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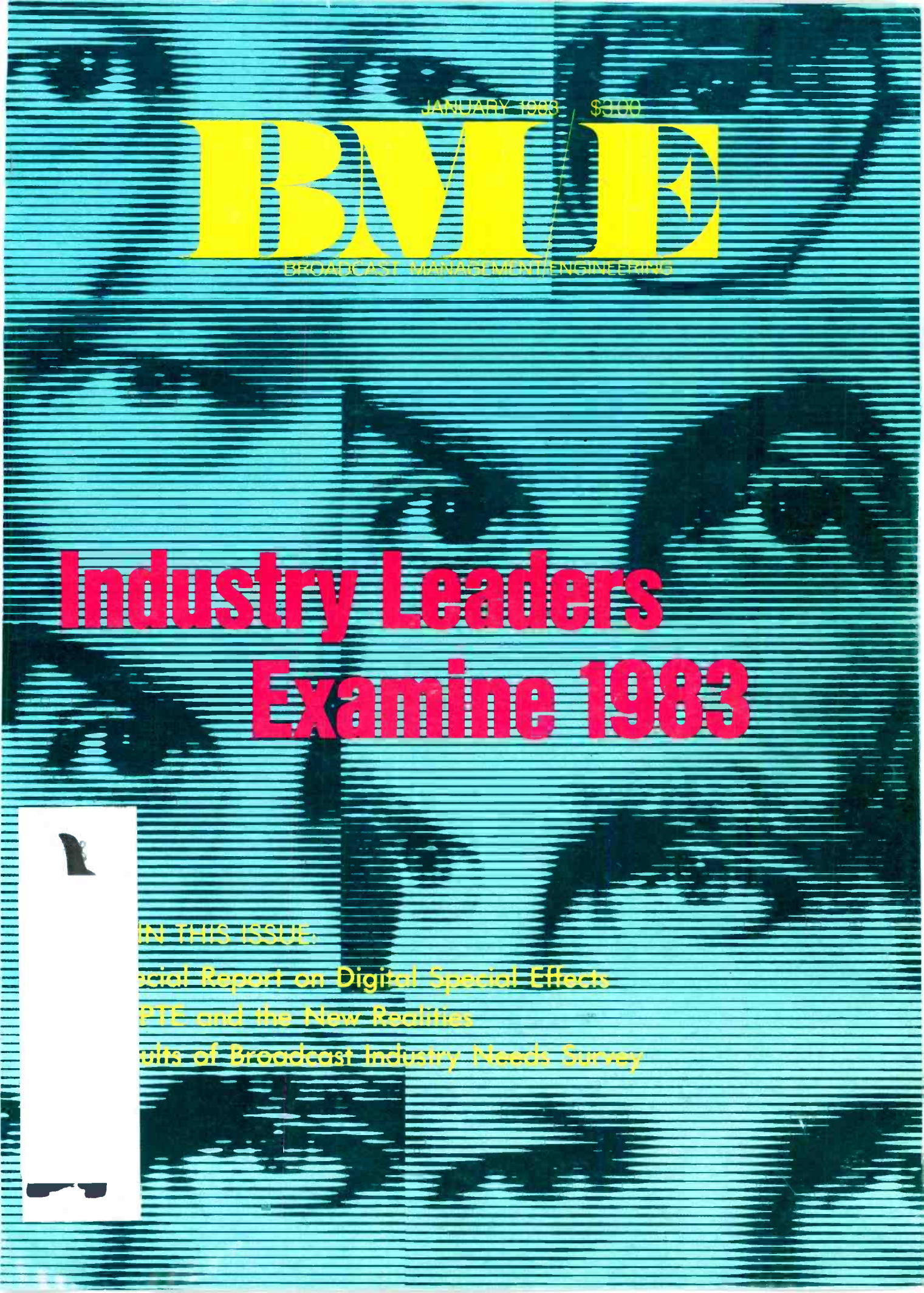

Industry Leaders Examine 1983

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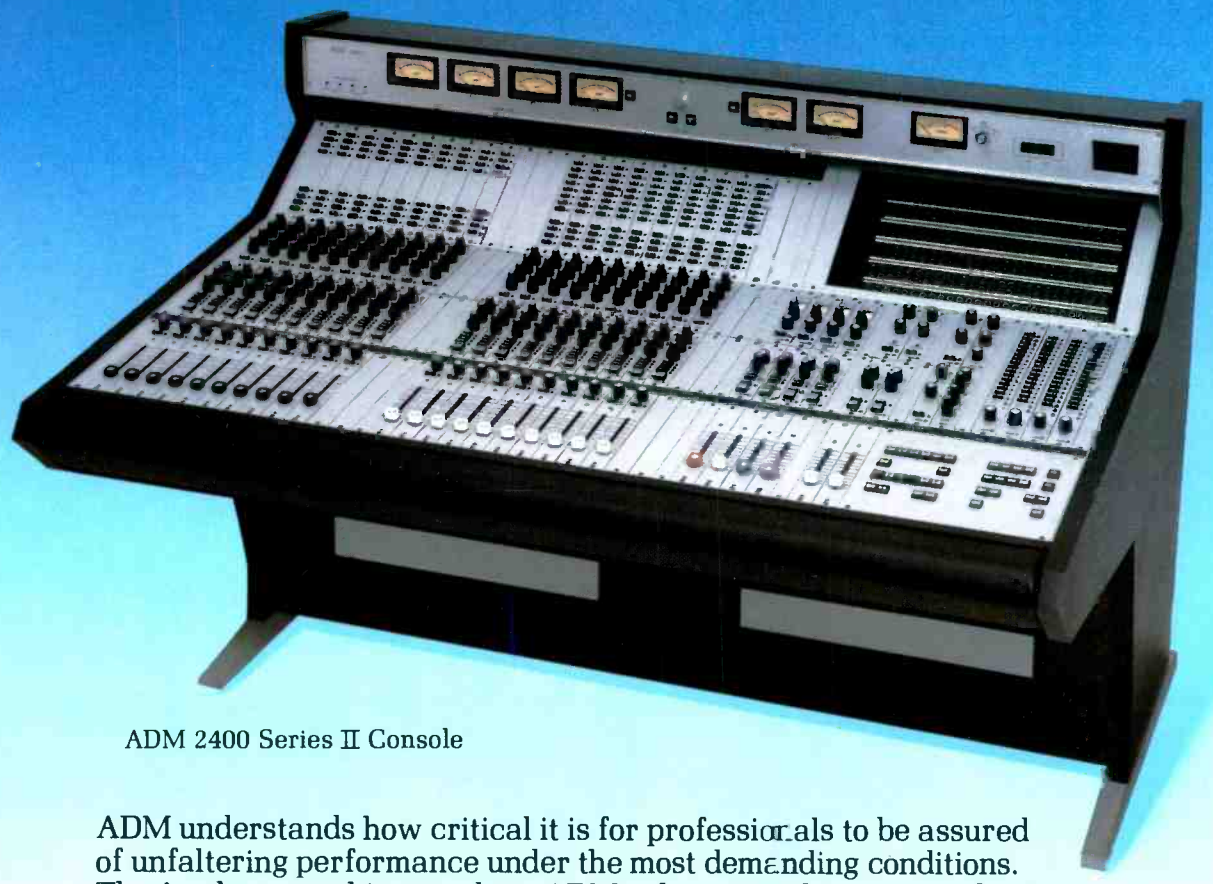

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ADM understands how critical it is for professionals to be assured of unfaltering performance under the most demanding conditions. That's why everything we do at ADM—from initial concept to final production—is geared to providing consoles of unexcelled quality and reliability.

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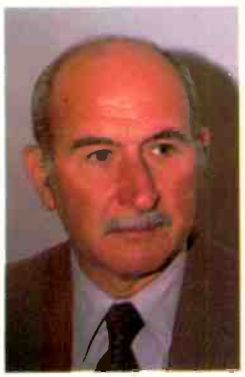
Why did WKRG-TV purchase the 300/Mk II DVE production system? "Because of the capabilities, and the Grass Valley Group reputation for how their equipment stands up", says Don Koch, Assistant Chief Engineer.

WKRG-TV understands Grass Valley Group value...but if it's news to you, isn't it time you took a closer look at the 300 system?



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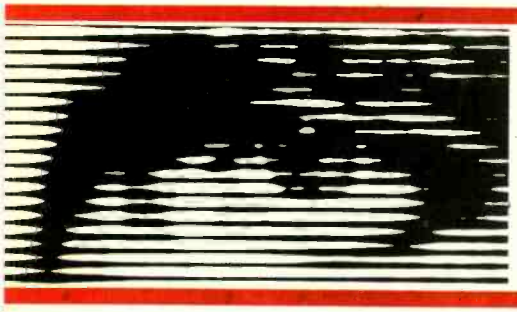
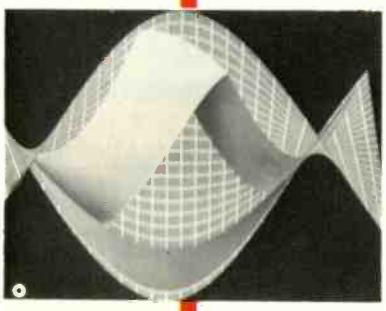
JANUARY 1983 VOLUME 19/NUMBER 1





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Special Report: Post-Production
plus NAB Preview

The Performance of an Open-Reel Recorder.

At Half the Price of Its Nearest Competitor.

Let's face it, the secret to better cart machine performance isn't in the cartridge, it's in the machine.

