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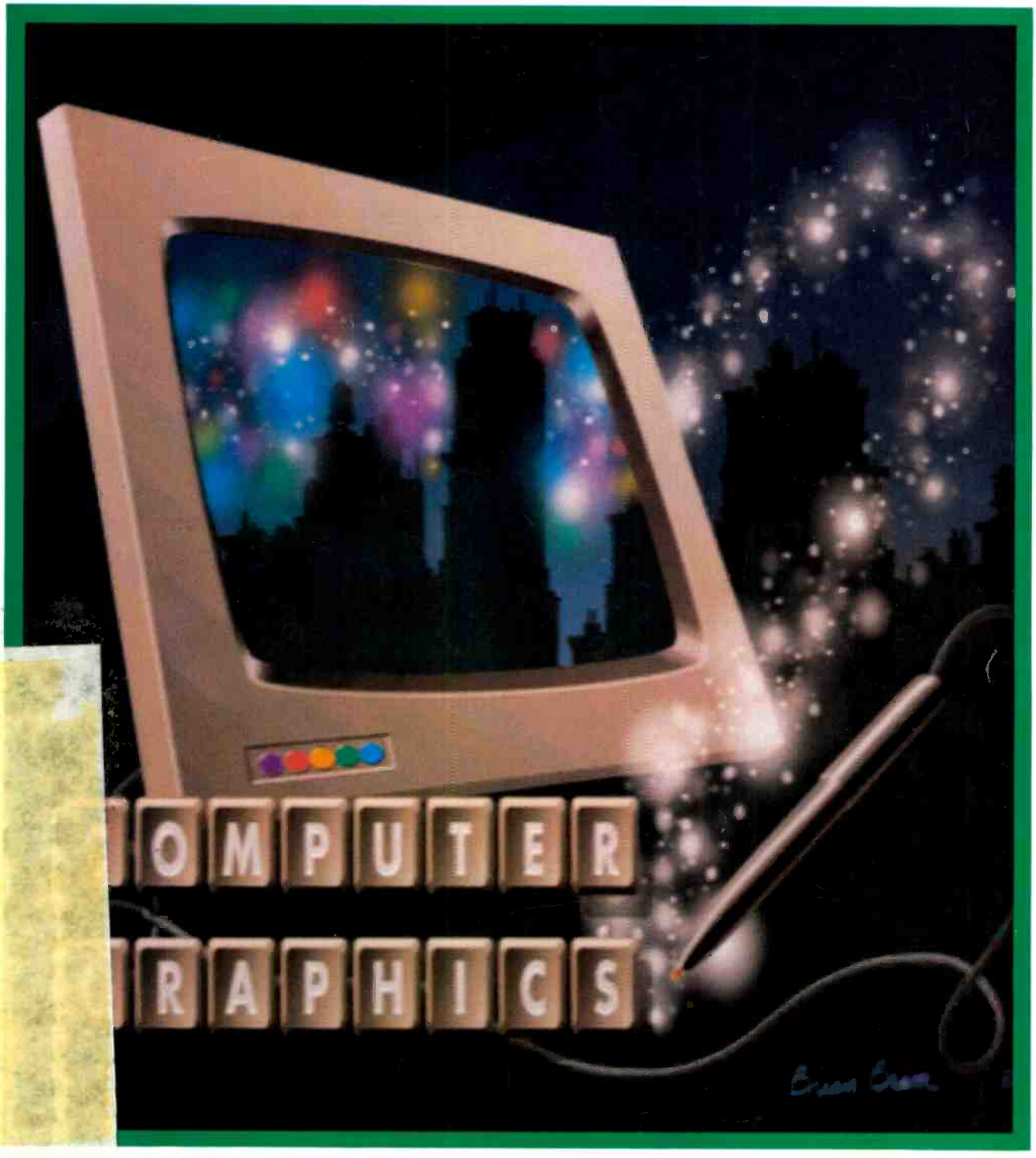

Also in this issue:

- Digital Audio EFX
- New RF Technologies
- 3D Animation
- BDA Preview

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SC 4016: Soft Alternative to Hard Production Tasks– The SC 4016 top panel shows a radical departure from the SC 4008 concept. Instead of dedicated keys, the SC 4016 employs eight "soft keys" with internal alphanumeric LED displays. The software menu assigns functions to the keys according to selected system mode, and keys are automatically re-labelled to indicate currently assigned function.

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SC 4008

SC 4016

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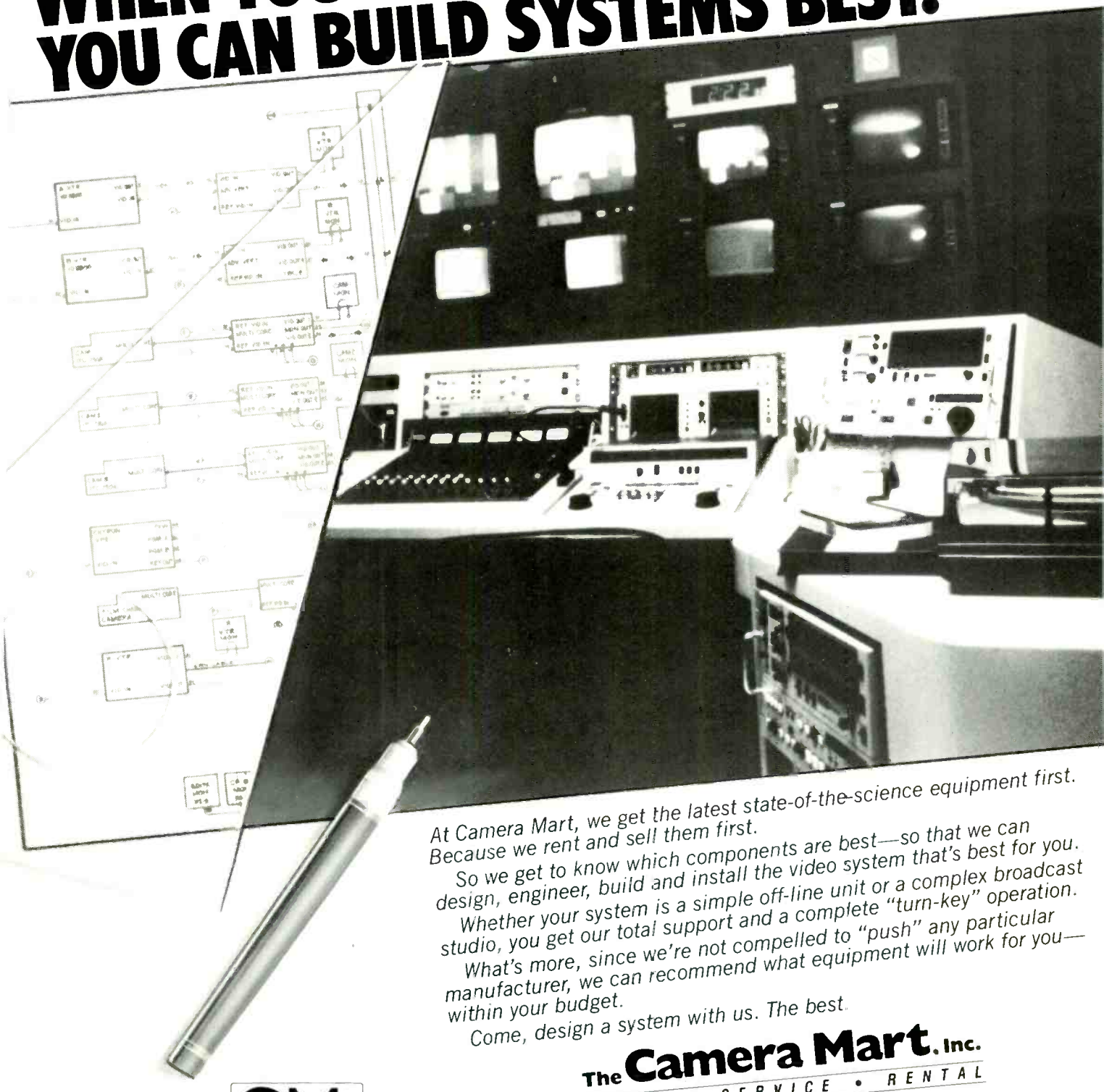

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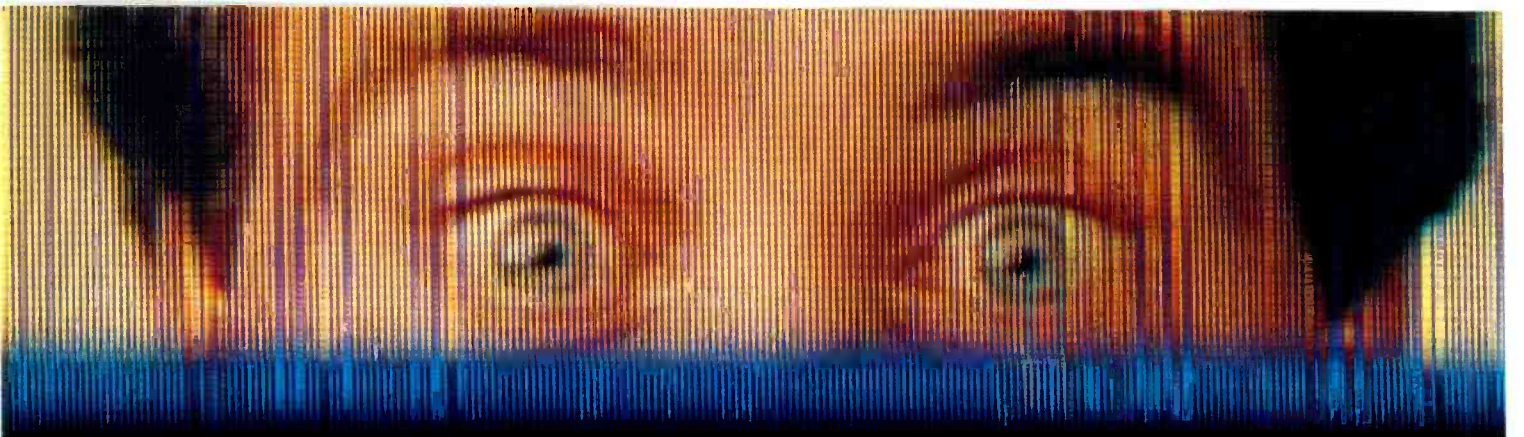

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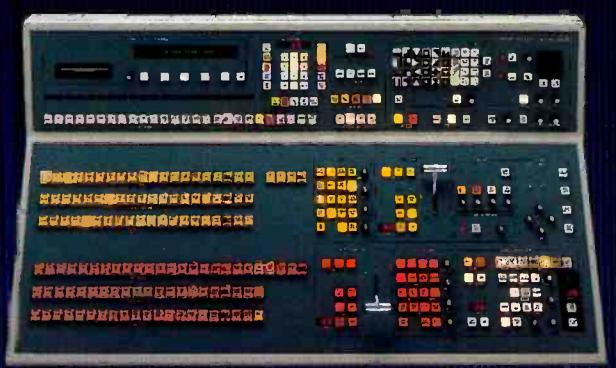

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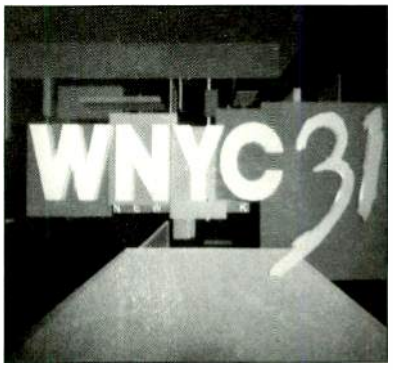

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Features

Cover:

The image was created by Brian Bram, design director at Boston Post Production, using an Ampex AVA-3 paint system. Bram notes, "The lighting effects were achieved with four-way gradations as well as airbrushing. The dimensional computer screen was created using the perspective features in the pasteup mode." The artwork was imaged by Ron Scott Photography in Houston.

Departments

Financial Disclosure

"The Commission now plans to implement a 'random check' of applicants who check the 'yes' box."

As part of the discussion on station trading, the three-year rule, and other licensing considerations, financial disclosure has been hotly debated. Forcing applicants to prove financial stability is, on the surface, a good idea since it weeds out those who are not seriously in pursuit of the broadcast license, but rather some kind of buy-out fee. It also precludes unnecessary paper processing by the FCC since, in theory, financial disclosure was meant to cut down on the sheer number of applicants.

The operative term here is "in theory," since it really hasn't worked that way. There has been no shortage of applicants for any broadcast license, and the extra paperwork involved with examining credit statements and other financial data provided by applicants actually increased materials processing time at the FCC. The forms were then changed wherein the applicant could simply check a box—yes or no—as to whether or not he was qualified financially to undertake the broadcast licensees responsibilities.

The problem, of course, here is that anyone can check the "yes" box and hope for the money to come in later, or pray that the real players will buy out one's interest in the license. The FCC has now come up with what they believe to be a solution for ridding the overburdened processing staff of such pretenders. The Commission now plans to implement a "random check" of applicants who check the "yes" box.

The FCC is doing the right thing now in trying to streamline its own operation and not requiring major proof of financial stability of broadcast license applicants. Instead the Commission is implementing a random checking of the certification applicants give as to their ability to undertake the financial burdens of obtaining and maintaining a broadcast facility. This accomplishes both goals: the elimination of paperwork, and the prevention of unqualified applicants.

This seems the only fair way to achieve the proper balance necessary between regulating a "deregulated" industry and permitting broadcasters to use a sensible form of license application. No legitimate contender should have problems with this method since, if he is qualified, he will pass the check. If the applicant does not have the necessary financial strength then, presumably, he will not file, or if he does he runs the risk of getting caught at a federal crime for which the punishment is fairly steep. If you want to know how steep, go ahead and try it.

Seems fair to me.

Tim Wetmore
Editor

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26,000 View New Computer Graphics Trends at NCGA

Although the computer graphics and video industries have been trying to converge for years, there is no better proof that they are still on equal, but only parallel, tracks than the back-to-back scheduling of NAB and the National Computer Graphics Association (NCGA) shows this year. Only a very few manufacturers (the most notable were Cubicomp, Alias, Wavefront, and Symbolics) had the resources to do both shows so close together. And few attendees who were planning to visit Dallas beginning March 28 bothered with the Philadelphia show that ended only one day earlier.

Ironically, the NCGA's annual video gala—presenting awards for the best computer animation in categories ranging from corporate communication to science and industry, and including theatrical—this year offered an award for the best broadcast computer animation. First place was taken by Robert Abel and Associates for an ABC logo and second place by Pacific Data Images for its *CBS Daytime Special*—though few broadcasters were on hand to witness the ceremony.

As usual, however, there were a number of developments at NCGA that may have an impact on TV graphics—if not immediately then certainly within the next few years. Most significant of these was the announcement of a new Silicon Graphics workstation, the IRIS 4D/60, that offers an enormous range of real-time computer animation capabilities (including mouse-driven control of light sources, object rotation, viewing angle, and so forth) in a hardware package priced at only $74,900 (applications software from third-party vendors is not included). In frame-by-frame rendering applications the machine renders more than 40 benchmark frames per hour.

The heart of the new workstation technology is a 7 MIPS (million instructions per second) RISC CPU that operates seven times faster than a VAX 11/780. This, coupled with the parallel processing graphics architecture, allows the real-time processing of 4,500 100-pixel polygons per second, including smooth shading and hidden surface removal. The system also incorporates full-color paint capability.

Silicon Graphics workstations are already well established in the computer animation market, forming the hardware platform for advanced 3D modeling and animation software from companies such as Alias and Wavefront, as well as Neo-Visuals (the 3D system now offered by 3M under the name Specter). Those wanting to improve on rendering speed, however, were forced to invest in an additional high-speed graphics engine such as the Pixar Image Computer (an extra $70,000 to $80,000).

With the 4D/60's new real-time capabilities, however, large-market broadcasters as well as teleproduction facilities can now experience not only an interactive working environment for viewing the models and animation, but also a far more cost-effective process for turning out finished work: the new SGI workstation comes fully equipped to output NTSC video directly to a VTR.

Deliveries of the unit to third-party software vendors such as Alias and Wavefront are sched-

A proud quintet displays their awards at the BM/E Best Station and Facility Design Competition cocktail party on the evening of Sunday, March 29, in the grand ballroom of Dallas's Adolphus Hotel. The party is held during each NAB convention, and caps *BM/E*'s annual competition recognizing excellence in management, design, and engineering in radio, television, and teleproduction. Winning stations/facilities are selected by a *BM/E* readers' poll.

Receiving the awards for 1986 were (from left): Dennis Lowe, chief engineer, KMVT-TV, Twin Falls, ID; Ken Chambliss, president, Video Tape Associates, Atlanta; Roy Pressman, chief engineer, WLVE-FM, Miami; John Stuart, president, KVOO-AM, Tulsa; and Tom Bohannon, chief engineer, WDBO-AM/WWKA-FM, Orlando.

Your station or facility could be this year's winner. Watch for an announcement in an upcoming issue of *BM/E*, or send a postcard with your station's call letters/facility's name, address, and the name of the person to be contacted to: *BM/E* Magazine, Best Station Contest, 295 Madison Avenue, New York, NY 10017. Contest rules and entry information will be mailed out in August.

Performance and Portability

The S-1 Flyaway – Another Midwest Innovation

It's the world's first hi-performance, truly portable Ku-band satellite uplink. Each of the 13 A.T.A. approved cases weighs less than 100 pounds, and the complete system conforms to international baggage regulations. Checked as excess baggage, the S-1 arrives when you arrive. Economically.

The system utilizes a Vertex 1.8M offset-fed antenna with a transmit gain of 46.6 dbi. This precision, aluminum surfaced reflector antenna meets the 29-25 $\log \theta$ FCC 2° spacing curves.

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Video and audio control and monitoring equipment are included in the standard S-1 package. Options include a 2-way communications channel, and an international receive configuration is available. The S-1 is also easily adaptable for data transmission. Contact Midwest for complete information.

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uled to begin shortly.

Ranging from the grandeur of a real-time 3D graphics processor to the more practical reality of PC-based graphics, the show also saw the introduction of the Vista board from AT&T—a high-resolution (1024 x 1024 x 32 bits to 2048 x 2048 x 16 bits) "big brother" of the Targa.

Fully NTSC and PAL compatible, the 32-bit graphics processor board also incorporates four megabytes of video RAM (this is expandable to 12 MB with an additional board) and four 8-bit channels for instant, full-color video capture. Working at typical video resolution of 512 x 512 with 32 bits/pixel, the memory can thus be divided into four pages, suitable for limited animation effects. The AT&T Vista board, which can be plugged into either the AT&T PC 6310 or IBM AT and compatibles, is list priced at $5,995.

New Owner for Ampex

Allied-Signal Inc., in a move to reorganize and focus on its aerospace and advanced engineering divisions, has sold its Ampex subsidiary to the Lanesborough Corp. The transaction, which cost $479 million plus the assumption of certain liabilities, was announced April 6.

Under the agreement, Ampex will be acquired by a newly formed subsidiary of Lanesborough, which plans to operate Ampex with its present management and organizational structure intact.

"We are extremely pleased to be affiliated with Lanesborough," said Charles A. Steinberg, Ampex president and CEO. "We're especially excited that Ampex will again be operated as a standalone corporation."

Edward J. Bramson, president and chief executive officer of Lanesborough, said, "We intend to make sure that Ampex has the financial and other resources to continue investing in the future. Ampex is a strong company with outstanding capabilities. We think the company's prospects for growth are excellent."

Videotape recording was invented by Ampex 30 years ago, and the company had sales last year in excess of $500 million. It is one of seven electronics businesses Allied-Signal is selling. Ampex was acquired by Allied in 1985.

Lanesborough, a privately held chemical manufacturing concern, intends to finance the transaction through a combination of its own equity and an offering of debt or equity securities. In the interim, Lanesborough has arranged for credit facilities with commitments of up to $475 million from a major New York bank.

The transaction is expected to be completed by the end of May, pending regulatory approval.

SMPTE Call for Papers

The Society of Motion Picture and Television Engineers (SMPTE) has issued a call for papers for its 129th Technical Conference and Equipment Exhibit, to be held October 30 to November 4, at the Los

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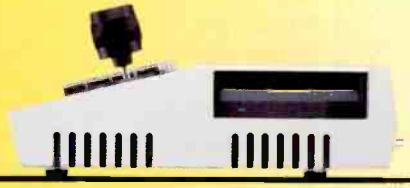

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Angeles Convention Center.

The theme of the 129th SMPTE is "Imaging and Sound: Today and Tomorrow," which will cover most areas of film, television, and video technology. Topic headings have yet to be finalized, but sessions on laboratory practices, film and video post-production, computer applications for television, and enhanced television are expected to be on the conference's agenda. Any paper dealing with these or other areas of motion-picture or television technology will be considered by SMPTE for inclusion in the program.

Persons interested in presenting papers should send their name, address, title of the proposed paper, and a 100-word abstract describing it to: Dollie Hamlin, SMPTE Program Coordinator, 595 West Hartsdale Ave., White Plains, NY 10607. The deadline is June 15.

AM Stereo, SNVs Subjects of NAB Surveys

Recent surveys commissioned by the NAB have served to highlight the continued growth of new broadcast technologies.

One survey, on technical advances at radio stations, reveals that the number of AMs broadcasting in stereo increased by more than 40 percent in the last eight months. The NAB cites figures of from approximately 446 AM stereo stations last August to more than 700 by the end of March 1987. The survey did not seek information on which AM stereo system stations used. The survey was conducted by telephone on a random national sample of 445 commercial stations on March 23 and 24.

There will be more satellite news vehicles (SNVs) on the road in the future according to another NAB phone survey, done between March 2 and 10. Seventy-one network affiliates with SNVs, and 253 other commercial stations without the trucks, were polled. Of the 253 stations, 23 percent said they plan to buy, lease, rent, or share an SNV within the next three years.

Of those stations with an SNV, 85 percent reported owning it. Stations said that they used their trucks an average of 12 days a month, with breaking news, emergencies, disasters, sports, and special events ranking as the types of stories usually involved. Eighty percent of the stations described their SNVs as "very valuable."

FMer Goes All-CD

WXCR-FM in Tampa, FL, has become the first classical radio station in the U.S. to feature full-time music programming on compact disc (CD). The station has been experimenting with the format for the last nine months, following a survey in April 1986 that revealed that 95 percent of the selections listeners prefer most are available on CD.

