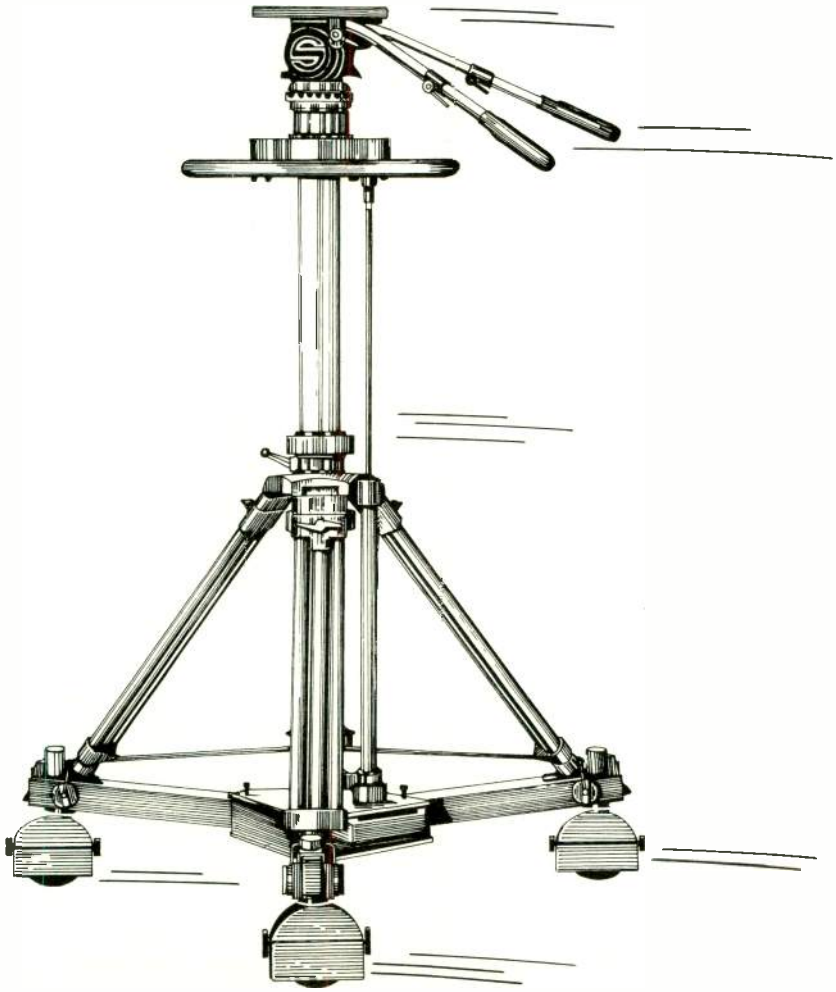
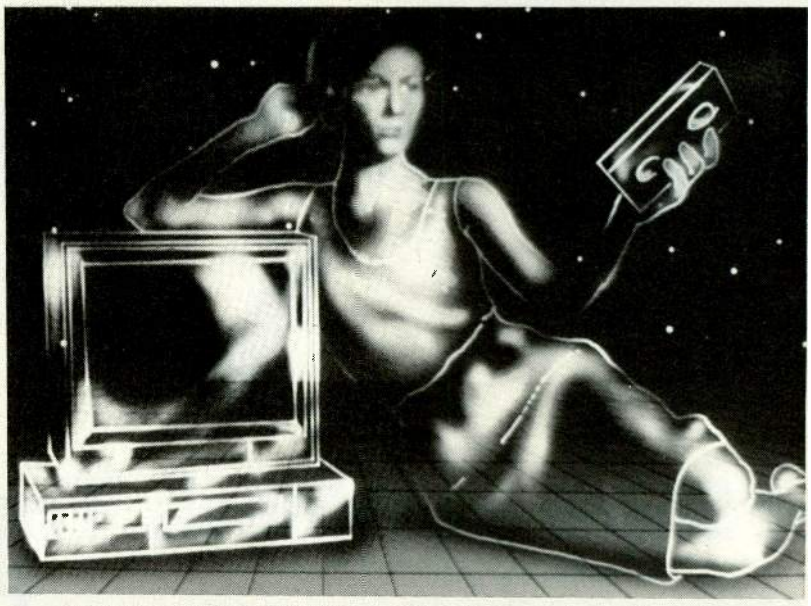