The new generation of improved cartridges and tapes alone can't solve the serious phase stability and noise problems. The plastic cart and its guiding system are highly imprecise, at best. The new "hot" tapes bring a slight decrease in audible noise, which is not terribly significant considering the noise base. The maintenance of precise machine-to-machine head phase alignment has been practically impossible in even the best installations.

The solution to the problem?

PhaseMaster. The industry's most advanced broadcast reproduction system. In the stereo units, our exclusive electronic solution utilizes variable delays in each of the output channels. A sample of the left program channel is encoded on the cue track (without interfering with the cue information), and upon decoding in the playback cycle is compared to its upper track (left program) mate. Thus, an apples-to-apples comparison which is used to correct for the time (phasing) differences due to head misalignment, tape skewing and jitter. It works flawlessly with any cartridge. It eliminates the compromise of unreliable and inconsistent electromechanical schemes; the tradeoffs imposed by noise-inducing and non-compatible matrixing approaches; the complex and inexact cross-correlation methods.

PhaseMaster gives you compatability with all your present, previously recorded carts too. An easy transition can be made at your own pace without having to immediately rerecord your station's entire library. Interestingly, even these carts will sound better due to our new noise-reduction circuitry.

Add to this the performance specifications that rival open-reel recorders and the best mechanical design you've ever seen in a cart machine.

Here's the best news yet: PhaseMaster can be performing in your studios for as little as $1,091.* At $2,600, our Stereo R/P is about half the price of the ITC/3M Series 99B. And the margin's even wider with Tomcat.** If you've given thought to adding the Phasechaser, you're now up to, or over the price of a new PhaseMaster with all of its inherent advantages.

Feature for feature, spec' to spec', dollar for dollar—the Phasemaster comes out on top.

The only way to fully appreciate a PhaseMaster is to get your hands (and ears) on one. To prove to yourself that PhaseMaster really has the performance of an open-reel recorder, that once and for all phase stability, noise and fidelity problems are a thing of the past, that there's a cart machine truly ready for FM & AM Mono or Stereo—write or call us now. We'll loan you a PhaseMaster at no obligation. Free, for two weeks.

Like we said, try it with anybody's cart.

You'll discover performance of an open-reel recorder, at half the price of its nearest competitor.

PhaseMaster's Numbers

Wow & Flutter:	0.095% max. DIN weighted (0.04 to 0.07% typical)
Signal-To-Noise Ratio: (Playback)	−68dB, @ 160 nWb/m (A weighted) −72dB, @ 250 nWb/m (A weighted)
Frequency Response:	Amplifier: +0.25 dB (NAB Curve) System: 50 Hz to 16kHz ± 1.5 dB
Phase Correction: (Stereo)	±738° correction range @ 16kHz
Separation (Stereo):	50 dB
Output Level:	+25 dBm
Distortion:	0.3% max. (amplifier)
Price:	$1,091 Model PM-1 Mono Playback
	$2,600 Model RPS-1 Stereo—Record/Play
	$2,000 Model RPM-1 Mono Record/Play
	$1,399 Model PS-1 Stereo Playback

*Model PM-1 mono playback.
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EDITORIAL

Our 1983 Wish List

JANUARY IS USUALLY THE MONTH for examining the coming year and outlining the critical challenges and problems ahead. And *BM/E* is no exception. If there is a single theme that emerges from the interviews comprising this month's cover article, it seems to be that 1983 is going to be a difficult year—a year for testing the skills and creativity of management and engineering. On the whole the feelings expressed by the industry leaders are upbeat, indicating that broadcasters will make it through the recession in good shape.

But there are nagging problems besides the economy that could hamper industry performance. If we had a New Year's wish list, here are a few of the problems we would like cleared up. We wish that:

- Somehow the competing manufacturers would settle through SMPTE a standard small-format ENG recorder-camera format and the major potential users would cut out playing politics with this issue.
- The FCC would modify its rigid dedication to "the marketplace" and recognize its responsibility in setting technical standards.
- Multichannel television would become a reality, with the EIA committee finally hammering out a transmission standard.
- A single worldwide digital audio format would be decided upon.
- The industry would define high definition TV so that orderly development and implementation can go forward.
- Congress would take the bull by the horns and rewrite the Communications Act of 1934 to reflect the profound changes in the industry and the need to legislate deregulation.
- The uses and impact of DBS would be sorted out so that broadcasters, cable operators, and the public could get a clear picture of what this service promises.
- Television broadcasters and teleproduction facilities would speed up their movement toward higher-quality audio.
- Costs of satellite delivery systems would decline to the point that every broadcaster can afford to install an earth station.
- The many groups that run trade shows would critically evaluate, first, if attendees who attract the exhibitors get adequate access to the displays and, second, if the exhibitors who pay the freight get even-handed treatment.
- For AM stereo, we wish that *BM/E* could this year report a marketplace decision.

How much of this wish list will come to pass? The answer to this question is what makes covering this industry continuously fascinating.

Harrison TV-3

STEREO TELEVISION CONSOLE

TV-3 is the only television audio console that provides production facilities and signal-performance specifications which match your high standards of video production. It incorporates virtually every function and feature requested by a wide range of surveyed teleproduction clients.

Eight stereo groups, a versatile separate multitrack-interface section, VCA input grouping, and automation make TV-3 the perfect console for all audio production, post-production, and master control applications.

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THE REMARKABLE VPR-3.

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Harris, Chyron Announce Major Graphics Agreement

Reflecting the continuing demand among TV broadcasters to increase the versatility of existing graphics systems rather than adding new hardware, a major agreement between Harris Video Corp. and Chyron Corp. will make the Harris IRIS II digital still store available with an internal Chyron character generator/graphics package.

The add-on module, priced at only $12,500, converts the IRIS keyboard into a character generator mode and converts the IRIS computer for character generator use; no extra hardware at all is required for the Chyron addition.

Information on the stills for both on-air captioning and library storage is filed on a separate computer disk, then accessed simultaneously with the picture. In another mode, the system can be set to automatically format data such as player names and states; the operator simply compiles a list of data, which is inserted into the correct format when picture and caption are called up. In essence, a station or facility with the new system can completely free an existing character generator from on-air or post-production captioning tasks.

In a related move, Harris announced the sale of four still store systems to the ABC network—two intended for WLS, Chicago, and two for KABC, Los Angeles. The deal, valued at $500,000 ("with more to come," according to a Harris spokesman), includes two of the brand-new IRIS/Chyron combination units.

Motorola AM Stereo Gets Delco's Nod for GM Cars

After analyzing the results of more than two months of tests, auto radio receiver manufacturer Delco has counseled General Motors' car divisions to install Motorola AM stereo receivers in their new cars.

AM stereo contender Harris Corp., which had participated in the Delco tests, said it was "disappointed" at the Delco move, but claimed, "Although it is important, the Delco announcement is not a decisive factor in the AM stereo marketplace and will not cause Harris to alter its plans." Harris suggested that the wide bandwidth of the Motorola system could require broadcasters "to eliminate or severely limit the use of preemphasis to stay within the FCC limits on radiation" and could cause distortion in current AM receivers.

Although GM had not issued an official reaction at press time, David Hudgens, news relations manager for the company's Buick division, said, "Our position has been that we are going to offer what the customers want, just as we did years ago" when FM's popularity grew.

Three AM stereo proponents—Motorola, Harris, and Magnavox—participated in the Delco tests, which took place at WIRE, Indianapolis, from August 2 to October 10. Each system was bench- and field-tested for three weeks, with representatives of each company invited to witness their systems' trials. Three other companies with AM stereo systems, Kahn, Belar, and Fisher, chose not to participate.

Engineer Keith Schultz installs Delco-GM receivers and AM stereo decoders (on seat) in 1982 Cadillac Seville for AM stereo field tests.

"We clearly believe Motorola is the preferential system," Delco spokesperson Marilyn Grant said. Final decision on whether the stereo systems will go into GM cars will await the results of marketing surveys, Grant explained.

Copyright Compromise Bill May Lose Senate Battle

As the 1982 Congressional session drew to a close, chances looked slim that the cable copyright bill passed by the House, HR 5949, would clear its hurdles in the Senate.

The bill, a compromise worked out primarily by NAB, NCTA, and MPAA, put no limit on importation of distant signals by cable systems. It codified the FCC's must-carry rules, with the provision that signals not covered in the current rules—including LPTV stations, drop-ins, and DBS signals—may not be included in the must-carry list.

Smaller cable systems, those with 36 or fewer channels, would have had relief from must-carry pressure under a provision allowing them to delete any station that does not receive a one percent share of local noncable homes or a two percent share of all local homes. An exception—designed to placate religious broadcasters—required the smaller systems to carry up to three educational stations, allowing the systems to delete duplicated network signals if necessary to squeeze in the noncommercials.

Meanwhile, the NAB praised the Copyright Royalty Tribunal's decision to raise cablers' copyright fees for distant television signals. As a result of the decision, said NAB president Eddie Fritts, "stations will be compensated more in line with what our programming is worth for at least some of the distant signals being imported by cable systems." The higher fees, however, may result in some multiple system operators dropping some of their distant figures to keep costs down, and NAB and NCTA have asked the Senate to amend HR 5949 to stay the CRT ruling.

Western Cable Show Outlook: Back to Earth

A downbeat cable industry gathered in Anaheim, CA, for the recent Western Cable Show, November 17 to 19. What excitement there was centered not around programming, as is usual for the show, but around hardware. The convention followed immediately after the annual meeting of the National Cable Television Association, leaving cablers tired after a busy "cable week."