"Our reasoning was simple," says station manager Tom Shealy. "The audio quality is outstanding, and the audience was not interested in classic perfor-

The Outperformer!

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mances, but rather the overall sound of the station." If a classic performance is not available on CD the station strives to find an alternate version that is.

Shealy adds that the switch from analog LP and tape sources to CDs required extensive equipment modifications to accommodate the change in format. These included the addition of a CRL FM-4 multiprocessor system, reworking the RIAA equalization curve to add a boost in the mid-range frequencies, and dropping the console input and output reference levels to zero.

"In essence, we refined and upgraded the entire broadcast chain to mellow the full sonic and dynamic range of CDs to be passed on to the listener," explains Shealy.

After carefully evaluating a number of professional CD players, the station selected the Studer Revox B225 for its on-air applications. There are currently six B225 players (with 1:1 redundancy) at WXCR, although six of the newer Studer B226 players are currently on order.

News and liners are still kept on analog tape and played back on Revox B77 two-track machines. Shealy hopes, however, to incorporate a PCM digital processor (used with any standard half-inch VCR) in the near future to compensate for the slight dip in audio quality that occurs when switching from digital to analog sources.

"The CRL processor eliminates most tape noise, but the PCM system will keep it all in a digital format," Shealy says.

He also points out that CDs that are digitally recorded and mastered offer significantly better sound than those that were simply digitally mastered. "You really can hear the difference—even on the air," he states.

In Memoriam

Jack Bush, a pioneer in television journalism, died March 27, at his home in Doylestown, PA. He was sixty-eight.

Bush was director of electronic newsgathering at ABC News when he retired last year, having joined the network in 1963. His management positions at ABC included the supervision of worldwide camera crews, and the implementation of new technologies for newsgathering.

Prior to joining ABC, Bush was a newsfilm editing and production executive at CBS News, and the chief film editor for *March of Time* newsreels.

"Jack Bush walked amongst the likes of Stanton, Paley, Murrow, and Friendly," states Marc B. Wiskoff, Motorola district sales manager for special markets. "The ABC News organization benefitted greatly from his experience . . . his absence leaves a void that will never be filled."

Bush is survived by his wife Henrietta, and son Ethan.

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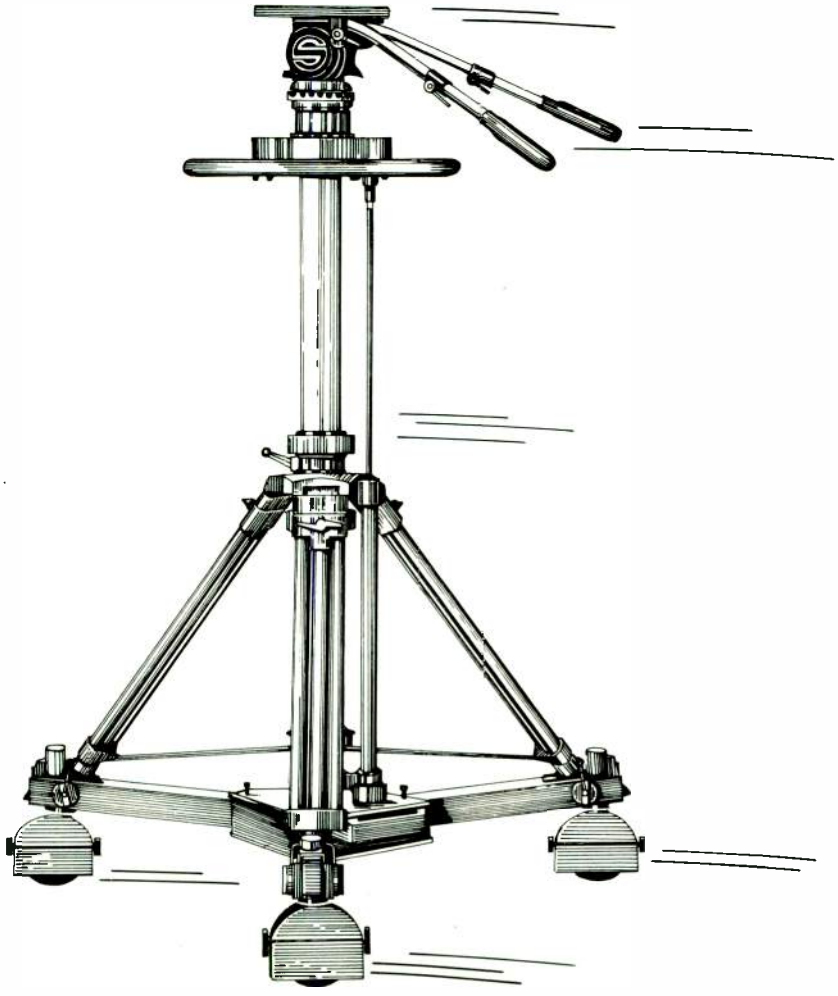

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y adapted to me."

Sit down at a Sony PCM-3202 2-channel digital recorder and you'll notice something strange.

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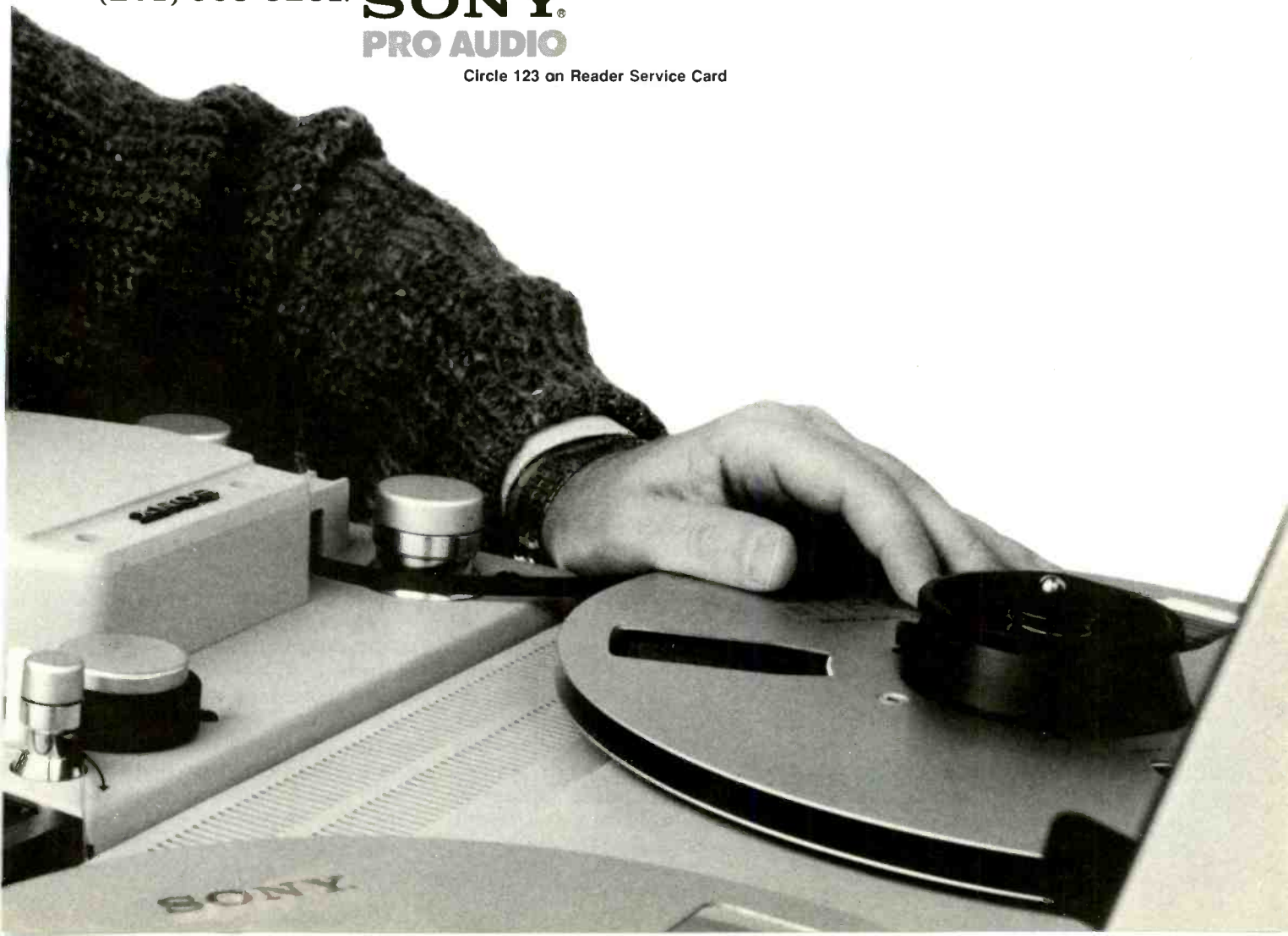


SEAS of COLOR

By Brian McKernan

Computers are replacing traditional graphics tools in television stations, providing artists with both familiar and new ways to work, and enough colors to rival a tropical reef.

The old saying that the first virtue of a painting is to be a feast for the eyes was never truer than today, as an increasing number of television stations add electronic paint systems to their complement of videographics equipment. The visual feast offered by paint does much to enhance a station's look, enabling it to present colorful, dynamic pictures whenever still images are called for. News is one of the major beneficiaries of this technology, which is rapidly making slides, razors, and airbrushes that require cleaning up anachronisms at many stations.

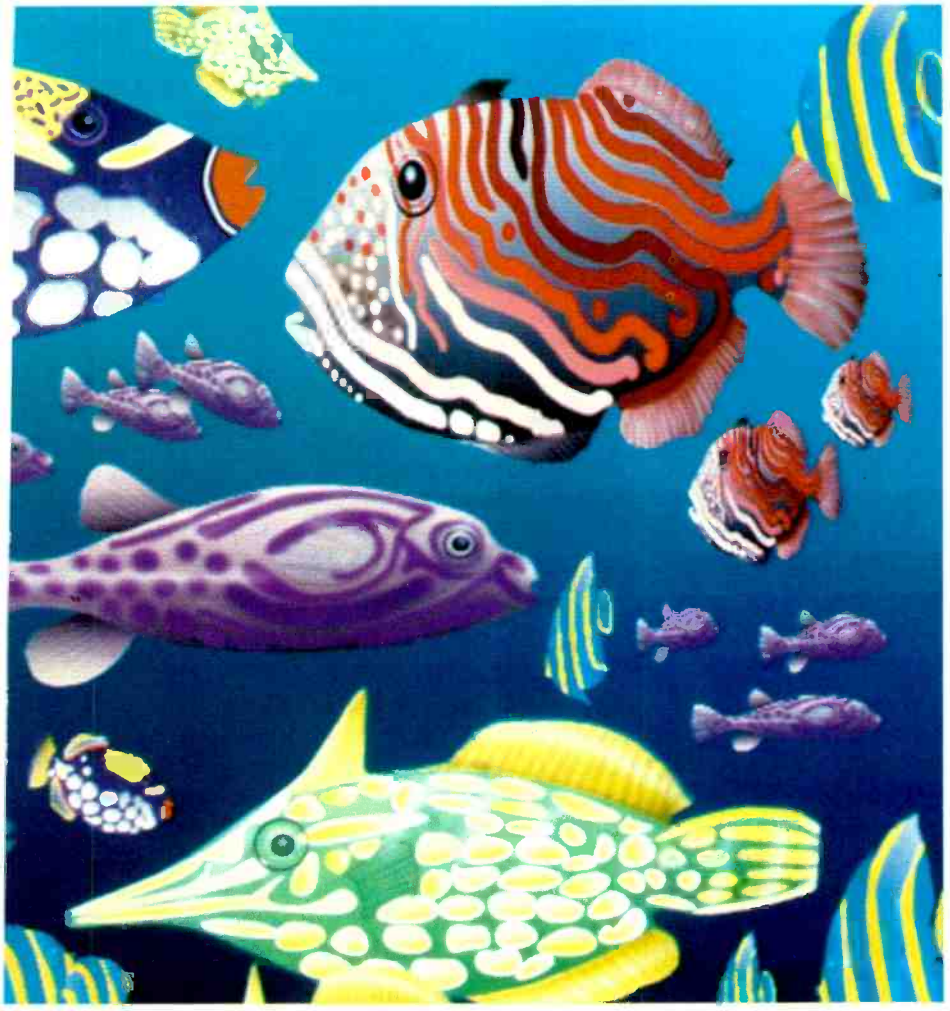
Still stores and character generators are, of course, also vital to a station's overall graphics operation, and are valuable adjuncts to using a paint system, even though today's paint systems often include elements of both. At the other end of video's computer graphics spectrum, 3D animation systems usually include paint software. But regardless of how extensively a station may be equipped, for its day-to-day graphics needs, paint is fast becoming essential for creating images that grab viewers.

Getting started

"Just a few years ago, we basically did nothing in terms of over-the-shoulder news graphics," recalls Bob Rankin, director of broadcast design at WHAS-TV, in Louisville, KY. "Then in 1984 we got our Ampex ESS [electronic still store], and that started the ball rolling. The over-the-shoulder graphic became part of our news function. We got an Ampex AVA-3 video painting system in 1985, and since then we've used it almost constantly. We did a survey and found our production of compressions—over-the-shoulder graphics—had gone up 200 percent. The AVA-3 is an integral part of our news presentation now, and makes it look infinitely better."

(Editor's note: the aqua at the beginning of this article was created on an AVA-3.)

"Paint is indispensable when you're trying to report on technical topics," explains John Shumway, WHAS-TV general assignment reporter. "I did a series of stories on groundwater contamination, and wanted to illustrate a situation where water from a septic tank was polluting a well. We used the AVA-3 to show a cross section of the earth 150 feet deep, illustrating the house, well, septic tank, and sewage flow. There's just no other way to do it. No matter how much you



explain something like that, you can't get the point across without a picture."

Art parts

Paint comes in two basic configurations, as standalone units specifically made for that purpose, or as a software function included within a 3D video computer graphics animation system. Manufacturers vary in their design of both kinds of paint system, but the basic parts are usually the same.

First and foremost there is what is called the architecture, which refers to the computer driving the system, and—by extension—the logic behind the user interface. This can be defined as the layout of steps or the process you have to follow to achieve what you want out of a paint system.

Different paint systems incorporate different computers, but the rule is the more sophisticated the processor, the more capable the system. Bit-level graphics is one consequence of processing power, the greater it is the more colors you have to work with. A 24-bit system can give the user over 16 million colors to work with, with over 300,000 displayable at any one time. Magnetic disk-based image storage is usually included in paint systems, and is often expandable for additional disk storage.

Into the architecture enters the video signal, usually in analog form. After conversion to digital, the image is held in a frame buffer for modification and display. A keyboard is often included in a paint system for entering commands and for titling, storage, and retrieval of finished pages. The stylus and digitizing tablet, however, are the major means of control and execution. A monitor displays the image being worked on. Edit menus may appear beneath it as pictures and/or text, or be displayed on a separate monitor. Menus using pictures—icons—feature touch-sensitive screens that activate desired functions when tapped by the stylus.

When the artist is finished, his images can be sent on to a still store, tape, or other media. What can be done to an image while it resides within a frame buffer is the essence of a paint system, and basically that includes anything that artists have been able to do with traditional tools.

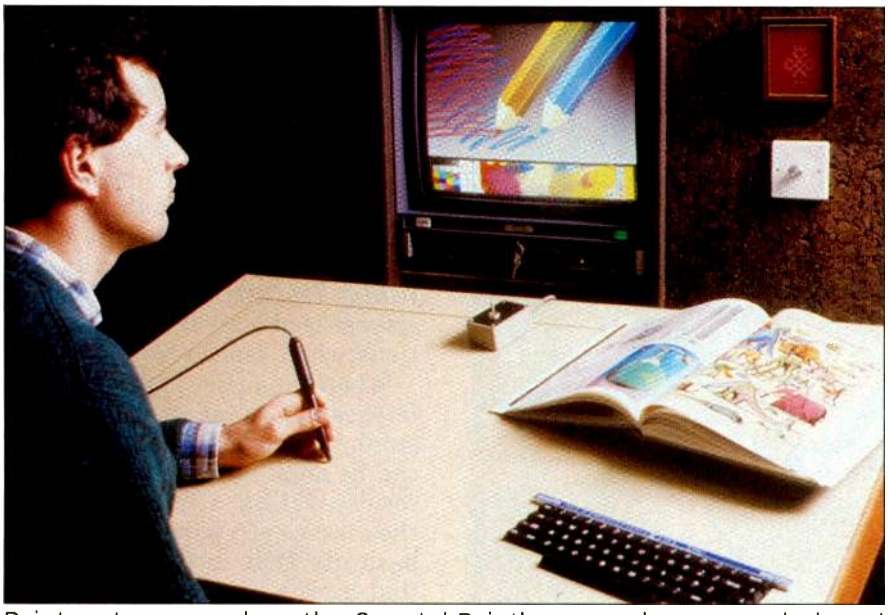
Images can be created from scratch, or existing pictures can be grabbed—in real time—from any moving or still video image, and then be modified. Pictures can be enhanced or altered by means of cutting and pasting, painting or tinting in a selection of colors that depend on the bit-level graphics of the system. The stylus can act as practically any kind of drawing instrument, from airbrush to chalk, and stencils can be created to make rules or outlines in any shape.

Most systems offer real-time antialiasing, and although features vary from system to system, they often include the ability to practice and mix colors and brushes on "scratchpad areas" of the screen, create user-defined brushes, blow up any picture area for pixel-by-pixel retouching, retouch by using any color present in the image, tilt and change perspective, and insert and manipulate type from built-in font generators.

Moving paint

"Making a better paint system means not only making it work faster and easier, but also giving it more features," comments Dimitri Chernyshov, product specialist at the Quanta Corp.

Additional features are always valued by the user, even on basic systems. The two-year-old Quantapaint 2500 is an 8-bit sys-



Paint systems—such as the Quantel Paintbox seen here—are designed for transparency and flexibility to allow the artist maximum freedom to create images.

tem, and for Tom Werner, chief engineer of KNPB-TV, in Reno, NV, its four-color color cycling enables him to do simple animation for a weekly newsmagazine show, *Silver State*.

"We've used the color cycling to make the grass appear to grow in a graphic on investments that compared money to a healthy lawn," Werner explains. "And for a story on prison overcrowding we multiplied hand-drawn inmates. It's a nice visual reinforcement."

Combining a character generator with paint is a logical next step in video graphics, and for WYCC, in Chicago, this means using their Chyron Chameleon with an RGU-2. "We use the camera capture feature a lot, and combine freehand art with text to do graphics for just about every holiday," says Don Rhodes, chief engineer. The station combines the output of the Chameleon and the RGU-2 in a switcher, and sends it to an Abekas A42 still store.

Moving up the product line, Chyron combines comprehensive character-generation effects and paint in one unit by adding a multimode graphics module (MGM) to their Chyron 4200 titling and graphics system. And at an even higher end, Chyron has recently introduced the Shimatronic graphic image system, a full-featured paint system that can be expanded to do 3D animation.

"We started with paint but are growing into animation, which is a natural for paint systems," explains Mick Ghazey, a vice president at Dubner Computer Systems, makers of the DPS-1 paint system. "Animation requires only a processor, frame buffer, and a tape recorder control, and that's already part of paint hardware."

In addition to comprehensive paint system features, the Dubner DPS-1 features real-time trajectory animation along spline paths. With this, the user can assemble single-frame animation sequences by specifying key frames, and then having the DPS-1 computer spline (draw the "in-between" pictures) according to the image's size, rotation, and perspective. Each frame is then recorded on a VTR. The key to this animation feature is software, which, in the view of many, is the key to all significant future developments in paint systems.

Tug of ware

"Software is of course a major part of systems nowadays," says Ghazey. "But the industry must make use of advances in both hardware and software, although software takes longer to improve because of the thousands of lines of code necessary in writing it. I feel that parallel processing will help hardware continue to improve, especially where video is concerned because the large number of pixels involved allow for computation tasks to be spread among available processors.

"I disagree that hardware has reached a plateau. The fundamental limit on the size of the computer chip has yet to be reached, and speed increases as chips are made smaller. Every two years the price performance of memory quadruples, and there's no end in sight," Ghazey says.

"Hardware and software are always leapfrogging each other," observes Wade Howie, marketing support manager of Alias Research. "When 32-bit processors first came out it took some time for programmers to catch up and write sofware that took advantage of that power. Now we're at a stage where hardware will have to take a major step again. But this does give the software people a chance to consolidate the products they're working on.

"The key to hardware and software updates is speed. If you can run things faster you can simplify what are really complex tasks for the user. Creative people need access to this power, and the more speed a system has the more transparent it is," Howie says, touching on a crucial aspect of all paint systems.

Transparency improves with the speed of the computer driving the system, the quicker it responds to the artist using it, the better. The goal is for the artist to feel that he is using traditional methods, and not a computer. The more user-friendly a system's architecture, the more the artist's influence—as opposed to the machine's—will be seen in the finished product.

"I've used other systems, and I feel that the Quantel Paintbox is just about the best one for an artist," says graphic artist Deanna Provencher, of KTLA, in Los Angeles. "You don't have to be an en-

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gineer to operate it. When you're airbrushing with the Paintbox, it feels like airbrushing. And there's no mess or fumes."

All quality paint systems should perform better and become easier to use proportionate to the amount of time spent with the system. As Provencher recalls, "Also, I do on-air promotions for the station's movies, programs, and sports, and I find that the more you work with Paintbox, the more things you discover you can do with it."

A changing picture

New features, such as animation, are expanding the range of what paint systems can do. But when integrated with other special effects devices, paint can do even more.

"We are the flagship station for the Pirates network, and we feed five other stations," explains Larry Komar, art director at KDKA-TV, in Pittsburgh. "We used our Aurora 220 videographics system to create all the ingredients of the opening graphics for Pirates baseball. It gives us a smooth, photographic look that is every bit as good as any network production, but for a fraction of the cost.

"This is the centennial year for the Pirates, and we've taken their logo and redone it with a woodgrain background. We did all the ingredients on the Aurora, and then we combined them in our one-inch room with ADO [Ampex Digital Optics] to tie it all together. We're still learning how to use the 220's optional 3D animation package, which we just received. It and the ADO will complement each other; production is always a challenge of finding the right machine to do the job.