Business Briefs

The Burbank Studios have placed an order for 60 CTR-501 wireless microphones with Micron Audio products of Valhalla, NY. This new order will bring the number of CTR-150s at the Burbank Studios up to about 150. . . .**The Grass Valley Group** of Grass Valley, CA, has just received its largest order to date for its TEN-X 10X1 routing switcher from the Andrew Corp. The switchers, which utilize an RS-232 serial interface to switch video and stereo audio, will be used at major television network affiliates. . . .New York's Windsor Total Video Co. has just had a new "Paintbox Room" installed by **Forecast Installations** of Great Neck, NY. The new room exemplifies Windsor's involvement with production graphics.

Fairbanks Communications' W. Palm Beach, FL, radio stations **WJNO and WRMF** have recently purchased a copy of Data Communications Corp.'s BIAS News Room automation software . . . .Buffalo, NY's NBC affiliate **WGRZ** has announced the recent acquisition of the Odetics TCS2000 Cart System for automated studio broadcast. The M format machine will be delivered to Buffalo right after the Dallas NAB. . . . **Resolution Video, Audio and Film** of Burlington, VT, has announced its purchase of 200 Revox B215 cassette decks and its intent to purchase another 200 additional units within the year. . . . With the recent installation of a Rank Cintel Mark III Flying Spot Telecine, **Allied Film & Video's** facility in Orlando, FL, can now make film-to-videotape transfers. Now, according to manager Jim Caron, the Florida facility is the only one in the Southeast that can process negative film and transfer film to video in one location. . . . Scientific-Atlanta, Inc., has announced the installation of a major addition to the up- and downlink system at the **Group W Satellite Communications (GWSC)** facility in Stamford, CT. The addition is the result of several long-term contracts recently awarded to GWSC, including a multiple channel agreement with CBS. . . .As it commemorated the pressing of its ten-millionth compact disc, **Digital Audio Disc Corp.** of Terre Haute, IN, released plans to increase its pressing capacity by 200 percent over the next two years. . . .A new audio suite is under construction at Boston's **Videocraft Productions.** The new suite will include 24-track recording equipment and mix-to-pix capabilities.



Rotoscoping, frame-by-frame animation, and an effects hybrid of Editel/Chicago's Paintbox and Bosch FGS 4000 computer animation were all used to achieve the futuristic video effects in this still from a Scotch-brand magnetic and videotape cassette commercial. Produced at Editel/Chicago, the spot required a custom Bosch object program to coordinate the animation techniques used.

The ALTA Group , San Jose, CA, has appointed four Canadian distributors to market its Pyxis digital video production system. The distribution firms are Matrix Professional Video Systems of Vancouver, BC; Western Cinevision, Ltd., of Calgary, AB; Videoscope, Ltd., of Toronto; and Tele Syn of Montreal. . . .Kathrein professional land mobile antennas will now be distributed in the U.S. by **Scala Electronics** of Medford, OR. The European Kathrein products will be integrated with Scala's own line of antenna products . . . .An agreement has been announced between **Anixter Communications, Inc.**, of Skokie, IL, and the Jerrold Division of **General Instrument Corp.** The agreement gives Anixter nationwide distribution of Jerrold's new VCR switching device. . . .Cromemco Inc., Mountain View, CA, and ColorGraphics Systems, Inc., Madison, WI, have reached an agreement to jointly market the **ArtStarII** graphic production system. . . .The formation of a joint venture has been announced between **Varian Associates, Inc.** , Palo Alto, CA, and **Richardson Electronics, Ltd.** , Franklin Park, IL. The two organizations intend to jointly handle the distribution of certain types of electron tubes in worldwide markets. . . .An OEM agreement has been signed between **Lazerus Productions** of Berkeley, CA, and **Artronics, Inc.** , of S. Plainfield, NJ. Lazerus will now increase the power and speed of Artronics' Columbus 3D modeling system.

The Color Graphic System, a 3D animation and paint system from **Symbolics, Inc.**, of Cambridge, MA, is now available at the company's new New York office.

WHEN IT'S TIME TO INVEST in routing switchers or distribution amplifiers, look no further than Videotek. Our terminal equipment line, diverse enough to satisfy your specific needs, offers the built-in Performance you demand, and the field-proven Reliability and Delivery-in-Days you expect from Videotek . . . all at a price that will make you relax.

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