After returning from the show, the cable industry was caught by surprise when Gustave Hauser, chairman and chief executive officer of Warner Amex Cable Communications, an-

WHY MITSUBISHI

No noise and perfect reproduction are expected from a digital recorder. But the performance of the Mitsubishi X-80 digital recorder at Fantasy Studios is why you should investigate owning this one.

As you've already heard, digital is big news. In fact, Roy Segal compares digital with the introduction of magnetic tape, and the advent of the transistor. And that's pretty good company.

Roy puts it this way. "Digital will supplant analog, period. It's simply a question of when. Recently, I AB'd the Mitsubishi X-80 in my own studio and for me the time is now."

No wonder. With a 35 db increase in S/N ratio, the total absence of hiss and added noise, and an uncanny ability to reproduce the dynamics of original performance, the Mitsubishi X-80 comes about as close to perfection as our greatest minds can take us.

But there's more to this machine than meets the ears, and that's why we went to a man who has been in the audio engineering business for 34 years.

"In a little over a year, we've made 24 albums direct from digital. And like anything else, a proven track record is the best reason to buy."

Roy Segal
Executive Vice President
Fantasy Studios

Roy Segal did not accept any compensation for this endorsement.

"We chose the X-80 because it's a natural extension of the analog recording system." It uses 1/4 inch tape. It has a traditional open reel format. And it's the only digital machine that's designed for good old razor blade mechanical editing.

But what Roy likes best about the X-80 is this: "When you consider the quality, the reliability and the price of this machine, it's totally cost effective."

When Fantasy Studios produces a digital master on the X-80, the record companies can make disc lacquers directly from it, and make as many first generation analog masters as they require. The end product sounds better. It sells better. And the artists come back to Fantasy Studios.

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nounced his intention to step down. Hauser's stated objective was to follow some private business opportunities in electronic communications, and the company has denied that its financial situation—in the red and still losing—had anything to do with the move.

Reasons for the less lively atmosphere at the show varied with the observer, with many citing the sluggish economy and others the dearth of of programming. The large exhibit space—over 50 percent larger than the previous year—made the floor traffic seem lighter than it actually was, some argued.

Still, it was the exhibit floor that provided the real news of the convention. General Electric's display centered around Comband, its system for compressing two TV signals onto a single cable channel, effectively doubling a cable system's channel capacity. To the disappointment of cable engineers, however, the company didn't have a working system at the show, and Comband won't be ready for industry use until next year.

Zenith Radio, another exhibitor, showed its Z-TAC addressable converters, which the company says can be adapted for teletext reception with an add-on decoder. Other exhibitors familiar to the broadcast market included Scientific-Atlanta, Microdyne, Hughes Communications, and Blonder-Tongue Laboratories.

Cable systems looking for survival in a tough market must emphasize solid local service to customers, warned Daniel Ritchie, head of Westinghouse Broadcasting and Cable, Inc. Caution was also the keystone of an address by Anne Marie Hutchison, chairman of the show's host organization, the California Cable Television Association. Hutchison warned her colleagues that they must develop "some restraint and a sense of reality" if they want to avoid the full impact of the recession.

Three-Year Rule Dropped In Ownership Review

Stating that a free-market environment for station sales will promote broadcasting in the public interest, the FCC has repealed its 20-year-old "three-year rule" and trafficking policies. The rule, originally intended to prevent speculation, had required broadcast licensees to hold a station for at least three years before seeking to sell or transfer the license.

In lifting the restriction, however, the Commission mandated that the initial licensee of a new station must operate the station for at least one year, if the license has been granted through a comparative hearing. The Commission also retained rules prohibiting the transfer or assignment of a construction permit for profit.

The move is a significant step in the FCC's review of its ownership policies, adopted at a time when scarcity of available spectrum was taken for granted. Shifts in viewpoint over the past year, spearheaded by commission chairman Mark Fowler and other Reagan administration appointees to the FCC, have led to a marketplace-oriented philosophy that has shaken the FCC's entrenched regulatory stance.

Fowler was jubilant at the action, which he termed "a true blockbuster in the unregulation process." Commissioner Mimi Weyforth Dawson concurred in most aspects of the decision, but disagreed with the one-year holding requirement, which she called "additional regulatory baggage" that "simply bears no relationship to the theoretical promises exacted from a comparative winner in the hearing process."

CEI 310SP: Innovation by Panavision

The 310SP represents a new generation of electronic features that provide both the "film look" of electronic cinematography while delivering unmatched performance in a video production camera. **All this at a purchase price that's very easy on your budget.**

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- In-band and out-of-band detail enhancement provides finer detail without signal-to-noise loss
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- Microprocessor featuring automatic pedestal, centering, size, white and black balance, interactive viewfinder displayed adjustment procedures
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CNN Leads Nets in News, Turner Tells Agency Reps

"We have taken news leadership away from the other three news networks," crowed a jubilant Ted Turner, addressing an audience of several hundred ad agency executives at a recent New York luncheon. Turner based his claim on the result of a survey, conducted for Turner Broadcasting System by Burke Marketing Research, that indicated cable viewers preferred CNN Headline News over other news sources.

When Turner tried to duplicate the survey results with an informal handcount of luncheon attendees, however, hardly anyone in the audience claimed to like CNN better than network news. Turner's explanation was quick: "You're trying to justify your inefficient buying," he told the laughing agency personnel.

The Burke survey, conducted last October, was designed to measure cable subscribers' perception of CNN Headline News in relation to the competing Satellite NewsChannels, a joint venture of ABC and Group W. When asked which service they would most like to receive, 64 percent of the 371 subscribers polled named CNN Headline News and 36 percent named SNC, according to Turner. In another question, the respondents were asked to compare CNN Headline News and SNC to network news programs. CNN was rated better than the nets by 55 percent of the sample, with only 35 percent considering SNC better.

Two other Turner-commissoned surveys, conducted by Opinion Research Corp. of Princeton, NJ, showed cable subscribers rating Turner superstation WTBS and CNN as "very valuable" or "somewhat valuable" more often than HBO, WGN, or ESPN. According to Turner, current Nielsen reports show CNN in 20 percent of all U.S. households. The headline service now boasts 130 TV station affiliates and 50 radio affiliates, Turner said.

Turner talked briefly about his proposed "fourth network," which he said won't be launched before spring of 1984 at the earliest. Early meetings with program suppliers have gotten a "pretty good reception," Turner claimed, and the company is now involved in one-on-one negotiations with film companies. "We're seriously negotiating for the entire rights for baseball—the whole thing," Turner boasted.

Another Digital Format Heard from at AES

Massachussetts audio manufacturer dbx has thrown its hat into the digital audio ring with the introduction of a new, low-cost processor. Unveiled at the AES Convention in Anaheim, CA, the Model 700 Digital Audio Processor will sell for under $5000—a price dbx believes will make digital technology affordable for virtually any recording studio.

Instead of the linear pulse code modulation technique espoused by Sony and others, the dbx processor uses companded predictive delta modulation (CPDM), which accounts for the low price tag. The CPDM processor promises a dynamic range of 110 dB or better, compared with 90 dB for the 16-bit PCM processors, says dbx.

In delta modulation, the numbers produced by the analog-to-digital data converter represent differences between successive sampled voltages, rather than the instantaneous voltage of the input signal at each point of time, as used by a conventional PCM audio processor. However, delta modulation has a dynamic range of only about 55 dB.

Now getting the hot story live is as easy as calling home. The SM82.

Sometimes a story breaks so fast there's practically no time to set up lines of communication. Knowing that, Shure has developed a microphone to keep both you and the story well covered.

The Shure SM82 Cardioid Condenser Microphone. It's the only line-level microphone tough enough for the rigors of day to day remote ENG broadcast assignments. And all your crew has to do is just patch it straight into the transmitter connection of the nearest telephone... call your station, and they're home free. Or, it can be connected directly across a dialed-up phone line. No separate amplifiers, limiters, or line-level adapters are necessary.

Just as important, the SM82 is ideal for assignments involving very long cable runs (up to one mile without equalization) typically encountered when covering sporting events, parades, and political rallies.

While electronic news journalists will appreciate the SM82's extended reach and exceptional balance in hand-held situations, you'll love its low mechanical handling noise, rugged construction and reliable operation over a variety of temperature, humidity and wind conditions.

Its built-in limiter kicks in at 100 dB SPL, preventing overload of the microphone's internal line amplifiers.

The SM82 utilizes an internal battery or it can be externally powered by an optional PS1 power supply or equivalent. For added security, it automatically switches to battery power if its simplex source should ever fail.

If you're in the broadcast operations ENG/EFP business, you know there are lots of ways to get a live story—even more ways to miss one. Now, with the SM82 on the scene, it is simply a matter of calling home.

For more information on the complete line of professional broadcast products, call or write Shure Brothers Inc., 222 Hartrey Ave., Evanston, IL 60204, (312) 866-2553.

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To eliminate this shortcoming, senior project engineer Robert Adams and his team came up with two unique circuits—linear prediction and precision companding.

"The linear prediction circuit estimates a signal's future by monitoring its recent past history," Adams explains. "It does this 700,000 times a second. In addition to avoiding audible noise modulation effects, the circuit is responsible for increasing the dynamic range of the basic delta modulator from 55 dB to 70 dB."