"Other full-screen graphics for the show were also created on the Aurora, including the starting lineup, scouting report, and centennial trivia," Komar says. But KDKA's use of its paint system doesn't end with sports.

"In one case we've used the Aurora paint system to create a slick, video storyboard for a serious client who had never been on television before. It showed him exactly what his ad would look like. We shot our own people in the station with a video camera, and then cut and pasted them into an imaginary office with the client logo displayed. When the storyboard was done it was dubbed onto VHS for the salesman to take to the client's office," Komar explains.

Mitch Caster, KUSA-TV news artist, created this graphic to show how a disabled Air Force jet managed to land safely. Caster drew the picture with 3D Illustrator paint software on the station's BTS FGS 4000 animation system.

System approaches

Paint users can choose between standalone units, and those that are part of an integrated video computer graphic system. Quanta is developing its Dimension 32 graphics computer, which will offer software packages not only for paint, but also for 3D construction and animation and for character generation. That company is not alone in taking a systems-oriented approach.

"We're not primarily paint people," states Alias Research's Wade Howie. "Paint is integrated into our 3D modeler, and it rounds out the set of tools we provide the designer. We prefer the single-box solution for video computer graphics, instead of stringing several boxes together." The Alias/1 graphic design system is designed to accept future software upgrades, and is one of a new generation of machines that have been dubbed video workstations.

"I believe that the video graphics industry is at the same technological evolutionary point that the computer industry was at eight or nine years ago," states Mark Gray, executive vice president of Pinnacle Systems. "Back then, if you went to buy a computer you'd either buy an accounting computer, or an engineering computer, or some other type. But then along came the PC, and it was revolutionary because now you could do more than one function in the same box, and people could program it themselves. That's what we're doing with our workstation concept."

Pinnacle's Video WorkStation is a multifunction, general-purpose video computer that starts with a model 2010 for digital effects. It becomes the 2020 with the addition of a still store via hardware and software upgrades. "The software is what gives the system its capabilities," Gray explains. "The technology exists to do more than one function in the same box. We can change a digital effects unit into a paint system by adding one board and a floppy disk." This—and a tablet and pen—turns the 2020 into the 2030, with 32-bit full-color paint system.

The Pinnacle Video WorkStation software-based architecture allows for on-site software upgrades. Modular design provides for future expansion via plug-in hardware upgrades and enhancements.

One very popular software-based paint system is BTS's 3D Illustrator, which can be added to their FGS 4000 animation system. Three-dimensional models of objects can be taken from the animation side of the system and placed into the 3D Illustrator, where paint functions can then be applied.

Television station KUSA, in Denver, recently took delivery on an FGS 4000. "I can't say enough good things about the system," says KUSA artist Eric Warp. "We're just setting it up. Over-the-shoulder is its main use now, but I plan to use it to revamp the station's entire look. We've all seen plenty of embossed backgrounds that stations have created with their paint systems, but I'm anxious to experiment with new techniques."

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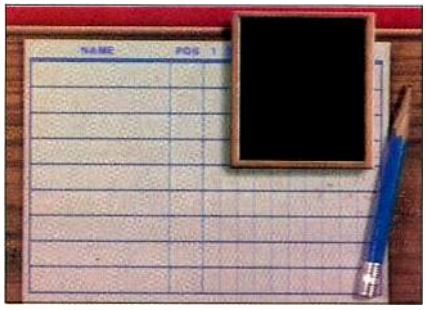
"There should be a machine for every pocketbook and every desire," observes Jerry Tapley, sales manager of distributor sales at 3M Broadcast. "Larger facilities may not want multiple functions in one box because they run it all day, but other paint users may feel differently."

Tapley goes on to explain the importance of system configuration. "We took six different computers and made co-processors of them, with function cartridges for each capability that can all be plugged in at once. We call the unit the 3M Silver. The functions include font and logo generation, animation, still storage, a special effect generator, paint, and business graphics for charts and graphs. It's software-based and we feel that gives the unit a good lifespan. When feature improvements are on software you don't have to make capital investments every few years."



KDKA's Komar scanned-in each picture element for this lineup card with an Aurora 220. Pirate player names and positions are generated on a Chyron IV; player pictures are inserted in the slate from an Abekas still store.

The painted set

Paint systems are being applied toward a variety of innovative uses, but perhaps one of the most interesting is happening at KMGH, in Denver. There, a new news set is being "built" not with wood and nails, but electronically with a Colorgraphics ArtStar 3D paint and animation system. Over 30 pictures of the set—one for every preset camera angle—are being drawn on the ArtStar 3D, and stored on a Quantel still store.

Talent, meanwhile, is positioned in designated areas in front of a seamless blue wall. The appropriate set backgrounds are then called up from the still store as they are needed, and integrated with live video of the newscasters through the use of the Newsmatte system.

The ArtStar 3D combines full paint and animation functions in one unit, and features both 8- and 24-bit graphics, which can be merged into 32-bit images. Like most other systems-oriented paint/animation products, ArtStar can be upgraded via software changes.

"Our ArtStar-drawn electronic set was conceived by Andrew Welsh, now with ABC/Capital Cities," explains Joe Negri, KMGH assistant advertising and promotions director. "It gives us a crisper, cleaner, high-tech, electronic, upbeat look. The set shows the Denver cityscape trimmed out as if you're looking out a window. It's framed in wood on all sides, with a gray felt material on the walls. All of the actual video frames are trimmed out in wood with a chrome-like polished insert of the station logo on the bottom. And because Newsmatte is a source feeding a camera—instead of a switcher—it allows you to do more effects, too."

Effects with the painted set include the ability for the anchor to intrude on an over-the-shoulder graphic without being cut out of the picture; in minidocumentaries this enables talent to actually "walk into" graphics. Floating boxes can be spontaneously inserted in the picture, allowing a newscaster to converse with a remote reporter. And flying letters playing on one-inch tape can be zoomed in behind the talent for various bumpers. Over-the-shoulder graphics are composited in the still store in advance.

"The set gives you more flexibility," Negri says. "It can be changed on a whim. If we want to create an election set, I merely take those backgrounds and make any adaptions I need to: put new signage on it, add stripes, and

then put it back in the still store.

"The planning involved in the show is double the norm," Negri says, adding that the way the show is blocked has to be consistent from night to night because of the special format. Cameras are locked down, zooms are not possible, and the set images are backed up with tape and slides.

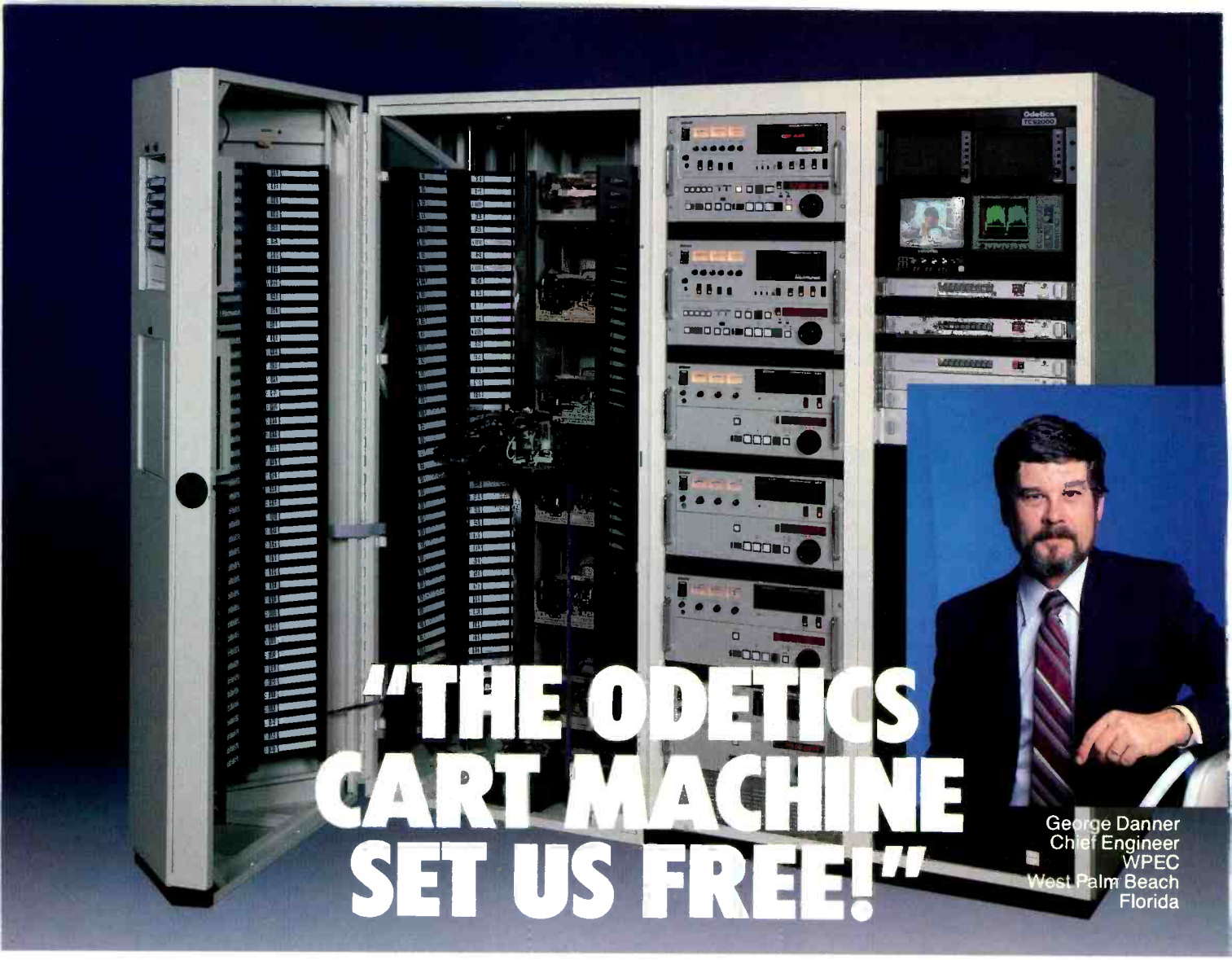
Print and praise

New uses continue to be discovered for paint systems, as more stations take delivery on these units. One use that further extends paint's applications even goes as far as the printing press. Paint-generated images and logos can be transferred to hard copy and be printed in newspapers and magazines, thereby rounding out station promotional campaigns.

"We're big on correlating print with on-air promotion, and getting a consistency there," says Lou Bortone, art director of WBZ, in Boston. A Quantel Paintbox user, Bortone feels that achieving the perfect print copy of a painted image is still an elusive task. "I haven't seen a really super system yet for capturing a print version of a videographic," he says, but feels that solving that problem is just a matter of time. Already, paint manufacturers are addressing this challenge. Quantel's high-resolution Graphic Paintbox, designed for the print industry, is one of several products that can solve the paint-to-print question. Chyron's Shimatronic graphic image system offers three different print options with increasing degrees of resolution and color.

"New equipment is coming down in cost, making it an exciting time for a local station," admits KDKA's Larry Komar, an Aurora and Colorgraphics user. "Paint has opened up a whole new world for our art department. Things that once went out of house aren't anymore, and we have better control over them.

"Paint allows your imagination to roam freely, but it's just a tool. The important thing is still the designer and his ideas. Executing them on a paint system is all part of the fun of broadcasting."**BM/E**



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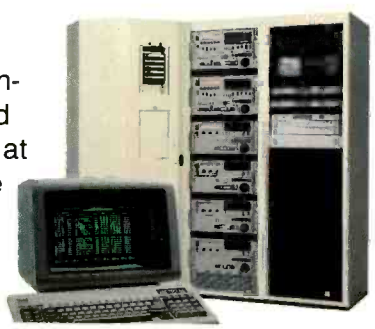

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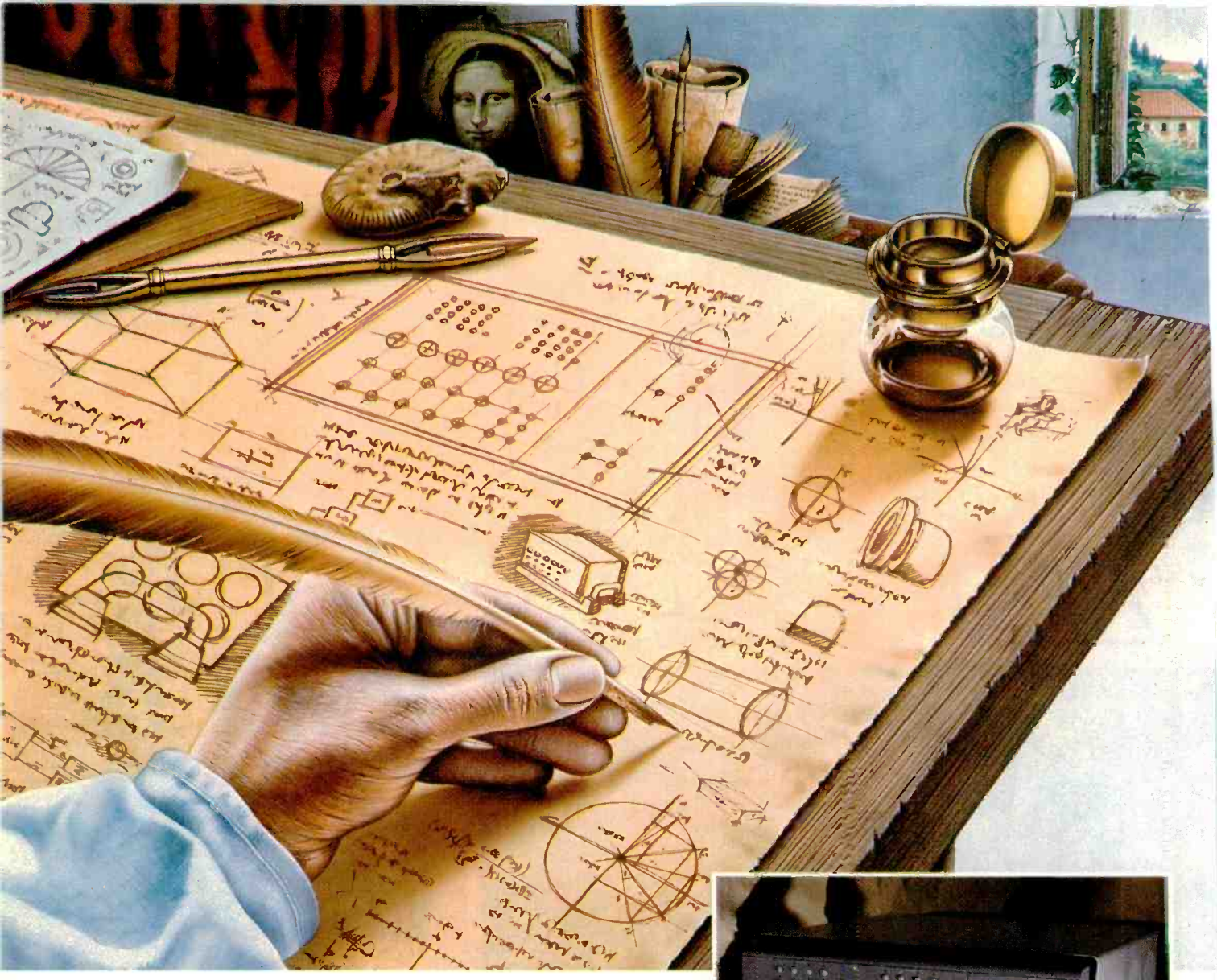
2D, 2.5D, 3D: WHEN IS ENOUGH ENOUGH?

Though there is a lot of interest in 3D graphics at TV stations, plenty of systems to choose from, and excellent reports from stations that have installed 3D, many are taking a wait-and-see attitude before rushing out to buy.

by Robert Rivlin

When you go to a show such as NAB and see all the interest in 3D graphics products, there's a tendency to get caught up in the excitement. "Every TV station in the country is going to have 3D soon" becomes the assumption. "I'd better get one right away."



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KVVU, Las Vegas TV5's logo is seen here created in 3D on an Aurora Systems AU/220.

When you look at the actual installed base of systems in the marketplace, however, and examine "plan-to-buy" figures, sobering reality sets in. According to the figures published by Sheer/DC&A Research as part of its most recent Broadcast Equipment Marketplace (BEM-2) study, only 21 commercial TV stations in the U.S. currently own 3D modeling and animation systems (ranging from the lower-end Ampex/Cubicomp product to the higher-end Bosch FGS-4000). And in 1987, only 26 more stations say they want to buy this kind of equipment.

Thus, while the rest of the market for graphics products—including paint, production switchers and digital effects—continues to be one of the hot growth areas in broadcast, 3D systems are still lagging behind. And while 3D is one of the major equipment trends at post-production facilities, local TV stations aren't that anxious to get involved yet.

Why? Industry analysts point to several factors. Perhaps the most fundamental reason is that 3D systems capable of doing the kind of work required by a television station have only been on the market for a very short time, and station graphics and engineering people are just becoming aware of their existence. Until two years ago, three-dimensional modeling and animation were almost exclusively the domain of specialized computer graphics production companies, which did work such as image campaigns on a project-by-project basis.

That 3D systems have not yet caught hold of the popular imagination, or the budget lines, of local stations may simply be a matter of time. After all, in the early days of paint programs, when they were first starting to become affordable, few would have predicted that they would one day become a "must have" item.

Still another factor contributing to stations' "wait-and-see" attitude is the question "when is enough enough?" Many have only just recently made the commitment to 2D electronic paint. Indeed, at last year's Broadcast Designers Association conference in Dallas, out of an audience of hundreds of TV station art directors and promotion people asked if they had a paint system, only a few raised their hands. Stations are just beginning to realize the potential of their systems, including the ability of some of them to do "2 ½D" or "pseudo-3D"—achieving the look of three-dimensionality by extruding two-dimensional objects (they cannot, of course, be rotated in 3-space, nor texture mapped or illuminated with imaginary light sources).

Learning new skills

Then, too, there is a potential "artist problem." Working with a 3D system demands a whole lot more of the station artist than simply learning a new piece of hardware: thinking in 3D means a complete reorientation of artistic sensibility. "You're taking a graphics artist, used to working in flat planes, and suddenly putting a piece of marble in front of him and saying 'sculpt'," explains one art director. "Not only does he suddenly have to think in three dimensions, but he then has to move the object around the screen—choreograph it. Some people are comfortable working in 3D animation . . . but some just aren't. And finding the right person to make the system do what the demo tapes say it can may be harder than you think."

Finally there's the question of "Is it worth it?" In one story, an art director working in media created a gorgeous, copper-metallic logo for a new high-tech magazine. It appeared to have been done with computer graphics, using reflection mapping, perhaps a fractal surface program, and certainly some advanced modeling techniques. How was the logo actually created? He had bought a piece of copper, taken it out into his back yard, and photographed it. He then took the color print and cut out the shapes of the letters in the logo.

Cost factors

As many arguments as there are against widespread use of 3D in broadcast television, however,

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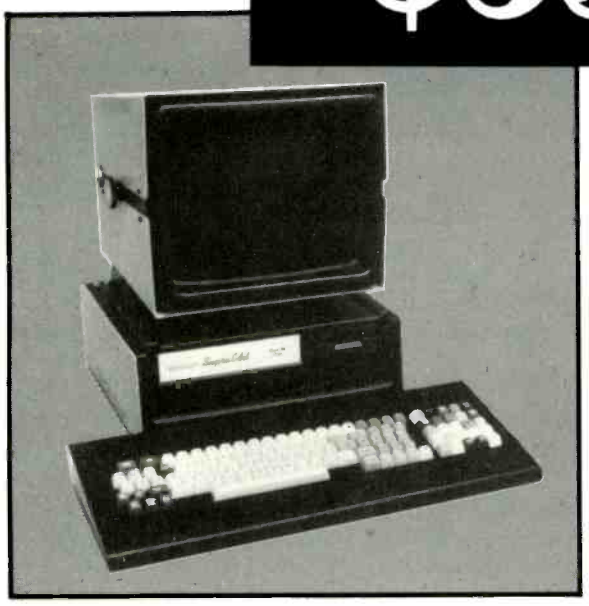

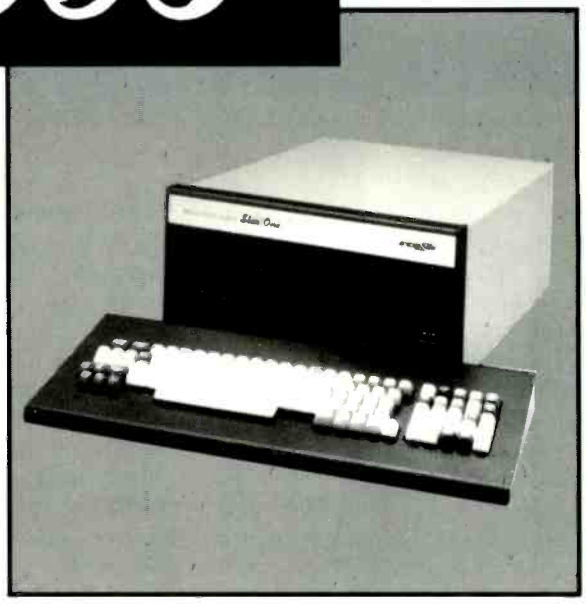

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3D modeling system under $30,000	☐	☐	☐	☐
3D modeling system over $30,000	☐	☐	☐	☐
Digital effects—1 channel	☐	☐	☐	☐
2 channels	☐	☐	☐	☐
3+ channels	☐	☐	☐	☐
Effects rotation and perspective	☐	☐	☐	☐
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Digital still store	☐	☐	☐	☐
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VTR animation recorder	☐	☐	☐	☐
Analog effects package	☐	☐	☐	☐
Character generator w/graphics	☐	☐	☐	☐
Text-only character generator	☐	☐	☐	☐
Weather graphics system	☐	☐	☐	☐
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2a. Do you have a separate graphics production department? ☐ Yes ☐ No

b. If yes, does this department serve all graphics needs within the station?
☐ Yes ☐ No

3. What departments have individual graphics capabilities?

☐ News ☐ Programming ☐ Creative Services/Sales
☐ Weather ☐ Promotion

4. Do you anticipate a need for a graphics system which produces:

☐ hard copy ☐ slides ☐ color prints

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

6. What is your job function?

☐ Chief Engineer
☐ Production Manager
☐ Engineer
☐ Operations Manager
☐ Graphics Director
☐ General Manager
☐ Other (specify) _____

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☐ Use the equipment?
☐ Make buying decisions?
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there is a growing sense among station graphics people that, despite the excuses and the research projections, 3D is about to take off. Among the stations that already do have 3D, there are nothing but rave reviews for what the extra dimension can do to a station's graphics image.