The remaining dynamic range increase results from the precision companding circuit, which features a direct digital link between encoder and decoder, thus eliminating any possibility of mistracking. The dbx system differs from adaptive delta modulation (ADM) in two ways. In ADM, step size is varied to follow the signal. The dbx converter uses a precision compander in which the signal itself is varied with a voltage-controlled amplifier to avoid overloading a fixed delta modulator. And the dbx delta modulator has the linear-prediction filter, which relies on the history of the audio signal to predict the future.

Teletext Systems Move to Satellite Delivery

Satellite technology met teletext head-on in two recent developments in the text delivery area. Launched late last fall, the Keyfax National Teletext Magazine is billed as the first national teletext service in the U.S. Keyfax, a joint venture of Keycom Electronic Publishing and Satellite Syndicated Systems, Inc., started as an experiment over WFLD-TV, Chicago, more than a year ago. The service is delivered in the vertical blanking interval of superstation WTBS and distributed to cable operators over Westar 5. Officials for the venture say almost 70 cable systems had signed up at the launch date.

The second development is the formation of Satellite Network Delivery Corp. (SND), funded by the Tribune Co. SND, which will use broadcast teletext technology to distribute information to business users, plans to sell 100 channels on its satellite-based system to information providers such as brokerage firms and publishers of financial newsletters. The information providers, in turn, will sell their services to end users. Information will be sent by satellite to a network of approximately 150 receive only earth stations in the continental U.S.; "last mile" distribution will be over television transmitters.

A second venture of SND will be T-SAT, a transmission service that will deliver spot TV commercials and syndicated programs in digital form to stations and cable systems in the top 100 markets. Material will be converted to digital at a control center, transmitted to a selected station in the destination market, and there reconverted to analog form and delivered to the end user on videotape. A computer at the control center will give advertising agencies—T-SAT's customers—full control over the routing of their material.

According to the company, both services will begin test operations this spring. Full operation is expected in about another year.

In another teletext development, a newly formed French company, VS-Videographie Systeme, has announced its intention to seek a foothold in the U.S. videotex/teletext market. The company, 51 percent owned by Thomson-CSF, will also operate a U.S. subsidiary, Videographic Systems of America, headquartered in New York.

Outstanding Outdoors

Camera location 3 behind home plate is no place to tear down a camera. Especially if the director wants to punch it up on air to catch the next pitch. That's just one reason why the rock-steady, works-every-time HK-357A is an outstanding choice for production in the field.

Beyond its reputation for legendary Ikegami reliability, the HK-357A has a lot more to recommend it as the ideal field camera. For example, its crisp, high resolution picture, signal-to-noise ratio of better than 53 dB, and superb colorimetry.

What's more the camera really shows off when it's time to set up. Use of the optional microprocessor control brings into play Ikegami's Emmy award winning (1980-1981) digital techniques for automatic setup. Simply press one button and the computer automatically refreshes all set up and registration adjustments in about 45 seconds. No chip charts blowing in the wind, no tweaking. Just unpack, plug-in, auto-setup, and shoot.

Hook up is a simple matter too. Choose the triax option and you can position the camera as far as a mile from the van with absolutely no compromise in picture quality as compared to multicore. And for versatility, our triax camera interfaces with TV-81 multicore at the flip of a switch.

Field test an HK-357A to see why Ikegami is the choice of so many networks, major market stations, and independent producers

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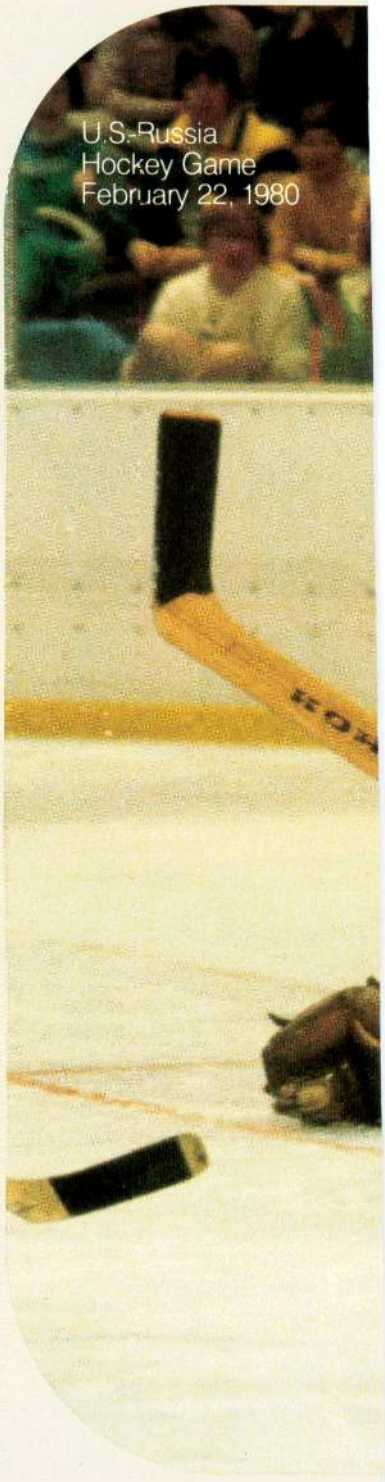
Circle 112 on Reader Service Card

IF IT WERE YOUR JOB TO GET THIS ON TAPE, WHAT TAPE WOULD YOU GET IT ON?



It's a complete mismatch. A collection of college amateurs together for only a couple of months against the equivalent of the Russian professional all-stars, a team that has dominated world hockey for a decade or more, a team that has recently embarrassed the NHL All-Stars with a 7-2 exhibition victory. But in the end, the amateurs win in a dramatic showdown for all the world to see at a time in world politics when a victory really counts.

America, like most of the world, will see the game on tape, recorded and broadcast by ABC-TV. In fact, many of the events at Lake Placid will be broadcast and rebroadcast to the world on tape under the most demanding time and temperature conditions. It's a one-chance situation all the way and the stakes are always high.

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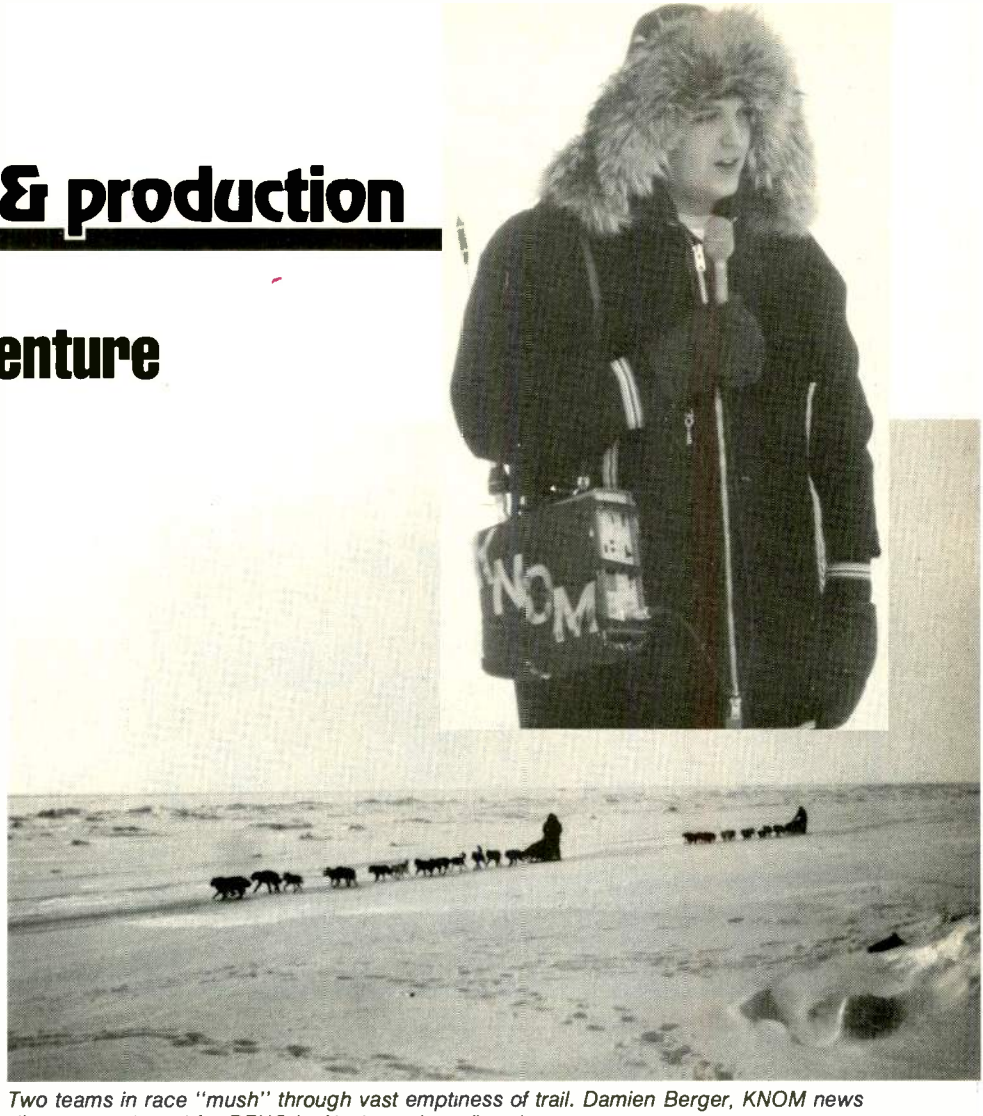
RADIO programming & production

Alaskan RENG Adventure



Two teams in race "mush" through vast emptiness of trail. Damien Berger, KNOM news director, equipped for RENG in Alaskan winter (inset).

THE BROADCASTER who undertakes to cover live the Iditarod Dog-Sled Race, run each year in March from Anchorage to Nome, AK, needs a crew with physical stamina and plenty of Arctic-style clothing, in addition to technical proficiency with RENG equipment. The trail is 1049 miles long, and good average time for the trip is two to three weeks.

KNOM-AM, in Nome, has covered the race for ten years, lately feeding the live account to 36 other stations throughout Alaska and western Canada. Tom Busch, general manager of KNOM and president of the Alaska Broadcasters Association, says the first problem is to get to Nome a running account of the start near Anchorage, 500 airline miles away. But then reporters have to get out on the route, and give interim reports with the actuality and color of the event. This could be covered comfortably from aircraft flying overhead, but it would not satisfy the need for close-up eyewitness and verbal contact with the participants, to capture the reality and excitement of the race.

Ten years ago, Busch points out, the route was considerably more primitive than it is today. Ham radio and widely scattered and unreliable telephones in some villages were the only links from the route to KNOM's studios in Nome.

Back then the remote crew had old VHF radio equipment for shorter hauls near the end of the route, but had to perform feats of tenacity and ingenuity to get their reports back from the earlier stages. KNOM became famous in the area because of this coverage.

Today, says Busch, thanks to satellites, there is high-quality long-distance telephone service in many villages not too far from most sections of the race. There are no roads linking Anchorage and Nome, but there is plenty of air traffic.

"Today, all one needs to cover the wilderness part of the race is a rugged reporter, a cassette recorder with clip leads, and plenty of Arctic-style underwear," Busch says.

The reporter goes by plane to a landing as close as possible to one of the checkpoints (if the weather is fit for flying) and gets two- and three-minute interviews with the "mushers" who come through. Then he gets as best he can to the nearest town to telephone his story and the "actualities" back to Nome. Obviously, this is all easy only by comparison with the earlier, more primitive days; nothing is easy outdoors in Alaskan winter temperatures.

The KNOM crew has developed such skill in the enterprise that their reports in recent years have been picked up by Mutual and AP radio, as well as many other stations in the area.

The race start in Anchorage has problems of its own. Because of last-minute alterations in snow conditions, the actual start must often be shifted from the originally chosen spot with as little as two days' notice.

At the start

In Anchorage, KNOM ordinarily reserves a special line from the local telephone company a month or so ahead to get the signal from the starting scene to Nome. If there is a last-minute shift, the phone company must move very fast, and Busch emphasizes that maintaining excellent telco relations has been important.

Another variable is the talkback route. Close to the city, it can be established through a local station that carries the race. Further out, however, the KNOM crew must rearrange its equipment to make a talkback channel.

Overall, stresses Busch, careful planning and flexibility are essential: "It really pays to develop a clear overall concept of what you are trying to accomplish . . . think it through to conclusion and put all your ideas on paper. Make flow charts—examine your options . . . ."

Starting lineup

The basic plan at the start is usually for a remote master control point, with roving RENG-equipped reporters. For this the station has four VHF transceivers on 153.230 and 161.760 MHz: three Regency voice-grade units and a Marti broadcast-quality RPT-40. One base receiver, powered by ac or a 12-volt battery, serves all.

There are also two handheld transmitters, a Marti RPT-1 and an RPT-2, on 450.050 and 450.250 MHz. Other units are a Shure mixer, a handful of RE-16 Electro-Voice mics, and a pair of Bearcat scanners. Although it hasn't been necessary so far, the crew, says Busch, could quickly put together a re-

peater to get the UHF or VHF signal back.

The crew's checklist for the job includes every conceivable piece of equipment and connecting gear. "Overplan," say Busch. "If you forget an important connecting cable, you have had it!"

Master control has lately been in a heated building, Settler's Bay Lodge, about a half mile from the start. UHF and VHF whips and Yagis are taped to upstairs porches, poles, and tree limbs. Outside, the starting line reporter is on foot (with the temperature likely to be 20 degrees below zero or worse), carrying the 1 W UHF transmitter and a pocket scanner. A second roving reporter is in the dog-handling area, in a good position to interview the mushers before they go over the starting line.

The two reporters transmit to the anchor on different frequencies. The UHF receiver is normally used at the starting line, at the frequency of 450.050 MHz. A scanner receiver is set to the other frequency, 450.250 MHz. It alerts the operator that the second reporter is ready to talk. The anchor waits for a pause in the action, tosses in a little color information, pots down the first reporter, and cues the second one in.

Environmental extremes

Keeping equipment warm is one of the special requirements of the operation. "In the past," says Busch, "we have found battery life to be a real problem. For example, the batteries in the 1 W UHF units are rated for two to three hours at room temperatures. Drop to 20 below, and you can count useful transmission time in tens of minutes."

KNOM tried for years to beef up battery life with heavy auxiliaries, for example by putting 4.5 amp-hour gel cells inside the operator's parka. But the cold, says Busch, makes the management of heavy outrigger batteries and cables very difficult.

A solution was found: styrofoam-insulated boots for the Marti transmitters, complete with inside pockets that are tailor-made for catalytic handwarmers. The boots are sealed with Velcro, to form simple wrap-around coats.

"With the boots on, the front panels of the transmitters may get frosty cold but it's above freezing where the batteries sit," says Busch. "The result has been full battery life, even in the coldest weather the Alaskan bush has thrown at us."

Busch concludes: "Modern gear is making this kind of coverage increasingly easy. Accomplishing a remote like the Iditarod gives you a satisfaction you can taste. And it makes everything you do at home seem easy. **BM/E**

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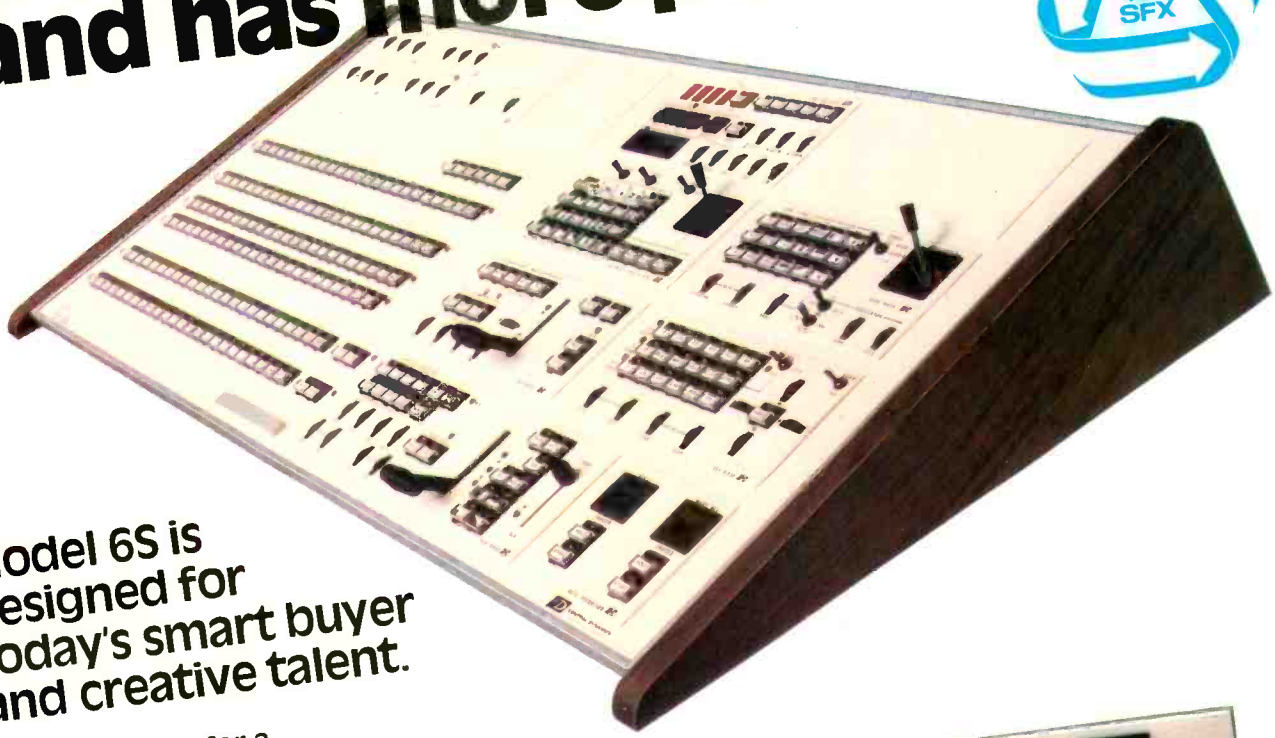

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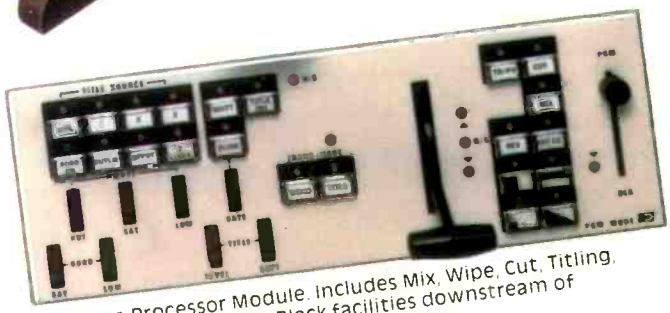

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Cable Programming on the Assembly Line

MOVE OVER, HENRY FORD —mass production is about to hit the television programming industry. The Program Factory, a soon-to-be-built facility in Nashville, TN, is designed with the aim of turning out 1500 shows a year for the cable TV market.