"I'm no expert," says Brent Garrett, art director at WTVX, Ft. Pierce, Florida. "But I think that in a year or two we're going to see a 50 percent increase in the number of these systems around. Artists are going to begin demanding them, and stations are going to have to buy 3D in order to stay competitive within the market."

Another factor Garrett sees as critical to the widespread adoption of these systems is their continually decreasing cost. "In a market this size [WTVX's ADI is in the mid-50s]", Garrett explains, "there's a rule of thumb that a station can take a gamble with a piece of equipment that costs $30,000 to $40,000. That means that if it doesn't get used enough or doesn't add much or doesn't get noticed by anyone, the station still isn't going to lose its shirt. Right now 3D systems begin around $40,000— that's what we spent for our ITI Ani-Maker. But when that price drops a bit, below the $30,000 level, then you'll see stations jumping in."

Joe Negri, art director and assistant promotion manager at KMGH, Denver, agrees about the all-important factor of cost: "When electronic paint systems first came out, you couldn't touch one for under $100,000, and that locked out just about everyone below the 40th market. But that's beginning to change now. You can get a good paint system for $75,000. And then next year, when you want to add 3D, you only have to cost-justify a $20,000 software upgrade rather than having to add a completely new hardware and software system. That makes a big difference in selling 3D capability to management. They can get so much more for so little these days."

Negri is convinced that because of this, 3D is going to catch on even faster than paint—despite what the research says. "You can simulate 3D," he says, "but when you've really got 3D capability it opens up a whole new world—especially for opens and closes and packages for promotions. It adds a new facet to production."

Different applications

Each station in each market is probably going to have a slightly different set of applications for a 3D system. And, depending on its needs, the resource will be allocated differently among news, production (including news and local program work), and promotion.

At KUSA in Denver, a BTS FGS-4000 was purchased recently primarily for illustrating news stories, both with 3D stills and 3D animation. According to Don Perez, the real-time capabilities of the 4000 will enable the station to turn around animated news graphics with almost the same speed as still images. In addition, however, the production department will also be able to make use of the machine for designing opens, bumps, IDs, and the like, permitting the station to achieve a unified graphics look between the news and promotion efforts. When time is available, the system will also be made available to the production department where painting and 3D services will be offered to outside clients.

At WOWT, Omaha, art director Craig Brehm heads up a one-person graphics department based around an Ampex/Cubicomp PictureMaker. The system was originally purchased two years ago for news applications, an effort spearheaded by art director Judy Rosenfeld at KRON in San Francisco, Chronicle Broadcasting's flagship. Since WOWT's news department wasn't using one-inch machines, however, and to get the best quality results, the PictureMaker was tied into a one-inch machine in the production department. From a work-flow standpoint, this did not create problems, since the machine could be left to render frames unattended at night or in the early morning when production had no need for the machine.

A more severe problem, however, rested in the demands made by the production department on the PictureMaker itself. "I used to do some work for station promotion and local commercial production as well as news," Brehm explains. "I'm still a one-man department, and my primary responsibility is the news. When you work for news, you have to get involved—you have to be available every minute of every working day. Production projects can take a week to put together, and you have to drop them in favor of news if you have to."

Perhaps this is why the station appears to b sell commercial clients on PictureMaker animation, and why Brehm's art department is finally getting a one-inch VTR of its own. At the same time, the PictureMaker's capabilities have been expanded considerably with the addition of a full-color paint package, plus the new flash digitizer allowing fonts and logos to be captured and treated as three-dimensional objects.

How is Brehm using the PictureMaker for news? "It has to be for material we know about a day or two in advance—such as for special series, documentaries, and the like. Or for generic backgrounds and objects."

Brehm cites as an example a recent documentary about drugs in the schools. The anchor is portrayed in various dramatic situations, such as walking over to a brick wall where the show's title appears as if painted from a three-dimensional spray can. In another segment, a marijuana leaf is shown growing, then rolling itself into a joint; this is followed by a three-dimensional chart showing the various constituents of pot.

"Right now," explains Brehm, "I spend an average of five hours a day doing modeling and animation. It may only take me 30 minutes to an hour to design the piece. But rendering it may take one to six hours. I try to limit designs to make them more simple, and it's perfectly possible to turn out a 3D animation on a next-day basis.

We could even do something in eight hours if we had to. But we don't see using it as a tool for the daily crunch of news graphics."

Not for day-to-day news

Lewin Humphrey, graphics and design director at WTVE, Nashville, agrees that in most cases, 3D animation for day-to-day graphics just isn't practical. "The low-end animation systems aren't fast enough," he notes. "They're fine for a logo to be used in newscast, or for a news series where we have a week's deadline, or for formatted news report such as 'Nashville Business' where we can just drop the latest figures into animation material that has already been designed and figured out. But these systems really can't do the work within the time frame demanded by day-to-day news operations. It's just not cost-effective to run the system for doing quickie graphics."

On the other hand, Humphrey is convinced that TV graphics are becoming very commonplace, and could use a little animation. That's why at the recent NAB he purchased a Colorgraphics Artstar and an Artstar 3D, and will incorporate it as part of a graphics suite that will also include a Chyron 4200 and may include an Ampex ADO as well as a small production switcher.

"First and foremost we were shopping for 2D paint systems," Humphrey notes. "But during the search period, we had two 3D animation projects that were being worked on by outside production companies that just didn't work out. That was when we began to look at ways of doing the projects in-house with our own equipment—so we could experiment and make changes without paying a fortune."

Humphrey calculates that the department's work is evenly split between news and promotion—and that they are often using the same material, such as an opening for a news series that can also be used to promote the series. The department also provides a wealth of other station graphics, including holiday messages, four-second image IDs, show opens, and bumps for the station's extensive local programming efforts, as well as day-to-day news graphics.

Brent Garrett at WTVX is of a like mind: the majority of the station's 3D work, done with a recently purchased ITI AniMaker—will be for outside commercial clients, then promotion, then news—for opens and closes, generic art and backgrounds, and perhaps eventually series work, but not for day-to-day graphics.

"We've been going outside for station logos until now," he notes, "but I expect we'll be able to do most of that work in-house now. But the majority of our news graphics will be done with a paint program, and fed to our ADDA still store through a Microtime Genesis 1 digital effects system and a production switcher." Animation, of course, is recorded on tape and rolled to air through the switcher.

Faster speeds

Stations that have bought more expensive 3D workstation systems might disagree with Brehm's assessment of whether graphics can be turned around quickly enough for the evening news. This is because the more costly systems produce rendered frames at greater speeds.

Another solution is that used by Joe Negri at KMGH: use the 3D system to create highly refined three-dimensional stills; or else produce animations by using short 16-frame loops in which the action is repeated, rather than rendering each frame of a sequence separately.

"We had a particular problem," explains Negri, who was initially called in to beef up KMGH's graphics to help overcome a sagging ratings problem. "We wanted to be able to create realistic-looking objects for reporting on stories such as the space shuttle, aircraft hijackings, and the like. And we wanted to be able to do three-dimensional logos. Plus we wanted a system that would also allow us to provide the three-dimensional shapes with the kind of variety that can be achieved through texture mapping—projecting a two-dimensional image onto the three-dimensional surface.

"For example, we had a story about a school-bus falling off a bridge. We wanted to actually show it happening—in 3D—not just a pretty painted picture. Three-dimensional graphics really helps the public understand what you're trying to portray."

Negri estimates that 80 percent of his department's work is for news, and that 30 to 40 percent of the work is currently devoted to 3D. Typical creation time for a "quick" graphic—the kind designed to be squeezed into a box

Manufacturer	System	Workstation	Base price
Alias Research	Alias/1	3130	$99,500
Ampex/ Cubicomp	PictureMaker	AT	50,000
Aurora	AU/220	AT	68,000
	AU/280	Sun 3	160,000
BTS (Bosch)	FGS-4500	Sun 3	150,000
Chyron (Shima Seiki)	SDS-480	prop	170,000
ColorGraphics	Artstar 3D	Cromemco	115,000
Digital Arts	DGS-1 0	AT	35,000
Dubner	CBG-2LX	prop	115,000
Texta	500	prop	79,000
Integrated Technologies (ITI)	Ani-Maker	AT	40,000
3M	Specter	3130	150,000
Pinnacle Systems	3000 Series	prop.	39,500
Quanta	Dimension 32	prop	69,995
Symbolics		Symbolics	144,000
Vertigo	V-2000 Series	varies	128,000
Wavefront Technologies		3130	145,000

3D Systems Abound

Whatever the reason that 3D is not taking off quite as fast as many had hoped it would, it is certainly not because of a lack of modeling and animation systems to choose from. Here is a brief summary of currently available 3D systems with an indication of the type of workstation and general price range involved. Some systems, it should be noted, come already equipped with a paint package as part of the basic configuration while others require the addition of a separate module.

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(Top row, bottom left graphics) Courtesy of Advanced Video Services. Artist: Martin Pisano. (Bottom right graphic) Courtesy of TSC Video Post and Transfer. Artist: Randy Tede.

Circle 120 on Reader Service Card

and only used for one news story—is 30 to 40 minutes per still 3D graphic. For more polished graphics, designed to be used repeatedly or seen full-screen, Negri likes his artists to spend 1 to 1.5 hours per graphic. Located in the station's electronic design center (EDS), the ArtStar keeps two full-time artists busy on split shifts, and is running almost 24 hours a day between design work and rendering.

"Our main goal is to take care of news," Negri explains. But right behind that comes promotion and public affairs and special projects. The station produces 10 one-hour specials a year, and most of them require 3D animation. Plus we do extensive election coverage graphics on the system."

How does Negri decide which pieces will get the 3D treatment? "You design a product to be what you want it to look like not because you have a 3D system and want to put it to use. There has to be a reason for using the 3D—something in the material that warrants it—if nothing more than simply giving the story extra depth or a different feel."

Selling a system to management

Given these reviews from stations beginning to experience the realities of 3D, is it likely they will catch on in the same way as paint? In some cases, the systems sell themselves—as was the case for Garrett at WTVX: "When we started looking it was for a weather graphics system—that had priority over the needs of the art department. But our news director went to the RTNDA show and saw that for the same amount of money we were going to spend on weather graphics alone we could get a full-blown graphics system. Our management people went to see the AniMaker and they were impressed—particularly with what it might do for our commercial clients. So, without expecting it, I was presented with the ITI system."

In most instances, of course, managment has to be sold on the idea of 3D. For some it will be a matter of increased station visibility and hopefully better ratings. "3D animation within news stories gets noticed and gets good response," notes WOWT's Brehm. "Animation in bumps gets seen, but it's the material in a reporter's package that gets noticed. Computer animation is still a mystery to the news department; but reporters are getting to know more about it and how to use it effectively."

Most often, however, a station is going to buy 3D because of bottom-line considerations. And here the reasons to rush out and buy a system are as plentiful as excuses to hold off. KMGH's Negri cites just one example: "We just created a brand-new open for our new four o'clock news show, and we did it in-house. It didn't happen overnight, and it wasn't without problems. But we did it—a job that would have cost $10,000 to $12,000 outside.

"It all comes down to a question of productivity. Using the electronic system we can produce twice as many graphics with the same people, and can make them look more and more sophisticated, more and more polished. Plus, we can redo things very quickly if they need changing or updating.

"Finally, there's the pure economics of the thing. In a couple of hours we can model and animate a client's logo so it never looked so good—$5,000 to $10,000 in outside production work that we can do right here, in front of his eyes. We look like heroes—who can argue with that?" **BM/E**

About the Author:
Robert Rivlin is president of Rivlin Communications, a Millwood, NY-based consulting firm specializing in video and computer graphics. He has been the editor of *BM/E* and *VideoPro* and technical editor of *Millimeter*.

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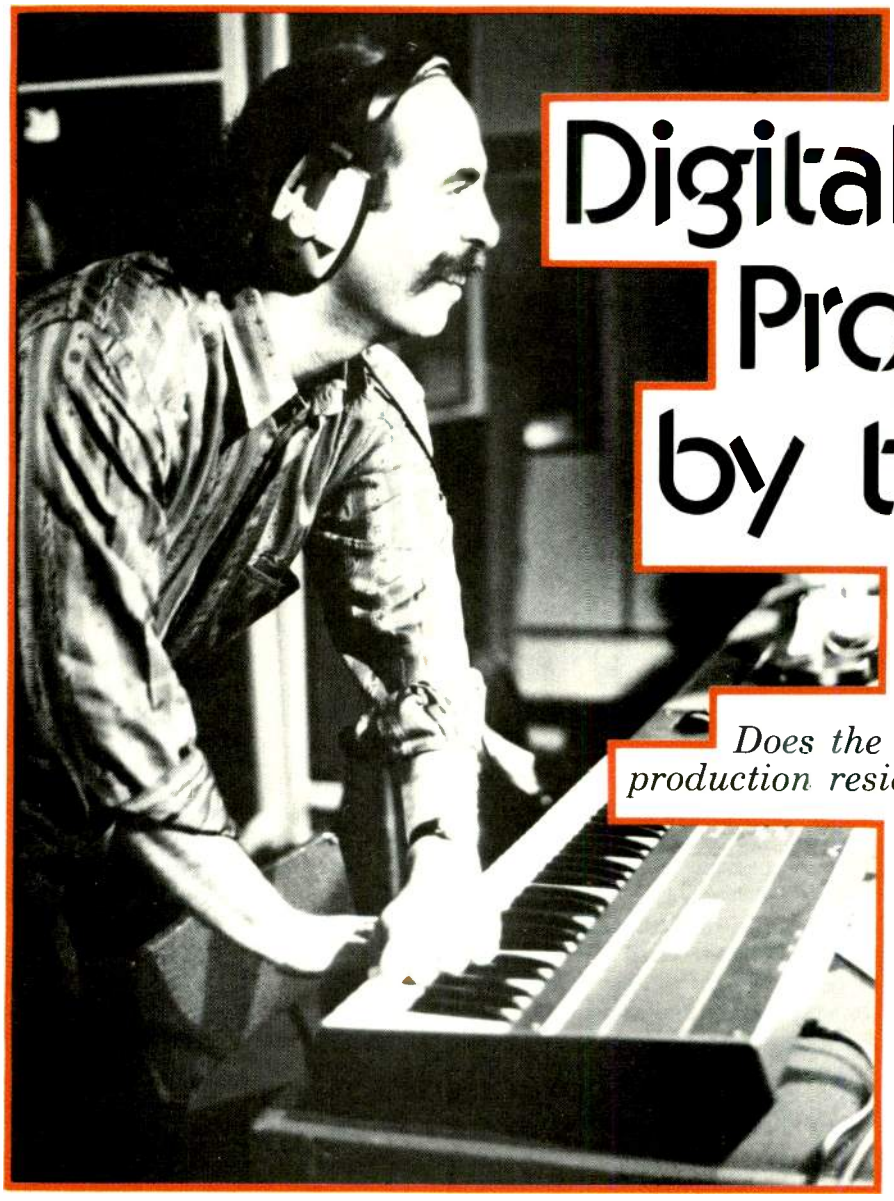

Digital Audio: Production by the Byte

Does the future of broadcast audio production reside in the digital domain?

By Steven Schwartz

WMMR zookeeper John DeBella triggering sound effects from his Mirage-DSK during a recent broadcast from London.

It's becoming increasingly clear that digital audio is more popular than ever in broadcasting. At last month's NAB show in Dallas, attendees gathered en masse for live demonstrations at the Fairlight and New England Digital (NED) booths. In simultaneous events, Jan Hammer displayed his audio-for-video compositional skills for *Miami Vice* on Fairlight's CMI (Computer Musical Instrument) Series III sound production system, while NED orchestrated a complete voiceover session with on-the-spot editing using the Direct-to-Disk recording option for its Synclavier digital audio system. At the same time, crowds filed into the Eventide, Lexicon, and Aphex booths to examine the latest digital effects processors.

Obviously, broadcasters—and radio personnel in particular—are beginning to realize the potential benefits of digital technology in audio production. In addition to providing the cleanest possible signals to work with, digital information affords unsurpassed flexibility and control throughout the production process.

Not surprisingly, recent interviews have indicated a sharp increase in the use of digital effects processors, synthesizers, and CD libraries over the past year at radio production facilities. The trend is expected to continue, with several stations' production directors predicting a rise in future applications of MIDI (musical instrument digital interface), a standard for interfacing one or more electronic instruments with a personal computer or with each other.

"MIDI is the future of production in music, in radio—in everything," says James Rosenthal, production director at KKBQ-AM/FM in Houston. "It allows you to chain everything together. So,

Jon Taylor, production director at New York's KISS-FM, relaxing behind his Casio CZ-101 and Korg SQD-1 sequencer.

if you have five MIDI keyboards, you can run them off of separate channels and control everything with the computer. It lets you get things done faster and the way you want to get them done."

The use of digital instruments and effects processors in the broadcast environment also coincides with the recent emphasis on sophistication in the in-house production suite. It wasn't all that long ago that such installations were used exclusively for editing prerecorded material and simple commercial assignments from local advertisers; the majority of ads were placed by national advertisers and agencies that worked out of large recording studios. With the economic slump of the late seventies and early eighties, the ratio of radio advertising shifted from the national to the local market. Thus, a reliable production department became a valuable asset for stations looking to attract new business.

Moreover, the radio production suite is currently playing an increasingly active role in on-air programming, particularly with regard to promotional spots and "morning zoo" shows now featured on several stations around the country.

Mirage at the zoo

Song parodies, skits, and humorous banter make up the basic ingredients of the morning zoo format. In Philadelphia, WMMR's morning zoo with "zookeeper" John DeBella is one of the city's most popular radio shows. A former production director, DeBella uses a Mirage-DSK (digital sampling keyboard) to reproduce a variety of sound effects live on the air. The instrument was presented to him about a year ago by his fans at the Ensoniq Corporation in nearby Malvern, PA, and is now his constant companion in the studio.

The Mirage-DSK uses digitally recorded waveforms of acoustic instruments and other sounds, which are stored on 3.5-inch diskettes; the disks can then be loaded into the keyboard via its built-in disk drive. The company currently offers more than 300 sounds, which are available in two 10-disk sets that sell for less than $60 per set.

"I haven't even started to develop the extent to which I want to use it," says DeBella. "There's a way to program it to hold 18 different sounds. What I'd ultimately like to do is to put in a disc and have it eliminate 18 carts. I walk into the studio every morning with about 350 to 400 carts, so any way that I could cut down that load would make me very happy." He further notes that the station recently purchased a new sound effects library on CD, replacing an older library on analog LPs. "It was a smart move," DeBella remarks. "There ain't nothing worse than a phone ringing with a scratch on it."

In addition to the Mirage, WMMR's production director, Steve Lushbaugh, uses a Roland JX-10 digital synthesizer to create music beds for station promos and commercials. The JX-10 is a 12-voice polyphonic keyboard with 50 preset tones and 50 programmable settings. It combines digital and analog technologies by controlling the analog sound output with digital DCOs and envelope generators.

Lushbaugh uses the instrument with the optional Roland PG-800 programmer, which enables him to adjust the JX-10's parameters via the accessory's slide controls. "It brings all the parameter controls out to analog sliders and switchers," he explains. "So, I can sit here and look for a sound without having to know that putting such and such a number in on this parameter will cause this to change. It allows me to work really quickly. I can change three or four things with one hand that would have otherwise taken 30 or 40 keystrokes to change by pushing the buttons on the JX-10's front panel."

Meanwhile, DeBella points out that using digital instruments to create sound effects beds can be more economical than purchasing prerecorded packages that may cost as much as $3000 per year for licensing. "It doesn't make a lot of sense to pay someone that kind of money for something that you can only use for a year, when, if you have someone with a little bit of musical talent, you can make your own for the same price and own them forever," he says.

The station has two four-track

production studios. Each is equipped with an Eventide H949 Harmonizer, an Otari MTR-12 four-track recorder, and two MTR-12 two-track machines. The newer room, which is used for most post-production assignments and creating all the music and special effects beds, features an Auditronics 341 console with 16 inputs and six outputs; the older room, which is employed for less demanding tasks, employs a 12-channel McCurdy console with four independent outputs.

Although Lushbaugh has not yet employed MIDI in any production applications, he expects to start experimenting with it by the end of the year (he is in the process of shopping for a personal computer and drum machine). "Between the two synthesizers, a MIDI controller, and the multitracking capabilities we have here, we will be able to record some pretty sophisticated-sounding commercials and music beds," he says. "Unfortunately, it's getting to the point where four tracks is becoming inadequate. I can do most of what I want like that, but it's difficult on some things. I guess I shouldn't complain, though. After all, they did *Sgt. Pepper* on a four-track—and without SMPTE."

Making it with MIDI

In some cases, even eight tracks isn't enough. At Houston's KKBQ-AM/FM, production director James Rosenthal is getting ready to install MIDI patch cables through the walls of his studio that will enable him to use the station's Atari 520ST computer as a MIDI sequencer (with Music Studio software from Activision) for digital instruments that can be set up in another room.

Rosenthal has only recently started using MIDI on promo spots and sound effects beds, and claims that it will be at least another four months before everything is set up for full-scale production. Nevertheless, he has discovered that in addition to being able to compose, play, and edit

passages via computer, MIDI offers many other inherent advantages—including the ability to conserve tracks on a multitrack recorder.

"A lot of times I would MIDI through several tracks to play onto two tracks in stereo on our eight-track recorder," he says. "That way, what normally might have taken up six tracks, now only uses up two, and I still have six more tracks to use for effects or other instruments if I need them. It helps me push the equipment to its limits.

Rosenthal currently employs MIDI with two digital synthesizers, a Korg Poly 800B and Casio CZ-101. The Poly 800B is an 8-voice polyphonic keyboard with a built-in sequencer and variable tempo control, while the Casio features full programmability in a downsized package (see "Getting in synth" section below for product description). He also has another mini-key Casio SK-1 synthesizer that is not equipped for MIDI but does feature low-resolution, 1.4-second sampling at 9.3 kHz via an onboard mic, as well as 8 preset sounds, four-note polyphonic performance, and 11 synthetic drum rhythms.