The Program Factory is the brainchild of F. Roger Muir, president of Nicholson-Muir Productions, Inc., a teleproduction company based in New York City. (Muir describes his partner, Nick Nicholson, as "the creative head of the company. I'm the nuts and bolts man.") Muir's long experience in producing cable programming, much of it for the less affluent Canadian market, taught him the benefits of cost-effective operations.

The idea for The Program Factory took root a year and a half ago when Continental Broadcasting Network, the secular arm of the Christian Broadcasting Network, asked Nicholson-Muir to develop some game show ideas to run alongside Continental's soap opera, *Another Life*.

"Down at CBN," Muir relates, "we developed the idea of producing different shows in the same studio. We'd do soap operas for half a day. Then, in the afternoon they'd roll in the game set and we'd produce the game show with a separate audience. The game show was eventually dropped, but the idea ticked away in my mind."

No overtime

Muir decided it would be a good idea to set up a well-designed production facility, with all technical and program personnel (except for major talent) on straight salary year-round, working a 40-hour week with no overtime. Sets would be built on casters so they could be rolled in and out for different shows, and lighting would be computerized for quick setup.

"Building from scratch and setting up an ideal facility," Muir continues, "we found that we could turn out something in the vicinity of 1500 shows a year. Even with a multimillion dollar operation, the cost per show would come in well within the reach of cable people."

Basically, the Program Factory plan is to produce "formula" shows, such as game shows (an N-M specialty), on a mass production basis, with a different audience each morning and afternoon. An average of three shows will be produced in front of each audience. Mark Ball of Scene Three, Inc., the Nashville production company that is Nicholson-Muir's partner in the Program Factory joint venture, explains the setup:

"One unique element of The Program Factory," says Ball, "is that it will be designed so the general public will have free access to the seating to watch a show, but not to the technical areas." Poor audience access has been a problem in several facilities Nicholson-Muir has used. To encourage audiences to attend and enjoy the shows, the plant, scheduled for September 1 operation, will be equipped with good parking facilities and comfortable seating. It will also include areas set aside for interviewing potential contestants.

Two production areas

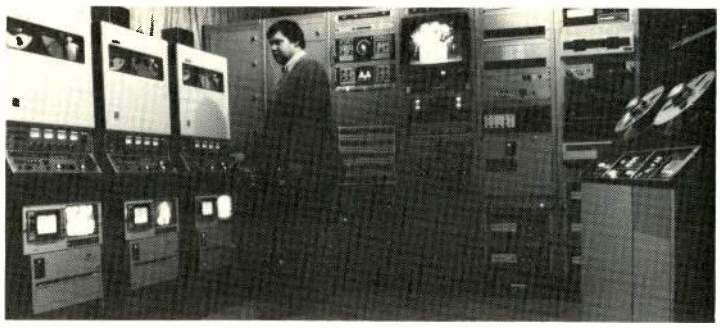
Although final design must wait for the land acquisition to be completed, Ball is able to give a good idea of what the facility will be like. The building will have two stage areas—a principal stage 100 feet square, where the show programming will take place, and a secondary production area, 60 by 40 feet, for production of inserts and other smaller-scale items.

A particularly important feature of the new facility is the prop storage area, which will measure 80 by 60 feet. To speed set changes, the sets will never come down—they'll just roll in and out. "It will be handled in such a way that it's almost like filing file folders," Ball explains. "The sets will go into their places and wait, and when their time comes they'll be rolled in and put in position."

After a search that took him to such locales as Miami, Dallas/Ft. Worth, Omaha, and Chicago, Muir settled on Nashville as the site for The Program Factory. One reason was the steady flow of people from all over the country, essential for producing shows in front of audiences. Besides, Nashville was the home of Scene Three, which had collaborated with Nicholson-Muir on a previous project, *The Shopping Game*.

In order to get up and running as soon as possible, the first stage in establishing the new Nashville facility was to acquire a $1.5 million tractor-trailer put together by Scene Three. According to Mike Arnold, Scene Three's chief engineer, the 45-foot semi was built by Matlock Trailers in Nashville, with interior work done by a number of local subcontractors. All the engineering, however, was performed by Scene

At Scene Three's current facility, one-inch video edit suit features a CMX 340X editing system and two-channel Vital SqueeZoom.



CE Mike Arnold operates one of the RCA one-inch VTRs in Scene Three tape room.

Three's staff. The six-camera truck is set up for all one-inch production, as the permanent facility will be. Its flexible setup allows the exact complement of cameras and VTRs to vary according to need.

The four VTRs, Arnold says, are a combination of Sony BVH-1100As and BVH-500s. Cameras are Ikegami HL-79s and HK-302 studio types.

Graphics come from Scene Three's Chryon RGU-1 graphics unit, which was recently updated to the RGU-2, introduced at the last NAB show. The production switcher in the truck is a new Grass Valley 1680, also newly introduced at the 1982 NAB. Arnold says Scene Three is "really excited" about being one of the first to have a 1680, which features such capabilities as downstream keying on each mix/effects unit and an improved effects package including soft bordered wipes.

Routing equipment will be by Utah Scientific, with 30x20 routers (the initial configuration will be 20x10) giving the director the capability of simultaneously feeding the VTRs switched program feed and up to three switched isos.

Stereo audio capability

A major design consideration in the truck, Arnold points out, was full stereo audio capability. "I think that's something that really is important to consider with the advent of multichannel audio for television, particularly in light of the fact that the programs we'll be producing will be targeted toward cable," Arnold asserts. "It's very likely that a lot of the cable facilities will have stereo capabilities before the FCC approves stereo audio for broadcast."

To that end, Scene Three specified some sophisticated audio equipment for the truck. The console, built by Harrison Systems, was exhibited at the recent AES show before delivery to Scene Three. It is, of course, fully ready for stereo. Its 28 inputs, according to Arnold, can be any combination of mics or stereo line level inputs, and unlike the typical television console, it has eight stereo groups. Signal-to-noise specs and overall performance are "close to state-of-the-art," Arnold glows.

Another advantage of the board, Arnold says, is its exclusive use of voltage-controlled amplifiers instead of conventional faders, a boon if Scene Three decides—as it may in the future—to equip the console with an automation system.

Normally, the truck doesn't carry a multitrack recorder, but if one is required Scene Three rolls in its Studer A80 eight-track, which is configured so it is expandable to 24 tracks. The truck's usual ATR collection includes a

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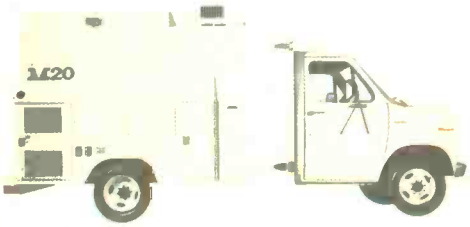

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Revox PR99 two-track machine and three ITC stereo cart machines.

"The cart machines are really a necessity for game show production," Arnold explains, "because you've got a lot of sound effects, laughter and things like that, which have to be rolled in on cue. About the only effective way of doing that is with an audio cart machine. The truck is set up with three dedicated units available and we have another three units in-house that can go in if need be."

Other audio gear includes a small echo unit (the company hadn't determined what kind at press time). A pair of dbx 165 limiters provide protective limiting of the output. ("The headroom and dynamic range of the console are so much greater than one-inch tape," Arnold says, "that we like to have something to protect us from the screamers.")

Setting up the audio side of the truck, Arnold admits, "is a real task for someone who's involved in the video end of things a hundred percent of the time. For us, audio on this scale is something we hadn't handled in the past. So it's been a real learning process."

Shows produced in the Program Factory truck will be edited back at Scene Three's post-production facility, equipped with a CMX 340X editing system interfaced to BVH-1100A one-inch machines and RCA TR-600 quad VTRs.

Emphasizing pictures

Scene Three's Mark Ball, chairman of the Program Factory enterprise, says the layout of the truck fits in with Scene Three's philosophy of operations.

"We place a lot of emphasis on the pictures, and we have a way of de-emphasizing the technical part of producing video," Ball comments. "In a lot of editing rooms you feel like you're in the cockpit of an aircraft or a spaceship. The pictures are almost lost in all of the buttons and electronic gear. We have tried to create an environment where we're comfortable and where we're primarily aware of the pictures."

Elaborating on the layout of the truck, Arnold explains that "it's not by any stretch of the imagination radically different. But I think we've allocated a little more space for the producer and director and client than is typical in the popular sports-type trucks. We've been able to take advantage of the fact that we don't intend to do sports production and optimize it for the program production and multi-camera to multi-tape machine situation."

The truck was scheduled to be completed in December, but Ball says it won't go into commercial use until this month. First, he says, it will go on several music-related shoots on a sort of shakedown cruise.

Once the truck is fully tested, production will begin on the first Program Factory show—a 90-minute special spun off from the old *Howdy Doody* series. If the special is a success, it may turn into a series; in any case, Muir and Nicholson have a number of game show and other format ideas up their sleeves.

Muir expects a good response to Program Factory product. *The Shopping Game,* designed for a Nashville company called American Video Shopper to sell products over the air, got an excellent response from cable systems, according to Muir. His advance testing of the market—not only cable, but also satellite networks, independent stations, LPTV operators, and DBS operators—has demonstrated plenty of interest, he says. Once The Program Factory gets rolling, it should be able to provide plenty of fodder for a product-hungry industry. **BM/E**

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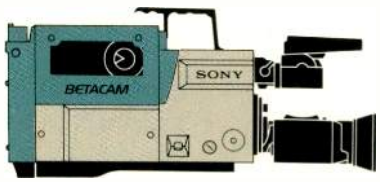
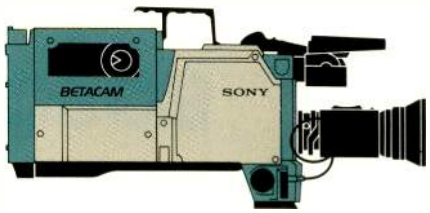
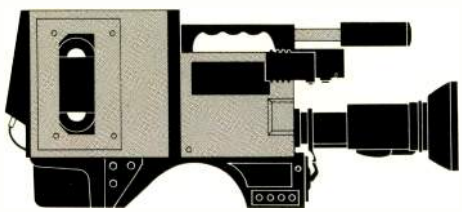
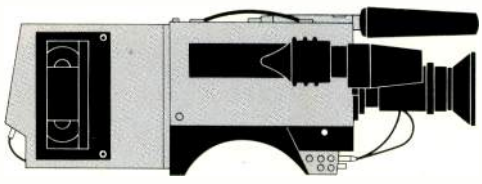
One Tube 	17.8	14.9
Three Tube 	21.9	17.1
Three Tube 	24.7	17.5
Three Tube 	27.6	21.5

*Includes camera, lens, viewfinder, recorder, battery. †Lens excluded. **Camera, lens, battery, battery charger, recorder, playback unit.

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27	58	Lum 47 Chrom 48	$62,000+
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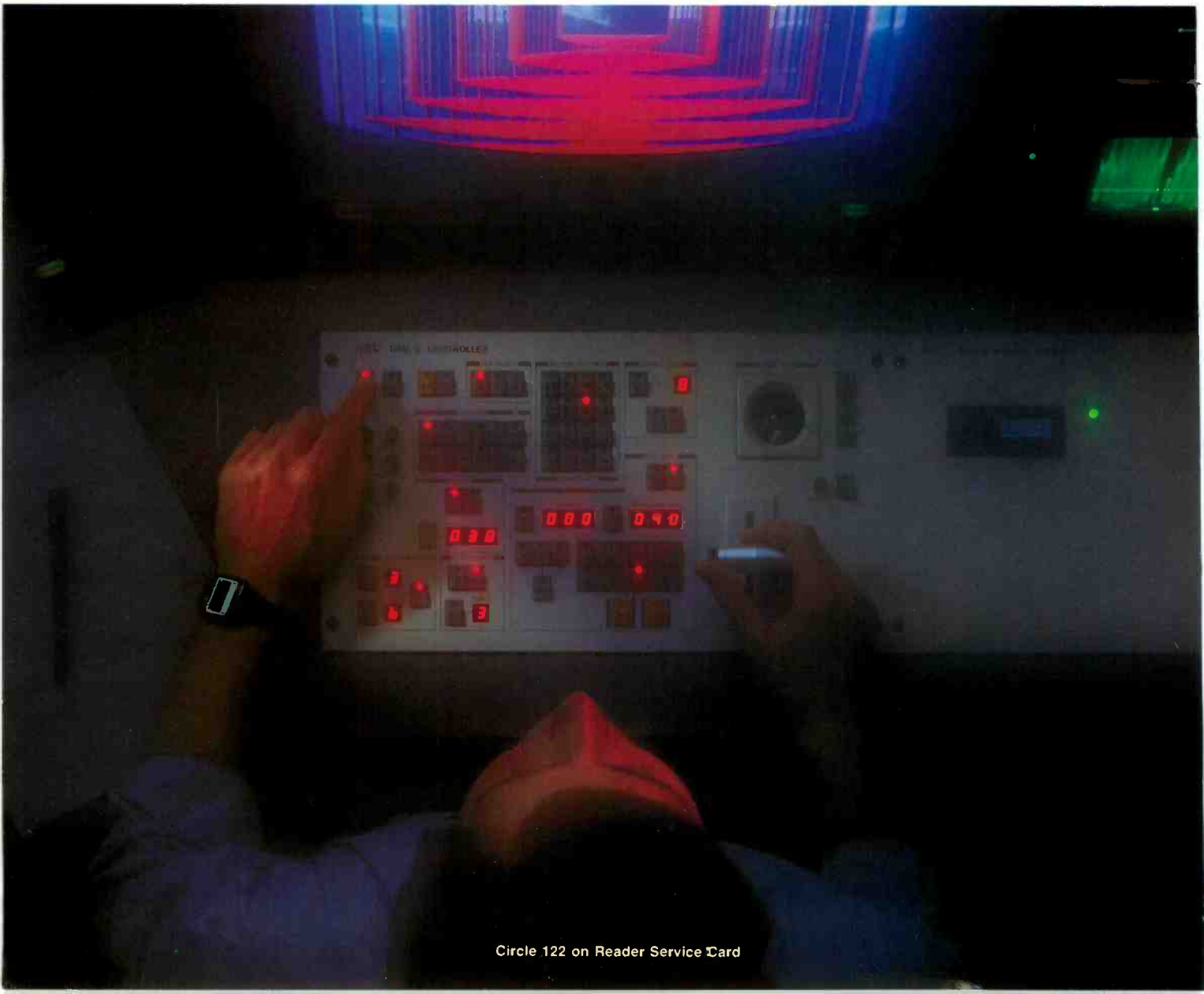

Circle 122 on Reader Service Card

Industry Leaders Examine 1983: A Tightrope to Prosperity

The pressure is on broadcasters to walk a tightrope over the recession while at the same time they must juggle the problems and opportunities presented by new competition and new technology. It's a tough act, but industry leaders interviewed for *BM/E*'s annual outlook feel confident that broadcasters will make it.

With much more attention being paid to the bottom line, industry executives look ahead with "cautious optimism." Tighter management, however, will not necessarily interfere with expansion or renewal plans. In fact, the top brass often sees investment in new technology as a means of reducing costs.

What kind of a year is it going to be? Perhaps unremarkable externally, but significant for what goes on behind the scenes. For example, ABC is rapidly gearing up for the 1984 Olympic Games. Radio networks are moving into more and more satellite distribution. Cable operators are getting ready for the impact of DBS. And the FCC will continue on its deregulation course.

Nineteen eighty-three, then, may be a year of getting ready for the next boom. And that next boom could be in 1984.

Martin Rubinstein

President,
Mutual Broadcasting System

Nineteen eighty-three, like the second half of 1982, will be a test of financial management, determination, and leadership for network radio. Those with a firm hand on expenses and the direction of a network's operations will steer a clear course through a period of economic turbulence. Those seeking to create or maintain new network services for radio stations will succeed or fail on the depth and strength of their financial resources. So says Martin Rubinstein, president of Mutual Broadcasting System.

Network radio will continue its battle to be recognized as a primary advertising vehicle, but network revenue growth may taper off as a general, national economic retrenchment makes itself felt across the industry. "In spite of general economic trends, the marketplace will still support all kinds of programming, albeit with a greater emphasis on target demographics and increasing requests for post-buy analyses and audits," Rubinstein points out.

Mutual's Rubinstein

The pace of new networks entering the marketplace will come to a virtual halt and the long-predicted "shake-

"Nineteen eighty-three will be a test of financial management, determination, and leadership for network radio."

—Rubinstein

out" will take place in direct proportion to the general economic climate. Traditional networks and instant satellite networks will be forced to examine each service with an eye to the bottom line, he adds. In a tight economy marked by rugged competition for network radio dollars marginal program services and excess overhead costs will be routinely dropped.

Some of the impetus for new programs on the network level will be in the ad dollars targeted at crucial 18-34 and 25-54 demographics. To a certain extent networks will build programming to meet a sponsor's marketing specifications—giving the client wholesale program ID and countless marketing and merchandising advantages. In addition, the Mutual executive predicts, "look for a renewed emphasis on live concerts, breaking news and play-by-play sports coverage made possible simultaneously by satellite multicasting. Look for at least one radio network to link up with a national cable TV program producer to simulcast live rock concerts."

As for program distribution, Rubinstein states, "I expect that by the end of 1983 we will see the beginning of the end for the old-fashioned use of tapes and discs as a method of distributing network programming. Using satellites, networks will feature more live events and a much greater range of program options fed numerous times by satellites.

"Multicasting will become firmly established as the expected industry standard. The leading networks will begin to experiment with multiplexing, evolving sideband technology and new refinements in high-powered amplification equipment. In a number of cases, broadcasters will look to the skies to create nonbroadcast revenue centers which may ultimately support radio networks."

Joseph Flaherty

VP Engineering, CBS Television

For Joe Flaherty, VP of engineering for the CBS network, several areas of "new technology" are an almost daily concern. One of the most important is HDTV. For Flaherty, high fidelty TV (as he prefers to call it) "is certainly not just a lot of lines. I think a very important part is the wide screen-aspect ratio. Just imagine what ordinary 525-line TV would look like on a wide screen—I think that would be worth doing all by itself. The second most important part of HDTV is improved chroma bandwidth, particularly urgent as the picture grows larger and larger. Third is the actual number of lines. And fourth is the extremely important area of stereophonic sound, which more and more is coming to mean high-quality digital audio.

"We've got to distinguish between high definition production and high definition distribution," Flaherty emphasizes. "At CBS we've been most concerned about trying to achieve a single worldwide standard for high definition production. We'd like to think that's not an unattainable goal. Because we've always had a single standard for high definition production—35 mm film, on which we can sell and exchange programs produced that way anywhere in the world. Prime time programs on all networks are produced 80 percent on 35 mm film, and that's likely to continue. But when it changes from film to electronic media, we want to preserve the high quality so that the residual value of the program is there for the producer.