For outboard effects processing, he uses an Eventide H969 Harmonizer, an Alesis digital reverb unit, and an Aphex Compellor limiter/compression device—which is used during the mixdown to two-track to keep everything at a consistent level. An Akai/IMC sampler is currently on order, while a choice has yet to be made between the Roland TR-505 and Yamaha RX-15 MIDI-compatible drum machines. "It's going to be great," Rosenthal exclaims. "I'll be able to do all the cool effects—reversing, interpolation, flanging, comb filtering, rescaling, set sustain points. It's all available right now."

The majority of Rosenthal's production work is composed of song parodies and comedy routines for KKQB's morning zoo show (which is simulcast on AM and FM) and two nationally syndicated shows—*John Landers Hit Music U.S.A.* and *The National Comedy Network* with Dr. Dave Colin. The rest of the time is usually dedicated to creating promos and other station-related material.

KKBQ has two production studios, one designed for eight-track recording and another for four-track assignments. The newer eight-track room—which Rosenthal uses for most of his work—features an Otari MX 70 eight-track recorder and a 24-channel Wheatstone SP-5 console with eight outputs, seven stereo inputs, and a selectable feature that allows the eight track returns to the board to double as instrument inputs.

Meanwhile, the four-track room has a 14-channel Ward-Beck console and an Otari MX 50-50 four-track recorder.

"I could do everything I do here on four-track," Rosenthal comments. "In fact, the four-track room is even better for things like dubbing because everything is within reach and all the cart machines are right there. Having eight tracks to work with just makes things more convenient. But that's about as much as you'll ever need for standard radio production."

He has also recently began using the digital audio capabilities of his Sony 8mm VCR from home for dumping audio tracks taken from television programs onto two-track for use on the station's Q-Zoo. "The sound quality is just so good that it would be ridiculous not to take advantage of it," he notes.

Another new addition at the studio is Firstcom's production music library on CD; Rosenthal also recommends the "Digital Director" series from Media General.

Still, Rosenthal's strongest endorsement of digital technology comes as a bit of a surprise. "I'm not a musician; I can't even sing," he confides. "But I listen and I know production. Mastering the equipment is the trick, once you've got that down you're set. And, with digital equipment, it's even harder to screw up. My rule of thumb for being a production director is to just be creative. If it sounds cool and hip—that's what's right. Follow your instincts."

Z100's J.R. Nelson in the station's production studio with his Roland Juno 106 above the console.

Keys to the city

In addition to their application in "zoo" production, digital effects seem to go hand-in-hand with the high-tech sound of today's urban contemporary formats. At New York's KISS-FM, production director Jon Taylor uses an array of synthesizers and digital processors for a variety of tasks, from generating sound effects to creating original remixes of records (usually handled with a couple of turntables).

Taylor's digital arsenal—which was compiled within the past year—consists of two synthesizers, a Casio CZ-101 and a Roland Juno 106, which features a five-octave range, 128 memory settings, and sequencing capability; a Korg SQD-1 MIDI sequencer; two Eventide H969 Harmonizers; a Yamaha SPX90

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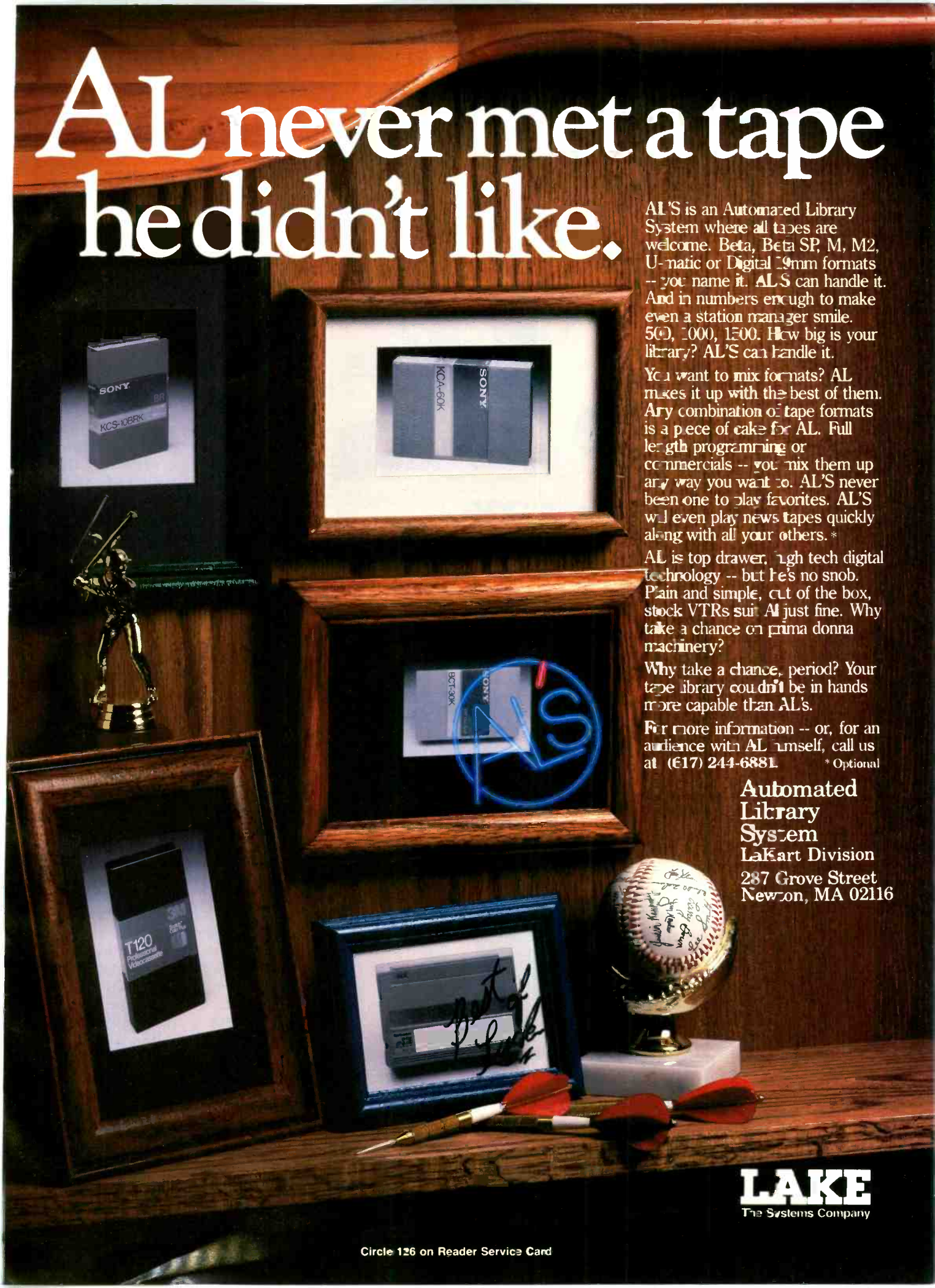

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digital multi-effects box; a Lexicon PCM-60 digital reverb; and an Aphex Compellor.

Unlike his contemporaries at WMMR and KKBQ, Taylor does not do a lot of straight music production, and hence, does not foresee MIDI playing a major role in his activities. "I use the synthesizers primarily to create sound effects," he says. "The Casio, in particular, is great for laser gun-type effects that are sort of in vogue now in hit radio. Occasionally, I might use the Korg sequencer for a repetitive pattern on simple electronic music beds for promos. But overall, the application of having to do something with music here is very, very limited. If I were creating 15- or 30-second music beds of original music that were fully orchestrated, I would probably want to get into some kind of MIDI recorder. But there really isn't any demand for it in this studio."

One of his recent projects involved spicing up an old promo for the station that featured a couple of people shouting "98.7 KISS-FM." After finding one of the station's DJs whose voice closely matched those on the recording, Taylor inserted the word "jammin' " in the beginning of the spot using the two Harmonizers to make the single voice sound like a chorus. "You run one of the Harmonizers up in pitch and the other one down," he explains, "and you get a sort of instant trio as soon as someone speaks or sings into it. Then you just overdub that a couple of times to make it sound like a whole crowd."

The station has two identical studios; one is used primarily for promo work, the other handles the more routine production assignments. Both rooms are equipped with 26-channel ABX-26 consoles from Pacific Recorders and Engineering, while all recording is done on MCI recorders (the station has a total of five quarter-inch two-track machines and two half-inch four-track decks). Taylor adds that most material is dubbed directly from four-track to cart using no noise reduction. However, to ensure maximum audio qual-

ity, the carts are run at 15 ips.

Taylor, too, now keeps an entire sound effects library on CD, compiled by the Toronto-based company Sound Ideas. Although he notes that CDs offer unparalleled convenience and sound quality, he complains that digitally mastered effects can sometimes sound "too realistic."

"That can really be a problem when you're trying to bring out an effect that can be instantly recognized," he says. "I'm frequently at a loss for finding things that are exaggerations of real sound effects, almost a comical sound. There isn't enough of that on some of the CDs I've heard."

In general, Taylor believes that the trend toward digital effects will continue to gain momentum among radio production directors. "I'm definitely hearing more of it on the air—and not just in the major markets," he observes. "I think it's because the equipment has become more plentiful and somewhat cheaper. I don't know the history of digital processing, but it seems like there's more of it going around. In fact, in the last year, I've seen a couple of companies spring up with people who just have big voices making a business on the side of putting out digitally reprocessed station IDs, which are really hot now. I think we're hearing fewer jingles on the air—which used to be all over the place—and a lot more of the dry voice-type promo with all kinds of fancy effects."

Meanwhile, J.R. Nelson, production director at New York's WHTZ-FM (Z100), sees the situation in a similar vein. "It's just a matter of coming into the eighties," he says, "although it's sometimes difficult to convince people that these aren't just little things that Howard Jones uses to accompanyhimself. These are actual tools that can make your life a lot easier."

In addition to his duties at the station (which include working on Z100's successful morning zoo show with DJ Scott Shannon and the nationally syndicated "Rockin' America" series), Nelson operates his own syndication company as well as a small MIDI-controlled studio in St. Petersburg, FL, that creates IDs, sweepers, and promos for about 20 radio stations and serves as a showcase facility for Roland digital equipment. The Florida studio is equipped with several Roland synthesizers as well as Roland 707 and 737 drum machines, the new MKS-100 digital sampler, and an MX-50 interface box, which acts as a central computer for changes in tempo, keys, and pitch.

Nelson also uses a Juno 106 keyboard at Z100, with processing supplied by an Eventide H949 Harmonizer and a Yamaha SPX90. "Most people use the Yamaha presets just as they are," Nelson says, "but I go in there and change everything around so they don't even sound like the original

settings." The main studio at WHTZ is further equipped with an MCI eight-track recorder and an 18-channel Auditronics console with four outputs.

Although MIDI is used extensively at the Florida facility, Nelson doesn't see a great need for it at WHTZ, noting: "In radio you do so much volume that, at this point, it really doesn't make any sense for me to have a computer in here for MIDI because I know what I want, and it's easier for me to punch it up and do it in the mix than it is to preprogram all that stuff. When you come right down to it, all you're really dealing with is voice and music tracks, so it's not all that complicated."

Likewise, although he is generally enthusiastic about the introduction of digital equipment in radio production, he cautions his contemporaries against going overboard with it. "Everybody has this new technology now, but the problem is that—just like any other new toy—after you play with it a while you get bored with it. And, when all is said and done, the production director's job is to be a producer. That's what you're supposed to be. You still have to stick to the basics of what radio is all about, which is the theater of the mind. That's probably the most overused phrase in the world, but it's so true. You always come back to what your job really is, which, essentially, is being creative and producing."

WMMR's production director Steve Lushbaugh sitting behind his Roland JX-10 (and in front of a life-size cutout of John DeBella).

Digital redoux

Unlike earlier digital audio equipment that provided high

performance at equally high prices, today's digital instruments and effects processors accommodate a wide range of applications and budgets.

The multitude of digital effects processors currently on the market runs the gamut from straightforward preprogrammed reverb units to ultrasophisticated, multieffects systems. Lexicon's new 480L digital effects system, for instance, is the product of two year's research and development. Designed to meet audiophile specifications, it features an expandable architecture incorporating high-speed processors that perform 16 million operations per second for creating "reality-based" reverberation as well as Dopler flyby effects and reverse sampling. Other features include time-based effects, 18-bit equivalent analog-to-digital conversion, analog and digital I/Os, and multitasking capability that permits users to run two different programs simultaneously.

The 480L allows up to 50 user setup programs to be stored on a removable cartridge with additional nonvolatile storage for 50 more inside the box. Furthermore, it can be fully automated via the Lexicon Dynamic MIDI ports or accessed with the optional Lexicon Alphanumeric Remote Control (LARC).

At the same time, Yamaha's MIDI-compatible SPX90 digital multi-effects processor provides a healthy assortment of signal processing capabilities at a suggested list price of $775. It features 16-bit linear digital-to-analog (D/A) conversion and 30 ROM preset effects, each with up to nine controllable parameters. At the same time, the unit's RAM memory allows users to store 60 customized settings with English-language tags (as opposed to numeric codes). Effects include: reverb, delay, modulation (for stereo flanging, chorus, tremolo, and phasing effects), gating, compression, programmable automatic panning, vibrato, parametric EQ, and a "Freeze" mode for 500-millisecond sound sampling.

Digital reverb units comprise the majority of digital effects processors on the market today; most are MIDI compatible and use high-resolution, 16-bit D/A conversion. The PRO-Verb from the Rochester, NY-based Applied Research & Technology fits that description. Although it is not programmable, it provides 100 stereo presets (50 natural reverb and 10 each for gated, reverse, chorus, echo, and delay effects) in a software-based system that will be compatible with future upgrades. The Midiverb II from Alesis similarly features 99 presets, any of which can be assigned to 32 MIDI patch points for custom control in MIDI applications, as well as input, mix, and output control knobs.

Meanwhile the Eventide Har-

monizer is probably found in more radio stations than any other effects processor. There are currently two models available: the H949 and H969 with 16-bit linear PCM (pulse code modulation) circuitry. Features common to both units include: pitch change (one octave up, two down), time compression and expansion, variable delay and reverb effects, electronic flanging, time reversal (i.e., backward read out), and a repeat mode that plays back a 400-millisecond segment indefinitely. The H969 further adds 12 instant pitch change presets (as well as the added ability to pitch down more than three octaves), independent pitch and delay readouts, dual concentric coarse and fine adjust control pots for pitch and delay, five delay presets, and a preamplified front panel input and headphone jack.

Eventide's marketing manager, Beth Babich, attributes the use of digital processors in radio as a sign of maturity in the marketplace, and points out that such equipment gives stations a distinctive, identifiable sound that also provides a competitive edge. "Stations are definitely making an effort to sound different from one another," she explains. "And these processors are helping them accomplish that. They're also very useful at smaller stations that have a limited number of DJs, in that they can alter voices in promos and ads to add variety to the programming. Generally speaking, radio is just becoming more sophisticated."

Getting in synth

The primary function of electronic instruments in radio production is to create music and sound effects beds—although they may also be used for song parodies and commercials. Programmable synthesizers that allow users to store settings on disks or RAM cartridges are extremely popular, while keyboards employing digital sampling of natural sounds are coming into vogue as well.

On the high end, instruments such as Fairlight's CMI Series III and NED's Synclavier are actually self-contained digital audio production systems. Like much of today's digital gear, both systems feature modular, software-driven designs that allow for compatibility with future upgrades. The Fairlight combines 14 megabytes of waveform RAM for more than 2.5 minutes of sampling at 44.1 kHz with SMPTE-based timecode synchronization, 16 internal voicings that can be accessed simultaneously, and a graphics pen for quick operation and menu access. Upcoming options will include two hours of sound storage on hard disks and up to 80 channels of digital audio provided by additional expansion racks.

The Synclavier similarly features stereo and polyphonic sampling of up to 100 kHz per channel with 16-bit resolution, digital synthesis, SMPTE synchronization, as well as optional Direct-to-Disk multitrack recording and engraving-quality music printing.

Although the capabilities of such systems exceed most broadcast production—and budgetary—requirements, they provide some indication of the future direction of audio technology. The concept of "tapeless" recording (i.e., the recording and manipulation of digital audio signals on hard disk), in particular, is already a subject of considerable speculation and controversy among broadcast engineers.

Meanwhile, new digital sampling keyboards such as Roland's S-50 and the Emax from E-mu Systems (both priced at under $3000) incorporate many of the successful design parameters and specifications of earlier, more expensive models. The S-50 is a software-based, 16-voice polyphonic keyboard that offers 14.4 seconds of sampling at 30 kHz (28.8 seconds at 15 kHz). It features a 61-note (five octave) range, two 256K word memory banks, wave data and tone parameter edit functions, and a built-in 3.5-inch disk drive for sample storage.

Following in the footsteps of its predecessor, the popular Emulator II, the Emax offers six different sampling rates from 10 kHz to 42 kHz (19 seconds at the stan-

dard 28 kHz rate) with 12-bit linear resolution. It further allows up to 122 individual samples to be assigned to the keyboard at any one time and permits users to combine whole samples or parts of different samples to create new sounds. Other features include a five-octave range, multitrack MIDI sequencer, arpeggiator, and an RS-422 port for high-speed data transfer.

For general production applications, digital synthesizers offer a variety of options, including programmability, key size, number of octaves, MIDI capability, polyphonic or monophonic performance, and effect range—to name just a few. One digital keyboard that seems to have carved out a niche for itself with in-house production departments is the Casio CZ-101.

This mini-sized, portable MIDI synthesizer features 49 keys, eight-note polyphonic performance, and 32 built-in sounds (16 factory presets, 16 internal RAM settings). Voices are created via the Casio-developed PD (phase distortion) sound source system, which distorts the phase angles of sine and cosine waves for more realistic effects. Eight-step envelope generators provide total user control over timbre, volume, and pitch, while program data may be stored on RAM cartridges or placed into any of the 16 internal RAM settings. The unit accepts both AC and DC power supplies using six D-cell batteries (required for memory backup) or an AC adapter.

Another major electronic keyboard manufacturer, Yamaha, has recently introduced two new digital synthesizers that feature upgrades on the basic architecture of its popular DX7. The DX7IID and DX7IIFD both employ dual six operator, 32 algorithm FM tone generators (as found in the company's DX1 and DX5 keyboards); the DX7IIFD further comes equipped with a 3.5-inch floppy disk drive for storing program data as well as MIDI data from sequencers and other instruments.

Both DX7II keyboards feature random pitch shift, in which the pitch of each note is slightly and randomly detuned to simulate the sound of several acoustic instruments playing the same note at different pitches. Furthermore, voice storage in the new keyboards is double that of the DX7, with 64 voices stored internally and another 64 on each external RAM cartridge. Other features of the DX7II series include expanded performance memory, which, in addition to storing the necessary program data, allows storage of all pedal, mod and pitch wheel, pitch bend, and other function data for each voice; 11 preset tunings; left and right outputs with panning capability; extensive MIDI implementation; and two foot pedals. **BM/E**

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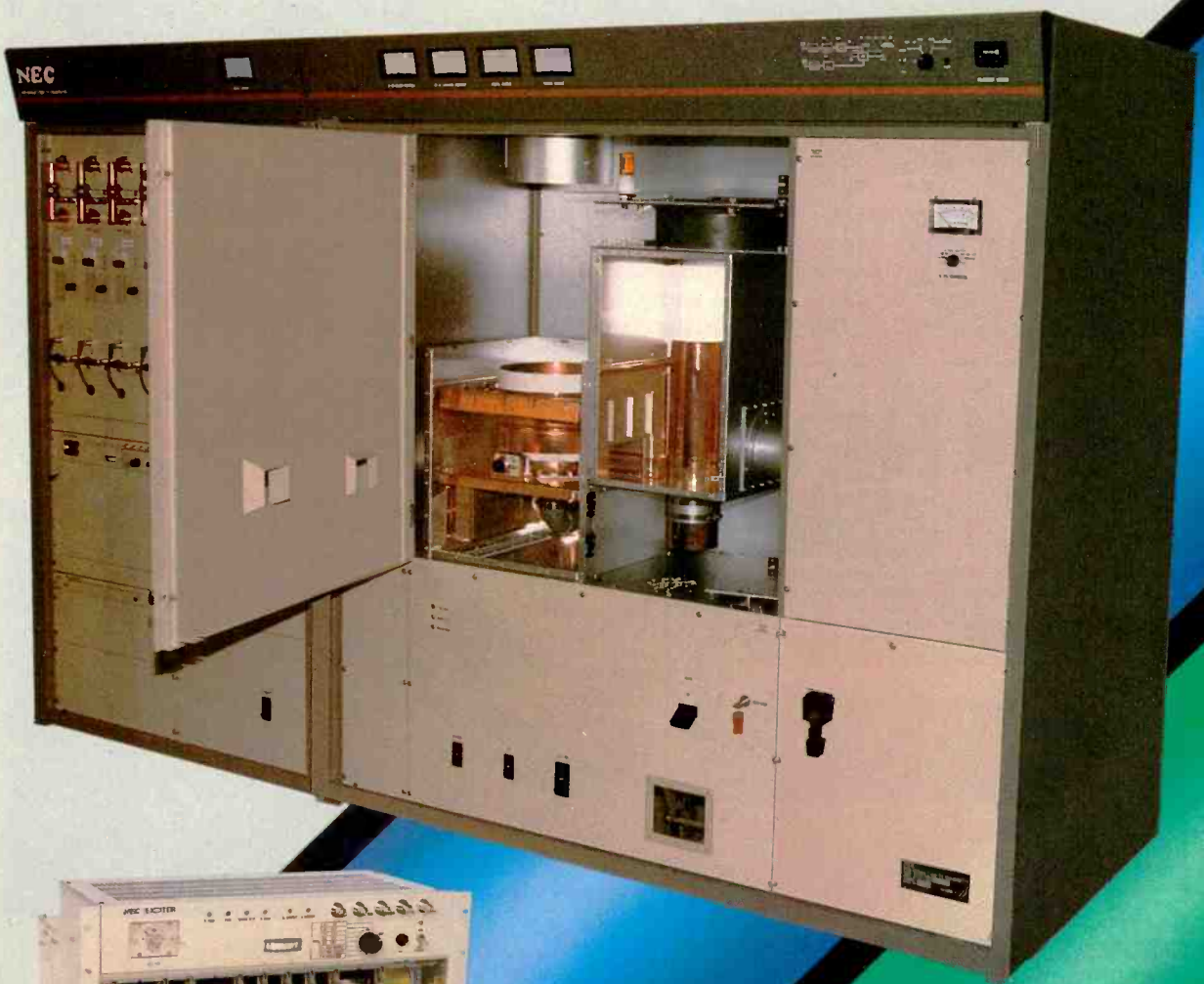

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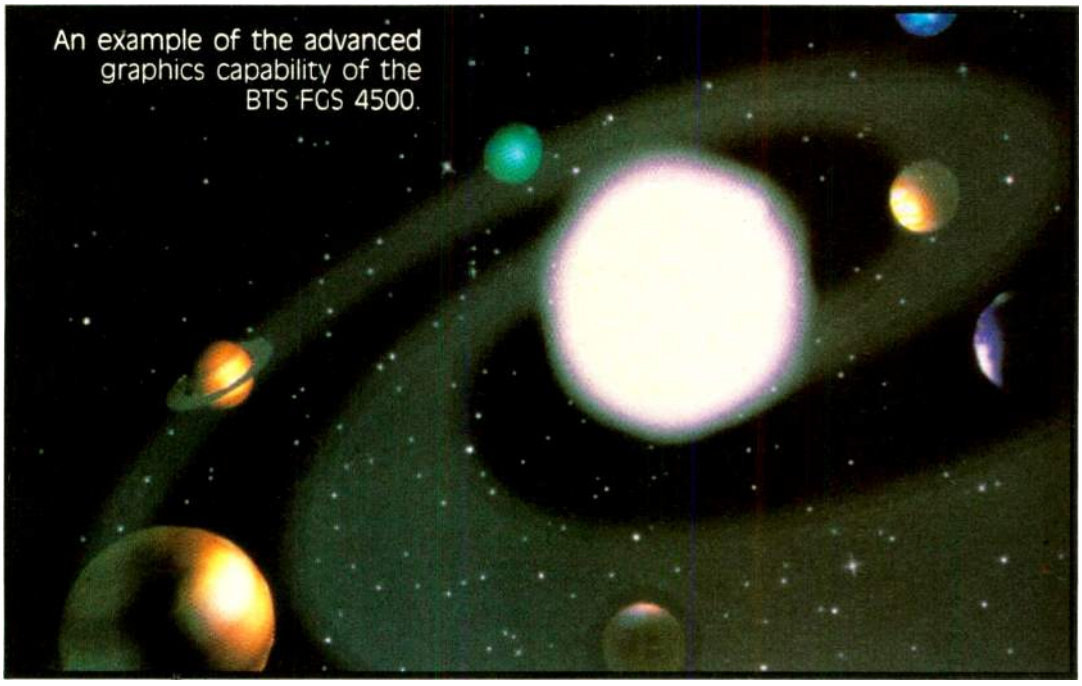

An example of the advanced graphics capability of the BTS FCS 4500.

The BPME/BDA Seminar scheduled for Atlanta, June 10 to 14, will provide direction for broadcast managers and others pursuing the smart way to implement promotion and design into an intelligent operation.

By Tim Wetmore

The important considerations in broadcast design and promotion are often very difficult to target effectively. Especially when the sights keep moving. Addressing the questions raised in the various aspects of the broadcast design world, as it speeds so merrily on its ballistic path, is the essential raison d'être for the BPME/BDA Seminar.

Learning the techniques and strategies employed by colleagues is an essential function of these conventions, as is keeping up to date on the latest hardware and software developments. This year's confab, held in the Atlanta Market Center and connected to the Peachtree Plaza Hotel via a skybridge, will not dissapoint. There are more booths (possibly up to twice last year's number of 70) and of a larger size than ever before. In addition, there will be sessions aimed at solving the many problems encountered by broadcast designers on a daily basis (see accompanying program).

Specifically, the BPME/BDA workshops will elucidate the various ways to approach promotional concepts and how to execute those concepts. There will be 40 workshops, some running continuously, and simultaneously, a number of which are hands-on sessions.

In addition to the workshops and seminars, there will be no dearth of distinguished speakers in Atlanta. These include Chuck

Jones, famed animator of Bugs Bunny, Road Runner, and many other famous cartoons. Also on hand will be Martin Holbrook, formerly with Quantel and now on his own, showing footage depicting the history of European broadcast design titled, "The Changing Image, Then and Now." Adding his name to the list of luminaries will be David Banel, editor of *Publisher Magazine*.

Banel will be speaking on Desktop Publishing, a discipline whose meteoric rise in capabilities in recent years has drawn great attention. It is this three-session topic, sure to be of interest to both BPME and BDA attendees, that will demonstrate to broadcast designers the future of computers interfacing with other equipment in the plant. This new opportunity is expected to provide dynamic tools for internal communication involving multitask-kinds of computer systems for the television station of the future. BDA Seminar Chairman, Paul Sidlo, indicates strongly, "This may be the major theme for the coming years."

Attendees will also see at the conference many new exhibitors offering quality, low-cost paint systems. Recognized as another strong current in the future of design, more quality at lower cost is on everyone's mind. Sidlo sees this occuring because "there is a hardware revolution going on, not necessarily in new technology, but in new economy. As the cost of equipment comes down, it allows small-market stations to buy the high-end paint systems permitting a growth in sophistication throughout the station market spectrum." In regard to the advancing of technology, there will be a number of workshops on the digital design studio, taking advantage of multilayering effects without loss of quality. **BM/E**

Seminar Agenda

Wednesday, June 10
10:00 a.m. to 6:00 p.m.
Registration
3:00 to 4:30 p.m.
Teaching and Evaluating Design
(Russ Smith, BDA)
4:45 to 5:15 p.m.
BDA Members Welcome Meeting
6:00 to 7:30 p.m.
Opening Reception, Exhibit Hall

Thursday, June 11
9:30 to 10:45 a.m.
What's New in Technology?
(Rodney Stock, Computer Arts Institute)
Illustration for Storyboarding
(John Townley, CCP)
2:00 to 3:15 p.m.
Desktop Publishing, Part I: What's It All About?
(Noel Travers)
Cable In-House Design
(Paul Sidlo)
3:30 to 5:00 p.m.
Desktop Publishing, Part II: The Software
Psst! How's Your Portfolio?
(Elaine Sorel)
5:15 to 6:30 p.m.
Designing a Sound Image
(Crit Harmon, Soundtrack Studio)
Desktop Publishing, Part III: User Groups

Friday, June 12
8:30 to 9:45 a.m.
Claymation
(Mark Gustafson, Will Vinton Studios)
Weather Graphics
(Eddie Terrell, Weather Channel)
10:00 to 11:00 a.m.
The Changing Image: A History of European Design
(Martin Holbrook)
11:15 to 12:30 p.m.
The Digital Design Studio
(Tony Redhead)
Small Budget Set Design
(Dave Joeris and Wiley Schmidt)
2:00 to 3:30 p.m.
Atlanta in Print
(Jackie Goldstein, Turner Broadcasting)
Using a Multimedia Approach
(Broadcast Arts, Olive Jar, Colossal Pictures, Will Vinton Studios)
3:45 to 4:45 p.m.
The Tire Kicker's Guide to Computer Graphics
(Glenn Entis, Pacific Data Images)
Creating a Winning Promotion & Design Team
(Elaine Sorel and Mike Berry)
5:30 to 7:00 p.m.
BDA Awards Reception
7:00 to 9:00 p.m.
BDA Awards Program

Saturday, June 13
10:00 to 11:15 a.m.
The Do's and Don'ts of Post Production
(Billy Pittard, Post Group)
Union Relationships
(Paul Sidlo)
12:30 to 2:30 p.m.
BDA Honors Luncheon
(Speaker: Chuck Jones, Warner Brothers)
3:30 to 4:30 p.m.
Design
(Randy Roberts)

Sunday, June 14
8:00 am to 1:00 p.m.
Everything You Need to Know About Post Production
(Richard Thorn, Post Group)

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Leasing Options

Creative answers to difficult questions. That's what is needed in the broadcast industry as it struggles to its feet. Leasing may be one of the creative answers to the question of how best to update broadcast hardware.

By Tim Wetmore

When an industry slows down, both vendors and purchasers suffer. When solutions to the slow-down are discovered, both parties benefit. Given the lethargic state of recovery the broadcast industry is now experiencing, leasing equipment could be the way for both television and radio broadcasters to stay competitive and for equipment manufacturers to build their businesses. Although it is true that leasing high-ticket equipment items has long been a management practice, in today's broadcast reality the leasing option takes on new dimensions.

Competition in broadcasting markets continues to get more intense as the years pass, bringing a greater number of entertainment variables into the industry, forcing the broadcaster to stay ahead of, if not at least in step with, those other entities that demand the time of the viewer/listener. After all, it is time that is sold by broadcasters, and a station can't sell time at a premium if it doesn't possess a significant audience share. How to maintain one's audience, while at the same time contending with an industry squeeze, becomes the broadcaster's overriding concern.

Addressing the industry's concerns while staying competitive means that station management must aspire to the purest equilib-

rium between programming and talent costs, labor and equipment expenses. Perhaps the most critical decisions in maintaining the complex balance are delivered on the subject of equipment acquisition.

Reasons for this abound, but most acutely encompass the details of keeping the station's news and production on a par with the best in the industry, requiring the management of cash flow in the most meticulous manner. In the face of such challenges, all financing options must be considered. Arguably, equipment costs can be handled in a much more flexible manner than can those expenses associated with talent and programming. And this, from station management's perspective, is what leasing is all about: managing cash. As the saying goes, "You don't lease to save dollars, you lease to save cash."

ing to the buyers' needs. In addition, in some cases, and with certain leases, the payments may be treated as a pretax operating expense. In other situations, the lease may work, in effect, more like a loan. Perhaps of most value, though, in leasing is the ability of the manager to see exactly what expenses will be over the term of the lease, allowing accurate projection of cost and profitability. This includes the benefits to cash flow and keeping bank lines of credit intact to meet short-term needs and emergencies.

The leasing relationship

Many broadcast hardware manufacturers are very active in the leasing of their equipment. Of note in this regard, due to their size and longevity in the marketplace, is Harris Corp. Harris, which handles its television and radio sales forces separately,

"Most fundamentally, leasing must be viewed as an alternate means of financing, often requiring no money down and offering 100 percent financing."

Leasing, it must be kept in mind, is not a panacea. It works in certain financial situations at certain times. Also, not all equipment manufacturers have agreements with leasing companies, and not all leasing companies will handle broadcast gear due to its high cost and early obsolescence. In other circumstances, it may be more expensive to lease than to purchase. Of course if short-term solutions provide answers to hardware questions then the excellent equipment rental houses, such as Camera Mart, Leaseametric, and others, will surely be considered. Still, leasing offers enough valuable options to bear looking into by station managers.

Most fundamentally, leasing must be viewed as an alternate means of financing, often requiring no money down and offering 100 percent financing. Other advantages include flexibility with the tailoring of size and frequency of payments manipulated accordworks with a few different leasing companies. Brian McCorry, manager of sales finance at Harris, maintains that the association with leasing companies "allows us to offer to customers extended terms, making it easier for broadcasters to afford equipment. Vendors typically can't offer the extended terms or lower rates like the leasing company. It creates a good situation where everybody wins. The broadcaster gets equipment he might not have been able to afford otherwise and we get a sale we might have lost."

Some manufacturers find that a close association with one leasing company or with several does not serve them well and does not fit into the organization's sales approach very easily. Others, however, find that it is an asset to have an organized leasing relationship when approaching a sale at a facility. Harris assumes this approach, and the company has demonstrated that it can be beneficial to the station as well.

The question then arises: in what situation is the best opportunity for a station to lease rather than to buy its equipment? Are there types of equipment for which leasing is the most viable solution, and is there a dollar amount beyond which leasing becomes most attractive? The answer to these questions can be found in the triangular relationship of vendor/leasing company/broadcast facility. In other words, the answer depends on the parties involved.

One of the companies Harris deals with, on the radio side, is LeaseAmerica Corp., of Cedar Rapids, IA. A typical radio deal for Harris may range from $20,000 to $150,000 with terms of three to five years. It is in this financial atmosphere where LeaseAmerica operates best, where it has found its business niche. Due to the internal structure, the amount of service provided to an account, and the set of rates determined by LeaseAmerica, the company has found that it can specialize in the radio market and price its programs accordingly. The important elements in a lease deal include, of course, the reputation of the vendor and the leasing company. Part of the reputation should be based on flexibility of terms in a lease.

It may be useful to examine how the leasing company operates and its motives for operating that way. Dave Harvey, vice president of marketing for LeaseAmerica on how and why: "Harris did a lot to introduce us to the broadcast market. When the satellite division in Melbourne, FL, got us involved in installing dishes at radio stations, we investigated the possibilities of expanding our base into the broadcast industry. Broadcasters looked good on financial statements regarding payments, so we got involved."

The company works with other vendors as well as with Harris, and has been involved with broadcasters for six years, maintaining 16 sales offices throughout the country.

Primarily, the company keeps

its broadcast leasing in radio because of the size of transactions. The company tends to be most competitive in rate structures up to about $250,000.

For LeaseAmerica, as with all leasing companies, these areas of specialization become a function of how the financing company operates in terms of time. Also important are the number of people involved in the credit checks and the ability to analyze all gathered data. The way LeaseAmerica is structured, it is more efficient for the company to do a greater number of mid-size transactions than it is to do fewer, high-dollar deals, though they do not shy away from million-dollar opportunities if presented with the proper perspective.

Leasing companies are not the only game in town, naturally. Banks offer loans, and there are some companies that will service the financing of their own equipment.

Harris has, in the past, handled leasing and other financing completely in-house. The manufacturer found, however, that holding the paper was not using the company's resources efficiently. Harris is a manufacturing and sales/marketing organization, not a leasing company. The Harris financial people realized that it was less efficient for them to carry the financing than it was for a leasing organization. It became obvious that a relationship with a leasing company or companies would better serve both themselves and the broadcast customer by making the financial transaction more streamlined. When a deal can be consummated with efficiency, everyone benefits. Harris has used leasing companies for years, and its arrangement with LeaseAmerica for radio equipment is three years old now.

It should be noted that the company has exchanges with other leasing people, and that the essential purpose of any Lagreement is to arrange the deal so that all sides come out ahead. Harris' McCorry states the benefits of leasing thus: "Releasing the financial reins alsoallows the ven-

dor to provide greater flexibility to the buyer in that the buyer can step in and say, 'Yes, I'll take this equipment, but here is the leasing company or financial institution with whom I would like to complete the transaction.'"

Still, the solid relationship and comfort that can be achieved when working with fairly large dollars makes close arrangements with certain leasing companies valuable. At this year's NAB convention, Harris announced a newly formed association with another leasing company, U.S. Concord, to handle the equipment manufacturer's television financing. The reason for using a different company for television equipment than for radio is that each of the two broadcast sectors have different operations and, thus, different needs. Therefore, different financing programs are required to service the accounts properly. In light of this, broadcasters should be aware of the leasing option always, and the varieties of leasing programs, because radio and television not only have different equipment needs but disparate financial needs as well.

The distinctions between the two broadcast sectors is evident in Harris' use of two different companies and in the dollar amounts typical of transaction in the respective businesses. In television, a Harris deal may range from $400,000 to approximately one million dollars, with a five-year term representing the typical deal. Other companies, like Sony and Grass Valley, which commonly conduct business in such dollar amounts, have employed the services of U.S. Concord in the past. This is due, in part, to U.S. Concord's abilities to operate most efficiently in this realm, offering finance leases that work much like a loan, whereas other structures may operate as a true lease with different tax advantages.

A broadcaster must, obviously, determine with the financial people if leasing will be advantageous to the station's fiscal health and, if so, what types of lease provide the most possibilities. The advantages of true leasing have to do with the accounting of payments and obligations in capitalization and depreciation. All details must be reviewed before deciding which program is best for the station. This is where flexibility in a leasing company comes in. Obviously, if the leasing company has only one way of doing things, and it doesn't suit the broadcast operation, then using that leasing company may prove to be a disadvantage.

"Radio and television not only have different equipment needs but disparate financial needs as well."

The leasing structure

Bob Burtiss, formerly with Sony and now with U.S. Concord of Oak Brook, IL, explains his company's experience in broadcast and its philosophy of business. "We are a wholly owned subsidiary of Hong Kong Shanghai Bank, active in broadcasting for several years. As a service company we stay flexible regarding those with whom we deal, but prefer to use the vendor base as a source of referrals."

Although Concord has four areas of specialization, telecommunications (including broadcast and teleproduction), medical, print graphics group, and aircraft, the company has been involved in broadcast equipment financing for eight years now. With four sales persons throughout the country dedicated strictly to broadcast-related financing, the company has handled everything from new facility startups to individual equipment deals ranging from $100,000 to approximately seven million dollars. Officially, the financing is stated as a financed lease with a dollar purchase option having depreciation going to the end user with fixed and floating rates available.

As previously mentioned, there are various ways to structure leases, depending on the leasing company and the needs of the station. The foundation on which the lease deal is built is essentially the same from company to company; the type of structure you build on top of the foundation is where the "personalized approach" comes into play. In most leases, the vendor sells the equipment to the leasing organization, which then, in turn, leases the equipment to the station. This makes the leasing company responsible for carrying the paper, collecting, and generally executing the transaction, though responsible equipment vendors play a central role.

Epitomizing a flexible business approach to this area is Charter Financial, located in New York, NY. Charles Drucker, director of marketing for broadcast and motion picture markets states that, "we work both with the vendor and the end user. We like to tailor a lease program so that the vendor can go in and present the system and be able to say, 'Here it is, and this is what it will cost you per month.'"

Charter concentrates on what it considers the middle market: $100,000 to five million dollars. Typically, they will purchase from the vendor and hold title until it's paid off. Also, in rare cases, Charter Financial will allow the client to put up collateral.

When asked about the attraction of leasing over buying Drucker quickly answers, "You earn income from equipment because you use it, not because you own it. This is especially true in an industry in which obsolescence occurs so quickly."

Charter also likes to have close associations with hardware manufacturers and has worked out programs with many companies, Wavefront Technologies among them. Such relationships become particularly relevant in the modern broadcast plant due to the onslaught of software-oriented developments as opposed to hardware. Will these developments cloud the clear waters of finance leasing since there is no actual

piece of equipment on which to base the deal? This doesn't pose a problem, Drucker claims, because there has to be hardware tied to it somehow and, currently, when software only is involved, the dollars aren't high enough for Charter, or other large financing groups, to react to it. If and when the numbers grow, expect these types of companies to be involved.

Harris Rogers of Abekas echoes this sentiment about leasing in general. "As the dollar value of the item goes up, the possibility of leasing goes up. As a sales organization, you have to be sensitive to the buyers' needs. So if the subject of financing comes up, then leasing enters the conversation." Abekas has worked with U.S. Concord, Signal Capital, Charter Financial, Leasing Concepts in Radner, PA, and Phoenix Financial in New York City.

It must be remembered that financing, and terms of financing, are integral parts of any sale. How to structure a sale or a lease can make or break the deal. And, according to Abekas' Rogers, "It can be tricky if you are carrying your own paper. Leasing companies provide a service in that regard, making it a viable alternative if outright purchase is not possible."

For a vendor to carry the paper, he is risking a great deal on two fronts. One is that he tends to take on a lot more than he should just to make the sale, the other is that he gets stuck with uncollectables. What happens is that the sales figures begin to look rather impressive, but the amount of bad paper ends up destroying the profit and this is not good for the buyer or the seller. Thus the niche for the leasing companies.

There are many options besides leasing, of course. Cash purchase is one option. Bank loans are another. Still a third possibility that presents itself is a unique twist on equipment purchase that has been undertaken by Chyron. In a hybrid approach to financing, Chyron has come up with a plan that combines features of renting, leasing, and purchasing.

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on extended terms employing three different plans. The plans are applicable to all three companies in the Chyron group—Chyron, DSC, and CMX—and can even include equipment purchased from two or three of the different companies. For example, a station may buy a Chyron IV, graphics equipment from DSC, and editing gear from CMX, and put it all on one purchase order and finance it under one plan.

The plans are based on one basic structure, explained by Chyron chairman and CEO, Al Leubert. "All plans require 10 percent down payment. The amount of payment and the duration is what varies. For example, on the 10-2-57 plan, if there is a purchase for $50,000, the down payment is five thousand, two percent per month is one thousand per month for 57 months. Two other plans offered are the 10-3-35 and the 10-4-26 for lower-level purchases."

What this amounts to is an interest rate of a little over 10 percent. The plans, started in August 1986, were designed to allow salesmen to calculate on the scene what payments would be for any given purchase, based on the total equipment cost. It also permits salesmen to employ effective wraparound financing for the three companies in the group.

As a unique alternative to both purchasing and leasing, the plan seems to have been successful. Put succinctly by Leubert, "We have sold over 10 million dollars worth of equipment for all three companies with this plan since last August."

If a financing plan, any type of plan, is successful that means the smart broadcast manager has also been successful by taking advantage of it. As leasing programs become more versatile and custom-tailored to the industry, and the individual stations within the industry, look for the recovery to speed up as equipment manufacturers, leasing companies, and best of all, the stations themselves benefit from the flexibility of modern financing options. **BM/E**

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Circle 140 on Reader Service Card

Deregulation: FM Restrictions and Call Signs Go Under the Knife

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

By Harry Cole, Bechtel & Cole, FCC Counsel

The dramatic face-lifting of broadcast regulation is continuing its phenomenal advance virtually unabated. This month, reports on the elimination of certain restrictions on the use of Class A FM channels is addressed, as well as a proposed change, which, if adopted, will certainly be more immediately noticeable to the listening and viewing public than just about any of the sweeping changes already effected in this decade of deregulation.

Class A FM restrictions

As most broadcasters are probably aware, for more than 20 years the Commission has designated 20 of the 80 commercial FM channels as Class A channels. That has meant that stations operating on those channels were limited to three kilowatts of effective radiated power and antenna height of 100 meters (328 feet); it also meant that the remaining 60 channels were reserved for higher powered Class B or C use. In other words, there was a real distinction between the Class A and Classes B/C, and imposed restrictions kept them far apart.

"The new rules are also almost certain to enhance the desirability of Class A stations."

While the more limited Class A facilities were in many situations adequate to permit the Class A broadcaster to serve its community of license, they often proved inadequate to meet the competition from nearby Class B or C stations. Further, the better the station's facilities, the better its ability to serve a wider area than merely its community of license. Thus, Class A licensees have occasionally pressed for relaxation or elimination of the limitations on their potential facilities.

In connection with Docket No. 80-90 the Commission had taken an initial step in the direction of breaking down the distinctions between FM channels with respect to the classes of station that could be operated on them. As part of the deliberations, the FCC had decided that applicants could use Class B or C channels for Class A use. In other words, even if a full Class B or C station could not be authorized on a particular channel in a particular community because of minimum mileage separation considerations, a Class A station could be established on that channel as long as it satisfied the less-stringent separation limits applicable to Class A stations.

Having thus opened all commercial FM channels to potential Class A operation, the Commission then moved to the next logical step: why not open all commercial FM channels to operation by any class of station? That is, why not permit Class B (including B1) or C (similarly including C1 and C2) stations to operate on channels previously restricted to Class A stations, as long as the more-stringent mileage separations can

be met. And, in February, that's precisely what the Commission did.

As a result, a variety of possible options are now available in the FM service. First, existing class A licensees may be able to upgrade to a higher class of service on their present channels. This will, in most instances, permit them to increase significantly their service areas, bringing service to audiences beyond the reach of their Class A signal. Such upgrading might require a change of transmitter site, in order to satisfy minimum mileage requirements.

Still, the advantages in increased coverage could be worth the difficulties encountered. The new rules are also almost certain to enhance the desirability of Class A stations that are subject to upgrade possibilities, a factor that could prolong what is largely a seller's market in FM licenses. And finally, vacant Class A channels that might previously have been written off as unattractive are sure to be scrutinized closely for upgrade possibilities.

In order to take advantage of the new rules, Class A licensees need not file an application. Rather, a licensee looking to upgrade will have to file a petition for rulemaking in which it demonstrates that a higher class of station could be operated on that channel at that location consistent with the mileage separation rules and other related allocation criteria. Your consulting engineer should be able to assist you in determining whether a particular situation is ripe for upgrading. A petition for rulemaking is usually a relatively simple document that should not take too much time (or money) to prepare and file.

If it is acceptable, the Commission's staff will issue a Notice of Proposed Rule Making (NPRM) in which it proposes to upgrade the channel classification and orders the petitioner to modify its operation accordingly; the NPRM will also invite interested parties to comment on the proposal. While some opposition might be submitted by, say, competitors in the market who would prefer not to face an upgraded operation, as a general matter there are few available grounds on which to oppose this kind of proposal successfully. (One such ground does exist where upgrading on Channel 221 is proposed and where there exists a nearby Channel 6 television operation. In such instances, the Commission intends to scrutinize the proposal closely to make sure that the availability of existing and potential noncommercial educational FM service will not be adversely affected.)

"The Commission is looking to provide licensees with greater flexibility in choice of call letters."

Once the comments and reply comments have been submitted and considered, the staff will normally issue a Report and Order that (absent any effective opposition) adopts the proposed upgrade and orders the licensee to improve its facilities.

In revising its rules, though, the Commission did not change a couple of related rules. In particular, it chose to maintain the geographic zone designations, which determine whether non-Class A stations will be either Class B (or B1) or Class C (or C1 or C2). Also, it decided to maintain the Class A power and antenna height specifications of three kilowatts and 100 meters. Some parties had suggested that, to improve the lot of Class A operators, the Commission should simply grant across-the-board power and height increases. The Commission, however, concluded that it did not have enough information before it to make that decision at this time; in so doing, it left the door open to the possibility of making this type of change sometime down the line, though.

The new rules were to become effective on March 23. If you wish to explore upgrading possibilities, you should contact your consulting engineer.

New call sign rules proposed

One area of FCC activity that many observers thought could not get simpler was the area of call sign regulation. After all, almost four years ago the Commission had substantially streamlined the call sign process, and things appear to have been working smoothly since then. But ever vigilant for more deregulatory possibilities—and also possibly because there are fewer and fewer areas left to deregulate—the Commission has again turned to call signs.

Basically, the Commission is looking to provide licensees with "greater flexibility in choice of call letters" and also to expedite processing of call sign requests. To those ends it has proposed to eliminate the requirement that "conforming call signs" be assigned only to a single licensee in a single market. Historically, the Commission has held that, where a licensee has a particular call sign (let's say, for example, WAAA), that licensee has an exclusive claim both to that call sign, and also to identical conforming call signs in different services.

An even more dramatic aspect of the Commission's overall proposal would be the elimination of the geographic restriction on the use of "K" and "W" prefixes in call signs. Since the earliest days of regulation the Commission has used the "K" prefix for stations west of the Mississippi and the "W" prefix for stations east of the Mississippi. Whatever basis that distinction may once have had, the FCC has concluded now that there is no longer any public interest justification for it. As a result, if the proposal is adopted, many listeners and viewers are likely to experience a whole new call sign sound, as the Ks travel east and the Ws travel west.

The final element of the proposal involves call sign swaps. These usually occur when an existing licensee in a given market sells its station(s) to trade up by buying a better station in the same market. In such situations, the licensee would obviously like to retain its original call sign for use at the newly acquired station. However, the FCC's existing procedures call for the licensee instead to turn in the old call signs and then apply for them again when the license assignment goes through. This process exposes the licensee to the risk that, before it can refile for the sign, another licensee will request it and, under the "first come, first served" rule, will be entitled to it. The Commission sees no reason not to give the licensees in such swap situations the assurance that they can retain their existing call signs. Accordingly, it is proposing to include this as an exception to the first come, first served approach.

The FCC's continuing march away from anything but absolutely minimal call sign regulation may cause some legitimate worries among broadcasters. After all, a station's call sign is its name, its public image. The notion of someone else using that call sign in a way that might confuse the public is a valid source of concern. The Commission's 1983 decision not to involve itself any longer in call sign disputes was bad enough; its proposal to eliminate just about any exclusive claims to conforming call signs creates even more potential problems in this area.

There is, however, a way in which a broadcaster can secure some measure of protection against the unfair use of its call signs (or confusingly similar call signs) by other unauthorized parties. The United States Patent and Trademark Office will accept applications for registration of a station's call sign as a registered service mark. Separate registration can also be obtained for any fanciful logos or other designs that you may have developed in connection with the call sign itself. The registration application process generally costs in the range of several hundred dollars and can take more than a year to complete. Yet, if registration is obtained, it is much easier to halt an infringing use of your mark and to obtain damages for such infringement. Of course, if you are inclined to change call signs regularly, without building up any goodwill in any given call sign, registration is probably an unnecessary expense.

However, service mark registration is certainly an option to be seriously considered if you feel that your call signs are a valuable asset you want to protect as much as possible. You should contact your communications counsel for more information about the registration process. **BM/E**

New RF Techniques

Both AM radio and UHF television are benefitting from fresh approaches to existing technology. Synchronized AM is gaining new impetus as is UHF with Klystron developments.

By Robin Lanier

The backbone of broadcasting, terrestrial RF, has been less glamorous technically in recent years than satellite networking, fiberoptics, advanced automation, digital modulation, and the various other exciting developments that are crowding the industry's stages. It is, therefore, important to take note of two developments in RF technology that promise substantial benefits for both AM broadcasters and UHF television.

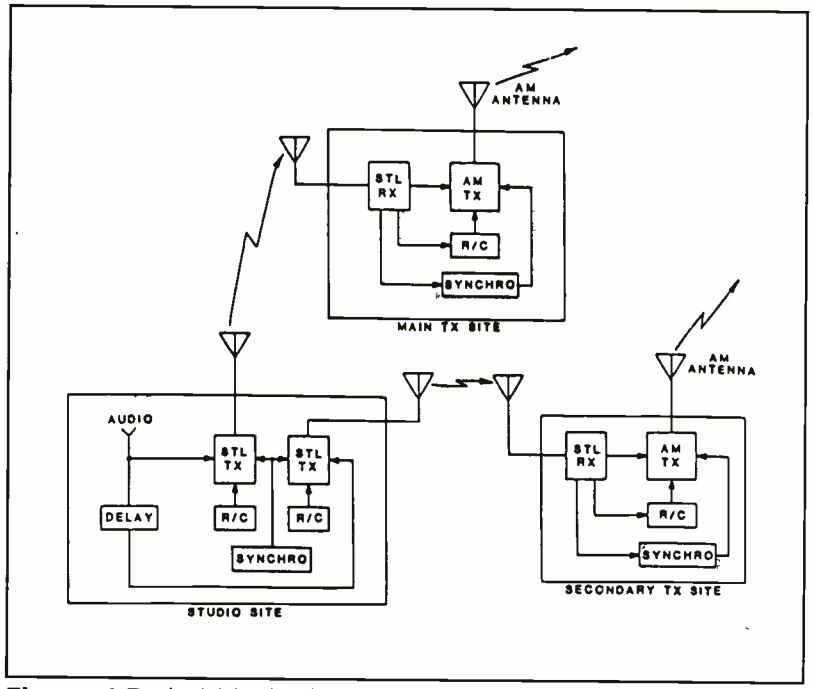


Figure 1: Typical block diagram for synchronous operation.

The one area of technical development with, perhaps, the broadest impact is "Synchronized AM," which should be capable of improving coverage for many AM stations that have reception holes in parts of their assigned areas.

The other revamped technique is the Depressed Collector Klystron, in the works for a number of years at NASA and Varian, which is aimed at achieving a reduction of at least 50 percent in power consumption by UHF transmitters.

Synchronized AM

Understandably, AM broadcasters are looking for any lift they can get. Some will soon be able to get assistance from an old transmission technique, Synchronized AM, to help solidify audience coverage.

The technique involves the addition of one or more auxiliary transmitters, fairly close to the main transmitter, operating on the same frequency, and carrying the same programs (see Figure 1). The auxiliary unit is typically of much lower power than the main transmitter and is within the station's assigned coverage area. It is important to note that, given the crowded state of the AM band, the auxiliary is not designed to extend coverage outside the station's assigned area. The purpose of the auxiliary is to improve reception in sections of the station's assigned area where

the signal is below standard.

In Europe, stations have been using synchronized AM for many years in their much less crowded "middle wave" bands, allowing the use of high-power auxiliaries to extend coverage over large distances. Of the half-dozen stations in the U.S. that have occasionally attempted to use the technology, WLLH in Lawrence, MA, has had an experimental license for synchronized AM since 1937, almost 50 years. The station was originally licensed to Lowell, MA, but later switched to Lawrence, maintaining both cities for its coverage area. In fact, the two synchronized transmitters are located one in each city and the station on-air ID must read "WLLH Lowell and Lawrence."

Yet, in spite of the fact that the FCC has not authorized synchronized AM on a regular basis, it has issued a Notice of Inquiry (MM Docket No. 87-6). In asking for comments toward a rulemaking for synchronized AM, the dates set for final comments was May 4, 1987, and, for reply comments, June 3, 1987.

The main impetus for recent action on synchronous AM came, in large part, from the Mass Media Bureau's "Report on the Status of the AM Broadcast Rules," issued in April, 1986. Positive reaction to the discussion led to the FCC's work on the Notice of Inquiry.

In the meantime, the Commission has publicly encouraged AM broadcasters to apply for experimental licenses, with the aim of developing technical experience that will be useful in the rulemaking. Four such licenses were issued in 1986.

Having received such encouragement from the FCC, broadcasters now await support from the hardware side. At least one manufacturer has shown a willingness to advance the cause, that being the Harris Corp., which has set up a program to develop equipment and systems for synchronized AM. Under the direction of Robert Weirather, the Harris program has given aid to several of the stations adopting experimental synchronized AM.

In a paper recently delivered at the NAB convention in Dallas, Weirather detailed the main technical requirements and problems. The major obstacle is interference between the signal from the main transmitter and that from the auxiliary. Weirather stated that, "the two signals will coexist in an area surrounding the two transmitters, while interference is most likely to be troublesome in areas in which the two signals are of roughly equal strength."

To find the area most at risk, the broadcaster can draw signal contours for the two transmitters, or survey the area with field strength meters. The accompanying drawings from Weirather's NAB paper (Figures 2 and 3) suggest how this might be accomplished in typical cases.

A close synchronization of the carriers from the two transmitters, with the frequency difference brought as low as 0.1 Hz, will minimize interference effects. Moreover, there are a number of ways to find frequency references for the synchronization. According to Weirather, "These include, among others, satellite signals, WWV signals, and FM

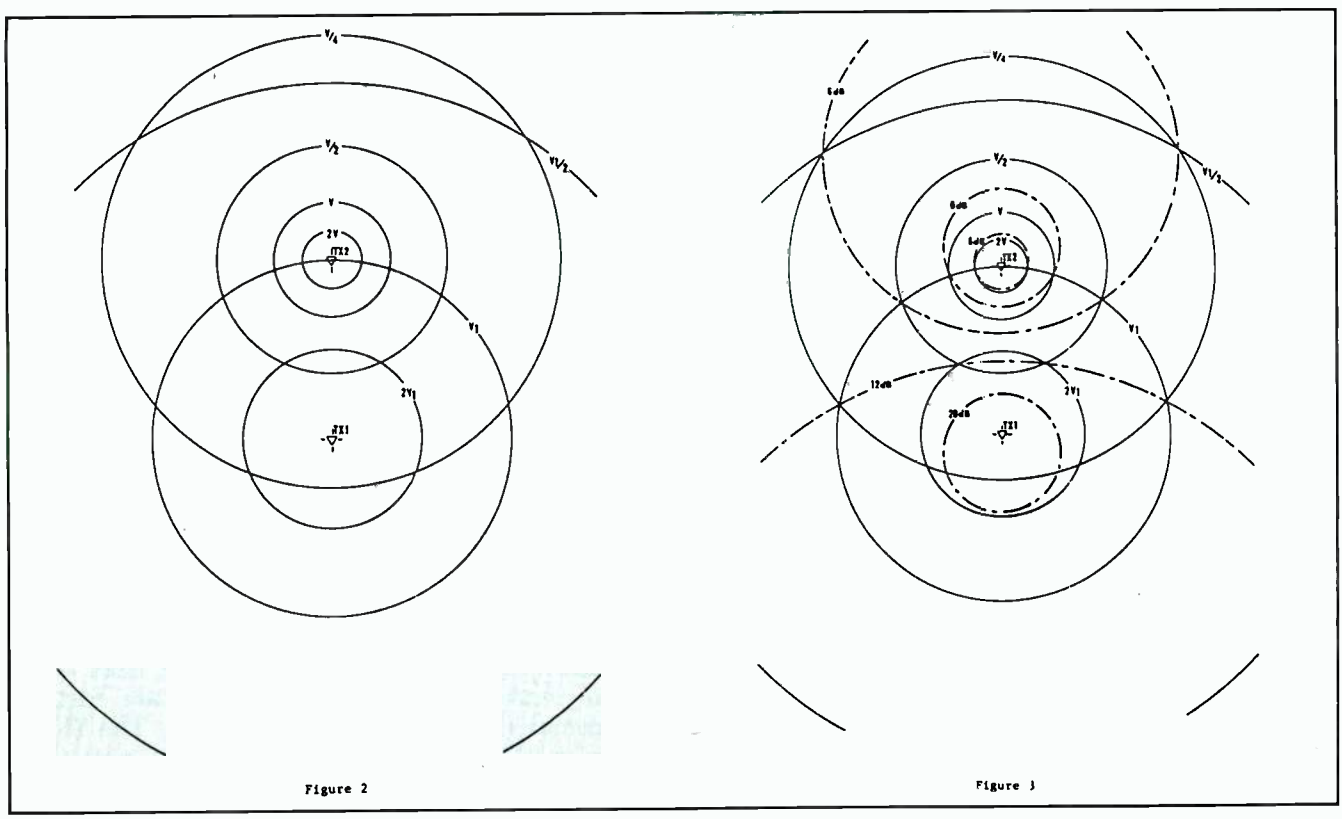


Figure 2 & 3: Signal contours for main and auxiliary transmitters in synchronized AM operation.

transmitters."

For more reliability, however, most stations are incorporating ultra-stable oscillators or phase-locked loop circuits into sync channels in the STL to the auxiliary transmitter. Either frequency or phase synchronization can be used to get the frequency offset to the 0.1 Hz parameter, giving the operation the best chances for escaping troublesome interference effects.

Even with such frequency control there may be a gray area in which the signal is noticeably degraded by interference. The broadcaster setting up the system must, in any case, survey reception conditions throughout the area reached by the two transmitters, carrying portable receivers and field strength meters to a number of locations. If there is a bad area, but with little or no present or potential audience, adjustment of the system, fortunately, is simplified.

On the other hand, if an important segment of the audience is due to get poor reception, the broadcaster must try to adjust the system to minimize the bad effects. Mark Durenberger of Durenberger Technologies in Minneapolis, MN, has been working with several stations around the country on the adjustment of synchronized AM systems. "One approach," claims Durenberger, "has been to set the frequency difference with ultra-stable oscillators so that the signal rise and fall can be absorbed by receiver AGC circuits."

An unknown result in the operation of synchronized AM is how it will mesh with a stereo signal. This will not presently affect any considerable number of potential users, with a total of about 300 AM stations transmitting in stereo. If AM stereo began to reach a substantial percentage of the industry, its relationship to synchronized AM could become more important.

These facts underscore the experimental nature of synchronized AM. Yet, the potential is so appealing to many AM broadcasters that the problems in the technique will gladly be addressed by the industry.

Synchronized in Vegas

At KROL in Laughlin, NV, the need arose to experiment with synchronized AM because the signal from the main transmitter did not reach Las Vegas, 90 miles away, adequately. Coverage of the city was assigned to the station, and preliminary study indicated that ground conductivity would be strong enough to help get a good signal into town. This analysis proved to be in error, and the station was faced with the prospect of poor service to a main part of its coverage area, an area from which was projected a significant influx of revenue.

The idea of a low-power auxiliary in Las Vegas was, therefore, attractive. The distance from Laughlin to Las Vegas made an elaborate STL necessary, especially since programs originated in Las Vegas, which was a fair proportion of programs aired, would have to go to the main studio in Laughlin and back again to the auxiliary transmitter in Las Vegas.

Given this situation, KROL was forced to install a microwave system with three hops for each one-way trip. General Manager Joe Reynolds reports that, "the adjustment of this system is still in process but hopefully will be completed during the spring." He adds that, "interference effects have been quite noticeable in some parts of the coverage area, especially at sunrise and sunset."

Reynolds is purchasing equipment to provide very close syncing, with the expectation that interference effects will be substantially reduced. The main transmitter has just gone to 10 kW, and the auxiliary puts out 300 watts by day and 500 watts at night. In addition, the KROL GM has applied for permission to increase the auxiliary power and believes that when the various changes have been accomplished he will finally put an excellent signal into Las Vegas.

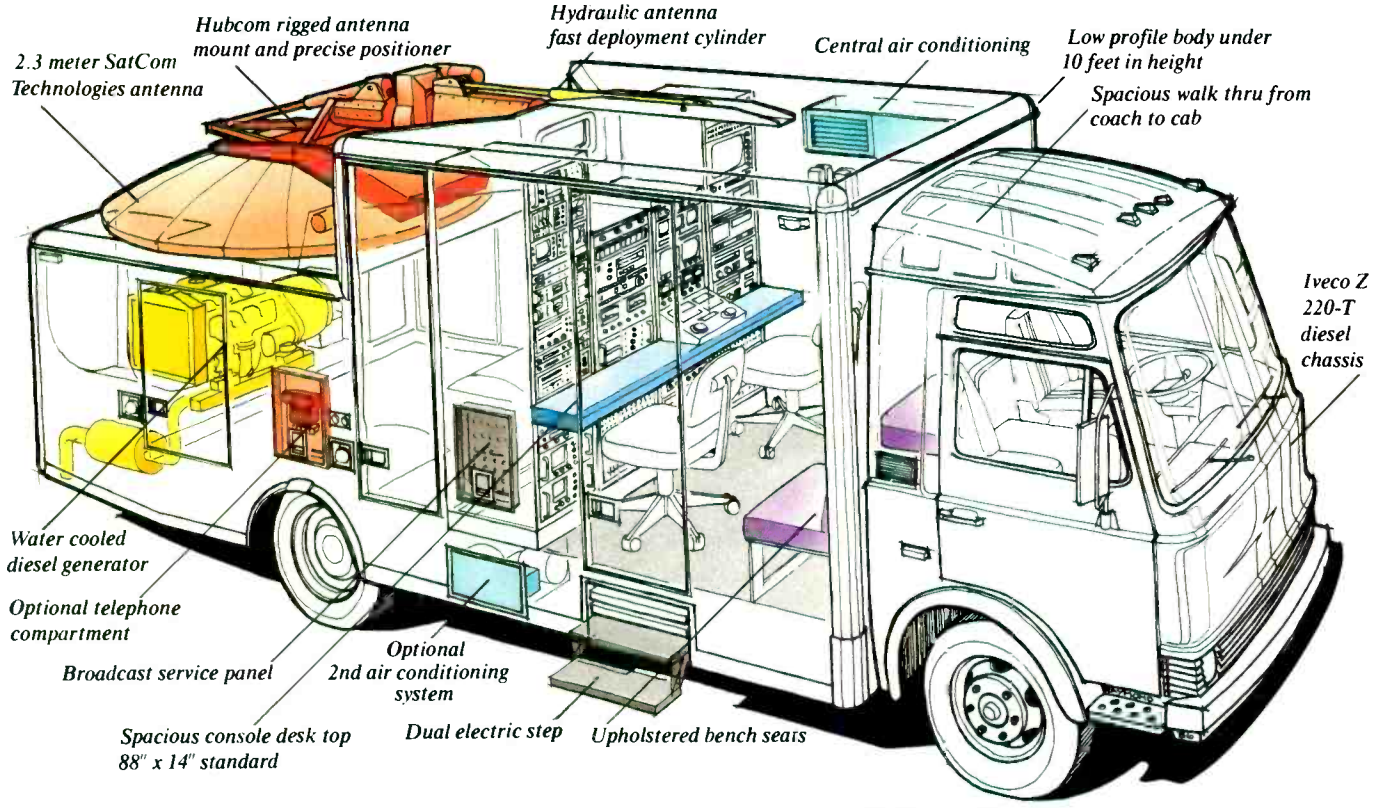
A second example in which synchronized AM offered the alternative to transmission problems occurred in Albuquerque, NM. The need for the technique at KOB was the result of the longest-running contest over an AM channel in broadcasting history. Hearing after hearing, lawsuit after lawsuit, 50 kW station KOB and WABC in New York fought for more than 40 years over clear-channel use of the 770 MHz frequency. Finally giving up, KOB was forced to change its directional pattern to create a null in the direction of WABC. This action required moving one of the towers in the directional array.

The null met the regulatory requirement, but it also dropped a blanket over Santa Fe, the state capitol and a vital part of the KOB audience. A low-power auxiliary seemed an obvious solution. Chief engineer Gary Diamond set up a two-hop microwave STL, the first stage going eight miles to the top of Sandia Crest Mountain, the second stage going the final 42 miles into Santa Fe. The auxiliary contributes just 230 watts, with diplexing from an existing antenna tower in the center of town. This power augmentation supplies a good signal in Santa Fe and meets the legal restrictions now imposed on KOB.

Surveys of the areas between the two transmitters are currently underway. Mark Durenberger has been working with CE Diamond on final adjustment of the system. And, fortunately for KOB, there is almost no potential audience in the worst interference zones.

As oppposed to the two previous examples WJNO, in West Palm Beach, FL, has employed synchronized AM as a positive expansion step rather than rectifying a "fault" in coverage. Population growth in the area is phenomenal, with estimates coming in at 900 new people every week. Areas on the fringes of the station's existing coverage, which used to be sparsely inhabited, are fast becoming metropolitan. The WJNO management would naturally gain something by adding these new listeners.

Chief engineer Dick Lucas is



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putting in a synchronized AM system with an auxiliary transmitter 28 miles to the south. Lucas hopes to have it installed and running sometime in May of 1987. He is, of course, aware of the interference problem and regards the southward orientation as a trial venture, a way of finding out how the technique works in WJNO's setting. If it is successful, he will seek authorization for additional auxiliaries to the west and north to cover population growth; to the east lies the Atlantic Ocean.

Efficient Klystrons for UHF-TV

Every owner of a UHF television transmitter would like to reduce the amount of electrical power the final amplifier (most often a klystron) draws down from the power supply. A considerable number of methods and devices for raising the efficiency of klystrons have been developed over the years, and some have been effective, within fairly narrow limits. New, high-efficiency klystrons are currently promised by several manufacturers, and they will no doubt further cut the power load.

A technology that will provide major reductions in power consumption, and in a form that has been brewing in various laboratories since the early 1980s, now appears to be fairly close to a useable klystron form. At the NASA Lewis Research Center in Cleveland, OH, H.G. Kosmahl and his associates worked out the very difficult analytical problems of adapting the depressed collector technique, long used in travelling wave tubes, to high-power klystrons.

The fundamental idea behind the depressed collector is this: As the spent stream of electrons moves toward the output, it carries a considerable quantity of kinetic energy. This energy was, in the standard klystron, lost in heat at the collector. The multistage depressed collector is a series of concentric electrodes at graduated voltages "depressed" below the body voltage (hence the name). By proper geometrical configuration of the electrodes and assignment of voltages, the series of "rings" will pick up the electron stream, converting the kinetic energy to potential energy, and returning power to the supply.

A major problem of the design is to avoid "backstreaming"— sending some of the electrons back up the line—an occurence that is obviously counterproductive. Beyond such considerations, the highest efficiency requires the smoothest possible collection of the electrons of various energies by the appropriate electrodes. Thus the problem is, to a large extent, one of trajectories. This poses the question: How do you configure the electric fields so that the electrons are guided effectively straight forward to the proper rings in the collector?

Kosmahl's work, reported by him in detail in the IEEE Proceedings in November, 1982, indicated that a depressed collector could be made to work. Earlier thought in the industry had been that the backstreaming and trajectory problems would be too difficult to handle and still bring about a net gain in efficiency. The NASA researchers used computer-aided analysis on a large scale and came up with convincing figures on the potential of depressed collector rings.

Such analytical success led to a large-scale development program jointly sponsored by NASA, the NAB, PBS, several transmitter manufacturers, and Varian. The latter began development under contract to the group. The stated objective was a high-power klystron for UHF television that cut the power load by 50 percent. The program got underway in June, 1984, at Varian.

E.W. McCune, of Varian, has reported each year at the NAB on the progress of the program. He has also presented papers on the program at various IEEE meetings; the super-efficient klystron is not going to spring upon the industry unheralded. In fact, industry observers agree that one, al-

ready evident, effect is the stimulation of work under other auspices toward higher efficiency.

A prototype based on the 60 kW VKP-7555, for 700 to 900 MHz, is now ready for actual operating tests at Varian, according to McCune.

The NAB, under the direction of chief of engineering Tom Keller, is now aiding in several engineering programs with broad interest for the industry. (One example is FMX, developed by Keller and Emil Torick of CBS, which is reported to enlarge the coverage area of FM stereo stations to get back the listeners stereo eliminates [see "FMX," *BM/E,* Sept. 1986, p. 47])

Similarly, PBS has a definite interest in the new klystron. As Mark Richer of PBS in Washington pointed out, "This organization has several television stations operating with UHF on very restricted operating funds. Cutting the consumption of power in the output by 50 percent will be of obvious benefit to them."

It is important to note that the tube will be generally available throughout the industry, as manufactured by Varian or under Varian license.

The development work has several interesting aspects, though this article by constraint of form can only briefly touch on them. Shaping the electrodes so that they produce the right electric fields, for the right trajectories of particles, might have taken years of trial and error without very advanced computer programming assistance. To get the particles to the electrodes smoothly, Varian used a computer program designed in-house called HGUN. The software could "draw" the paths of the electrons with various selected electrode geometries (see Figure 4).

Researchers involved in the project also had to develop a special technique for coating the electrodes with a thin layer of carbon. A new sputtering device did the job successfully. The objective was to reduce the effects of secondary electrons, knocked out of the metal surface by the impact of arriving electrons.

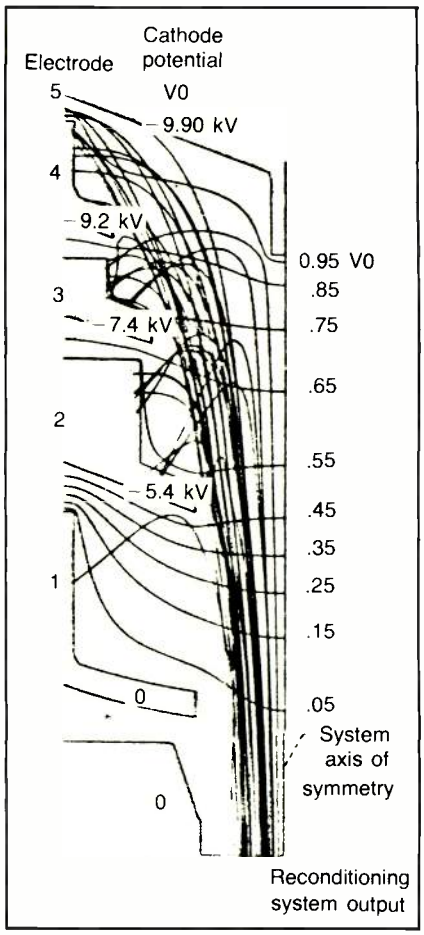


Figure 4: Electron trajectories in four-stage 2.4 cm-diameter depressed collector with TWT operating at saturation.

As the entire industry begins its recovery from a severe slowdown, it seems that the backbone, terrestrial RF, is leading the way in strengthening existing technology, developing new strategies, and incorporating advanced design systems as a way of finding the right solutions. If the accomplishments in synchronized AM and UHF television are any indication, these contributions will help to straighten broadcasting's sagging posture. **BM/E**

About the Author:
Robin Lanier, formerly *BM/E*'s senior editor, is now an independent writer and consultant living in New York City.

Minor Adjustments

By Harry Cole, Bechtel & Cole, FCC Counsel

With most of its substantive deregulatory measures already in place, you might think that the FCC would have little to do anymore. Think again. One of the problems with designing a major overhaul of longstanding rules, policies, and guidelines is that the results have to be monitored fairly closely for undesirable consequences.

Obviously, where such consequences arise, adjustments have to be made. And sometimes the problem is not so much in the monitoring of results as it is in the implementation of the policies in the first place: while the Commission may be clear as to what it wants to accomplish, it occasionally is not so clear as to how its goal can or should be accomplished. A clear example of this phenomenon popped up recently.

Financial disclosure

First, as anyone who has filed an application for, say, a new station within the last several years knows, you don't have to submit an exhaustive showing relative to your financial wherewithal as part of your application. In fact, you don't have to submit *any* showing. Instead, you merely have to put a checkmark in the "yes" box in response to two questions on the application form which ask, in effect, whether you are financially qualified to do the deal you are proposing in the application.

In the old days, things weren't so simple. Applicants used to have to provide a detailed listing of their anticipated expenses together with documentation demonstrating that they had sufficient funds available from committed sources to meet those expenses. This "documentation" could be a loan commitment letter from a bank, stock subscription agreements from shareholders, credit agreements with equipment suppliers, or other similar materials. They all had to be submitted with the application, which meant that they had to be negotiated, reduced to writing, and signed *before* the application could be finally assembled. Everything that was contained in the application had to be reviewed by the Commission's processing staff. That alone added to the time required to process applications.

Moreover, an applicant's financial documentation was available to competing applicants and petitioners to deny to review and criticize, which made the staff's job even more difficult—even if the staff might have been willing to overlook minor deficiencies in a financial showing, rest assured that competing applicants would not be so charitable. Thus, the requirement that documentation of financial qualification be submitted with the application tended to cause problems and slow down the processing of applications. Accordingly, as part of its initial deregulatory approach, the Commission eliminated the documentation requirement and substituted, therefore, the "certification" approach.

Now, when the Commission adopted this approach, it did not intend that applicants would simply answer "yes" to the financial questions without having first done all the homework that would previously have been required of them. That is, applicants were still expected to generate their own list of projected expenses, and they were also still expected to arrange for sufficient financing, and they were also still expected to obtain and maintain documentation of these efforts in their own files. The only difference was that they were no longer required to file this documentation as part of the application.

That, however, is not how a number of applicants apparently have interpreted the new certification approach. Rather, the Commission has now determined that "a number of ... applicants have certified their financial qualifications without any basis or justification." Of course, the certification process certainly does not discourage that type of behavior. After all, if the FCC's form asks, in effect, "are you financially qualified," it should not be surprising if applicants are reluctant to answer "no." Further, the form itself was less than clear as to the assumptions that the Commission would attach to an affirmative answer. (Indeed, as we will discuss below, the Commission continues to be somewhat unclear on this.) But, in any event, the Commission is not pleased that it is uncovering so many instances of applicants who, despite affirmative certifications of financial qualifications, are turning out not to be qualified.

To adjust for this troublesome glitch in the deregulatory program, the Commission announced in March that it is instituting procedures "designed to detect and deter" false financial certifications. Those procedures call for the processing staff to "initiate a program of random checks" of applicants for construction permits for new broadcast facilities. The Commission has given no indication of how it will implement this random spot check system, although it did say that "where an applicant has a large number of pending broadcast applications, the staff may question the validity" of that applicant's certifications. Applicants who are selected for spot checking will be required to "submit documentation and information supporting its certification that it has available the financial resources to construct and operate the facility for three months without reliance on advertising or other station revenues."

Abuse of process

The real kicker is that failure to make an adequate showing in this regard will raise questions about whether the applicant has made misrepresentations to the Commission and whether it has abused the Commission's processes. These would present heavy-duty problems to an applicant because even in this deregulatory, nonenforcement-minded day and age, misrepresentation and abuse of the Commission's processes remain among the most serious charges that can be leveled against an applicant or licensee. Further, if the Commission concludes that misrepresentation or abuse of process has occurred, the guilty applicant could be rendered unqualified to own *any* broadcast facility. Also, intentional false certification is a federal criminal offense, the punishment for which is a $10,000 fine and/or five years' imprisonment. This is, therefore, something which should not be fooled around with.

If you have any applications on file in which you have made a financial certification, you should be sure to review that certification (and the basis for it) with your communications counsel, to ensure that adequate justification for the certification exists. If it does not, you may have to take appropriate corrective steps immediately in order to avoid any adverse conclusion in the event your application is selected for a spot check.

In this last respect the Commission is less than clear relative to what, if any, steps can be taken now to correct a financial certification that, at the time it was made, lacked adequate justification. As a theoretical matter, an applicant who certified on the basis of inadequate justification could never correct the potential misrepresentation problem because, even if the applicant did manage to shore up its finances after the fact, it still technically filed a false certification. The Commission has made clear that false certifications are, in its view, misrepresentations.

The trouble is that, in its announcement of the random spot check procedures, the Commission states that, under the certification process, "applicants are spared the time and effort necessary to prepare and submit the documentation previously required to demonstrate their qualifications." This in effect says that the Commission may not have expected its applicants to "prepare ... the documentation" in order to justify a financial certification. If that is what the Commission actually believes, then it would theoretically be possible for an applicant to obtain documentation now in order to shore up a previously filed, inadequately justified certification.

While it remains to be seen how the Commission and its processing staff will deal with this question, it is reasonable to assume that a central focus of their review will be the applicant's actual efforts—independent of the availability (or lack thereof) of documentation—to establish its financial qualifications at the time it prepared its application. In other words, if the applicant simply checked "yes" in the financial certification boxes without giving any thought to how to finance its proposal, that applicant will likely have substantial difficulty if its application is randomly selected for checking, even if it can now secure some adequate form of documentation. On the other hand, if an applicant can prove that it did in fact meet with financial backers and did in fact make arrangements for funding when it first applied, the Commission may be willing to accept the certification even if the applicant did not have documentation of its efforts prepared at the time that its application was filed.

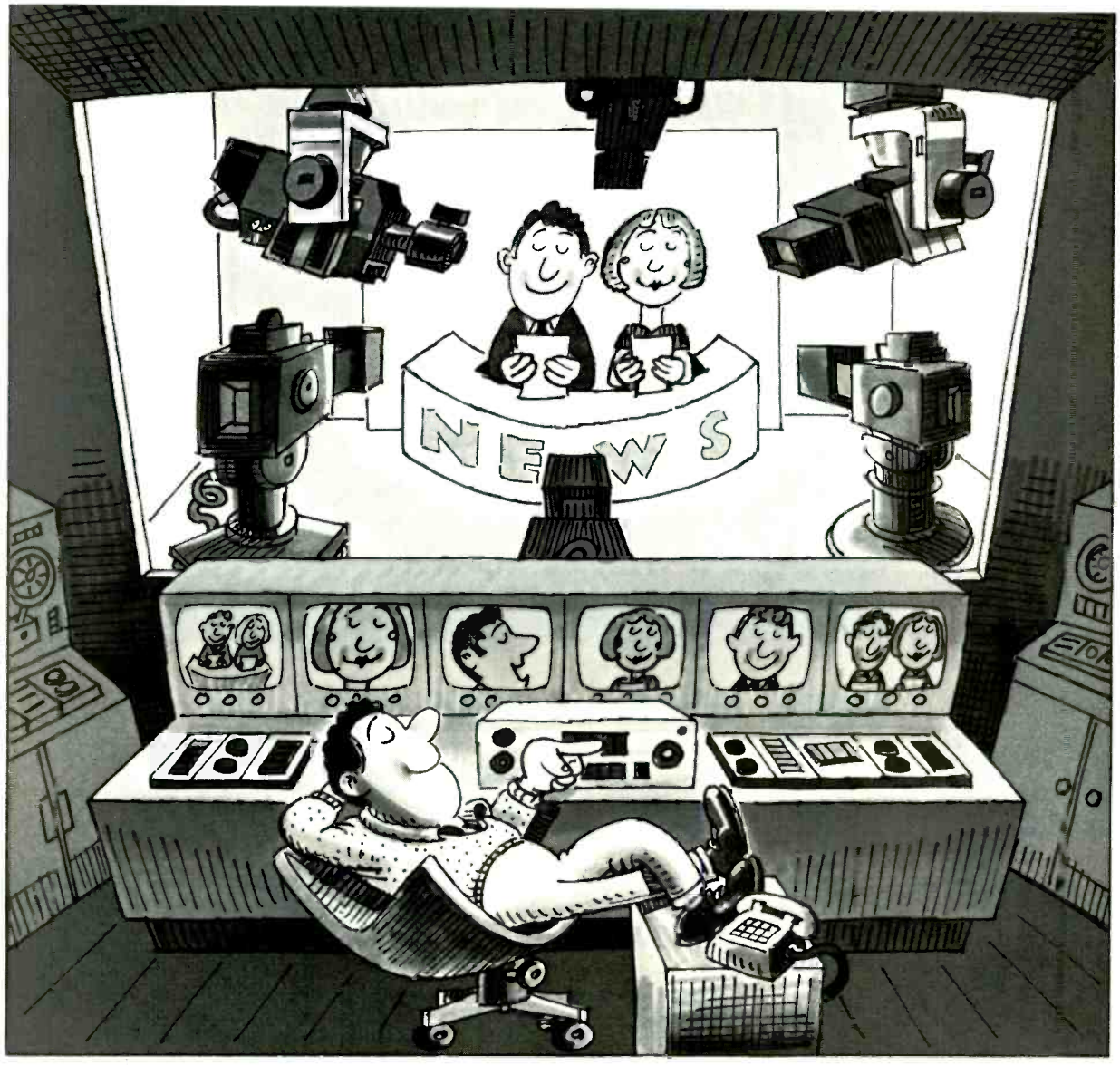
The new random spot checking approach is clearly a departure from the deregulated streamlined processes which the Commission has been working to develop. It is, however, a necessary approach if the Commission intends to continue to require that its applicants be financially qualified.

Revised licensing

On a marginally related note, the Commission also announced in March that it is now prepared to issue its revised Ownership Report form for commercial licensees. If you are a commercial licensee, you should have received your copy of the form by now; if you have not, you should contact your communications counsel. The Commission has long required broadcasters to provide it with information concerning their ownership structure. This information was generally submitted on formal Ownership Reports (FCC Form 323). Each time the information already on file changed at all, an updated report had to be filed. This was, in the Commission's deregulatory view, unnecessary and accordingly, a couple of years ago, it reduced the filing requirement substantially. Under the modified requirement, ownership reports need only be filed once annually (on the anniversary of the filing of the station's license renewal application). Licensees that are sole proprietorships or partnerships composed entirely of natural persons are exempted from even the annual filing requirement.

The modified Ownership Report filing requirement has not previously been implemented, though, because at the time that it was adopted the Commission also decided to revise the Ownership Report form to include various changes in Commission rules and policies. The revised version of the form required approval of the Office of Management and Budget, and that approval was a long time in coming.

In order to bring the Commission up to date on ownership changes that have occurred since the last reports were filed several years ago, all nonexempt commercial licensees are being required to file a Revised Ownership Report form on or before August 3, 1987. Then, starting next February 1, the annual reporting system will kick in, with each nonexempt licensee filing a revised report on the anniversary of its application. **BM/E**



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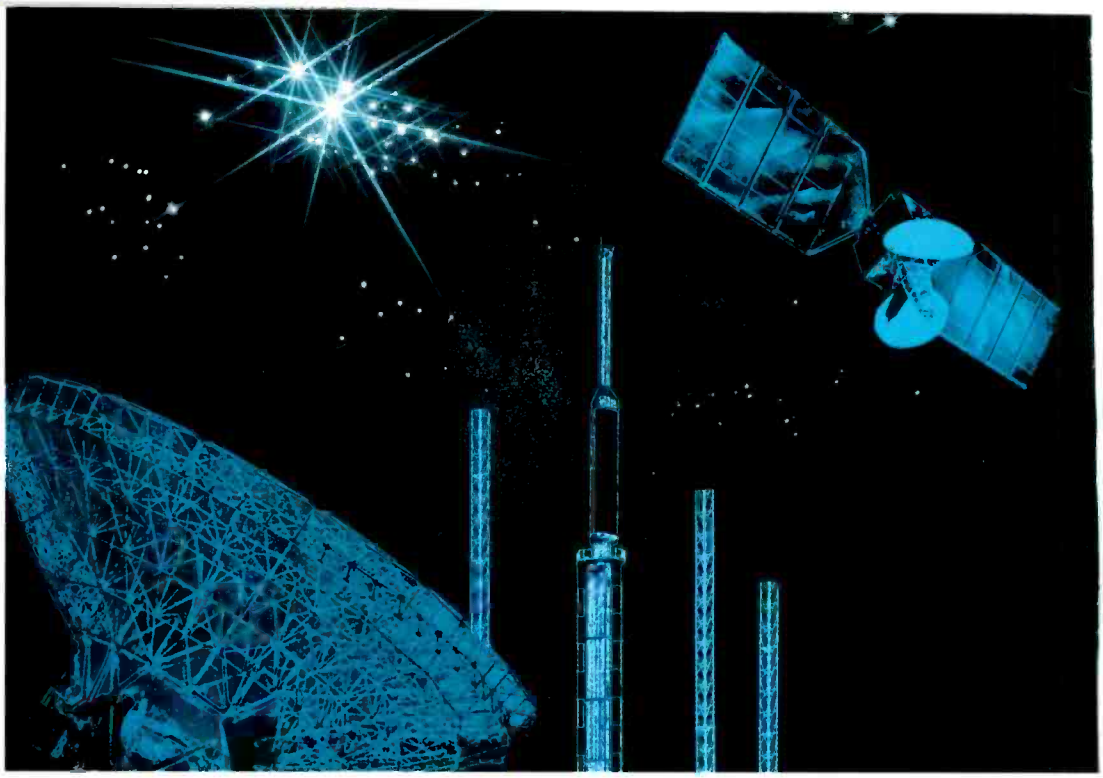

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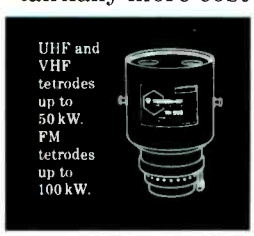

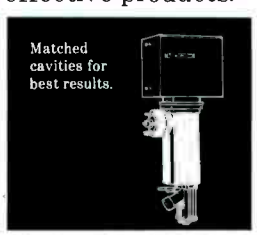

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