"If you're going to make a major change like this, you want to be sure it will last for at least the next 25 years, so it's worth going as far as we can. I'm not sure what the

CBS' Flaherty

standard HDTV system is going to be—probably somewhere between twice 525-line and twice 625-line resolution. We have never supported an 1125-line system. In fact, we've been extremely cautious about not supporting *any* system. We've demonstrated the 1125-line system because it's the one that's available to show people what a version of high definition looks like. But I don't think that all the best ideas have surfaced yet.

"On the distribution side, we're anxious to see a standard that will be as widespread as possible—to prevent each of the distribution media from developing its own HDTV system. Some media are more flexible than others—cable, for example, and videodiscs, because they have no spectrum limitations. I wouldn't be surprised if the first HDTV application wasn't in the disc area—they could do it today if they could get consumer acceptance, because HDTV encoding equipment is already a reality and disc companies are also those which make the receivers and the large-screen projection systems. They have every positive interest in making this thing go."

Another area of vital concern to Flaherty is the digital

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"As for analog components, this certainly wasn't something which the broadcast community asked for."

—Flaherty

studio. "We've put forth through Frank Davidoff several scenarios on how we think we could progress in an orderly fashion from the composite analog to the component digital environment. It will probably begin where digital technology gives the most gain—in post-production suites, which are the heart of program production these days. This is where you build up multiple generations of tape, and where, because the suite is like an island unto itself, the flexibility of the digits buys you something. After that we can begin building back to the camera and forward to the transmitter so that eventually the lens will be the analog input device and the transmitter encoder will put it back into analog again, and everything else in between will be digital.

"So there really is no danger in introducing digital systems into the analog world, particularly in the post-production environment. But as for analog components, this certainly wasn't something which the broadcast community asked for, and I'm not sure how analog component recorders fit in. The concept was handed to us by the manufacturers who suddenly woke up one day with a solution to a problem which didn't exist before.

"If analog component systems are going to proliferate, certainly it makes sense that the components be the same as those that will eventually be used in digital coding. But it's not all clear that there is a need or a market for an interim between analog composite or digital components. We're studying this very problem now, trying to decide if the sizeable investment in equipment will be worth the anticipated gains."

As for teletext, "we only went into it because we thought it was a good business facility to be able to add to our program," Flaherty insists. "We've finished our audience tests in Los Angeles. We've announced the initiation of a national teletext service—which is only waiting for FCC approval. Most significant of all, CBS has placed a senior executive in charge of this new service. So we obviously mean business.

"I see our job in all these things as providing the tools which the creative community thinks are useful. Not all of these ideas are going to be successful, not all are going to be extremely important. But some of them *are*."

Julie Barnathan

President, BO&E Div., ABC Television

Julie Barnathan, president of ABC's BO&E division, is spending a lot of time these days preparing for the network's 200 hours of coverage of the 1984 summer Olympics in Los Angeles—much of the coverage live. "There's nothing like it in the world," he comments. "It's like a continual three-ring circus with sometimes 14 events going on at once. We're only broadcasting one image, and so one of our major priorities is communications among all the different sites. That and an extensive RF microwave system that will let our producers and directors see what's going on all over the place so they can make their split-second coverage decisions.

"This is the first time the summer Olympics have been in the U.S. in 52 years. Things have really changed. In 1932 there wasn't any television, radio was just being born, and the whole Olympics movement was questionable. In 1984 there will be eight to ten thousand athletes from 123 countries around the world participating in 22 to 24 events for 16 consecutive days. And this is our chance to show the television audience just what it's all about—

ABC's Barnathan

because television is largely responsible for having made the Games so popular in the first place. Just for openers we'll be using over 200 cameras, 279 one-inch VTRs, over 100 ¾-inch VCRs, and 35 mobile units—staffed by over 1500 technicians."

Olympics coverage ABC-style is concerned with more than events reporting, however. "We're going to treat the Olympics as a human event, not a sports show. That's why it's particularly important for us to have close-up material. You'll see a huge amount of information in advance of the Olympics on the athletes so people get to know who they are as human beings, not just as athletes. They become part of your family and you invite them into your home. To do all this we have to be extremely technically proficient—getting the close-ups, the tight shots, rather than just sticking to the safe route and staying back."

But Barnathan is concerned about other major issues, too—such as half-inch recorder/cameras. "We asked them to set a standard, and told them we wouldn't buy without one. And frankly I think the SMPTE committee has abdicated its responsibilities by throwing up its hands rather than keeping these guys talking. Unfortunately this

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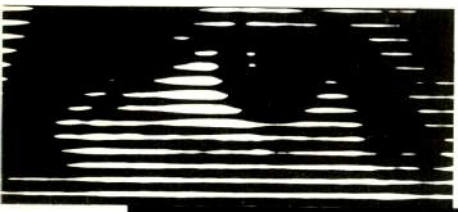

"I don't care which half-inch format ends up the winner . . . but until there's one, we're not even interested in which is preferable." —*Barnathan*

half-inch thing has become a political battle between Beta and VHS, and we're not going to let ourselves get caught in the middle of it. I don't care which format ends up the winner—VHS or Beta—that's for the engineer to decide as a practical operating manager. But until there's a format, we're not even interested in talking about which is preferable. The only exception might be for very unusual applications—such as giving a guy a unit to use while parachuting.

"We must have standards. I want to know that I can operate anywhere in the world with other broadcasters and know that if we don't all have access and only one of us can tape, all of us can use the material."

Another area of major importance to Barnathan is increased electronic graphics capability—anticipating, as he puts it, the needs of ABC's extensive news, sports, and programming production areas. "We want to work with anyone who has a new idea. We have 10 Dubner systems. We've bought an MCI/Quantel Mirage. We're working with an Ampex ADO and Chyron and Aurora. And we're still wide open for innovations—like the new Bosch 3D system that is supposed to be coming along.

"Our prime criterion is the look on the air. I won't say that money is no object in this area, but it's certainly not our prime concern when it comes to devices that create it. We're definitely going to continue our push to be the most visually exciting image around. People have learned that they can get a large amount of information in a relatively short period of time visually, and that's what we're doing. Newscasters can talk and we can display images at the same time, and in a minute and a half or even thirty seconds you can get a full story across.

"The main role of engineering is to support production of all our different divisions—including entertainment, sports, and newsgathering. But we do more than just support—we try to anticipate the needs of our users. We know what they need; we know what they haven't got; we know what they would like to have. And we try to work with them in the development of the products they need or to suggest things when we come up with them first. Engineering is still basically a service function. But we also try and lead production whenever it's desirable. But you need to have a brave group on both sides."

One thing Barnathan is insistent on: engineering and maintenance of ENG equipment falls under the jurisdiction of his engineering supervisors, not the news directors. "Having the full resources of the engineering department provides the news people with their best possible alternatives. When a special event comes along, engineering is already committed to news rather than having to bring people in just for that event. There's no sacrifice or handout—our people are always there. When the news people were using film, they could always go outside and get freelance help. But in today's electronic operation there's got to be support from inside the operation if things are going to run smoothly."

Michael Sherlock

Executive VP, Technical Operations and Services NBC Television Network

Mike Sherlock, who has been heading up technical operations at NBC only since last March, is a man posessed with an almost passionate devotion to a single idea: "improving network quality for both us and our affiliates. Trying to improve the quality of the picture our affiliates get is something we spend a lot of time on.

"There's no question that NBC needs some new EJ equipment, and we are going to be buying some this year pending the outcome of our current evaluations. We're seriously looking at recorder/cameras, but the decision

NBC's Sherlock

hasn't yet been made as to which way we'll go. We have to be very careful. Our engineering sense says that if we are going to go into new equipment, part of the change must lead to better quality—I think we differ from ABC here in that we'd like to improve the quality of our newsgathering images. The half-inch recording technology does that, and also offers equipment that is more portable than the current ¾-inch. But unless someone comes up with a standard before we make our purchase, it's going to be made with risks.

"Clearly if I am to give my news division—both the network and local stations—a piece of equipment that they are going to use as their lifeline, I have to take into

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"We broadcasters will have to bite the bullet and prepare ourselves to live in one way or another with DBS."

—Hubbard

account where they do their business. If they're in Washington covering a plane crash, they have to be able to run into the local affiliate and play back what they have recorded. If that affiliate doesn't have compatible equipment we're dead. Somehow I can't see a system where we have two or possibly three different formats in the U.S. alone."

Asked what NBC's primary technological concern for the coming year will be, Sherlock replies that the network "plans to begin satellite telecasting of its video signals sometime in 1984. It seems to us that with the rising costs of the terrestrial system and with the new technology we can get a more flexible control system and perhaps an even more reliable distribution system through satellites. We've spent a lot of time over the past nine months learning about this area.

"The only question that remains is that if we commit ourselves to going to satellite, do we go with the existing, proven technology of the C-band or do we go with the Ku-band. Ku has its advantages because there's no interference with terrestrial microwave and you can locate the dishes almost anywhere, which means you can save a lot in costs, worry, local hookups, and so on. On the other hand, Ku is perceived to have the disadvantage of not working well in heavy rain. We're going to be testing three- and six-meter dishes in Port Arthur, TX, Palm Beach, FL, and New York City early this year to see exactly what this interference means and how to combat it in a cost-effective manner."

Not all Sherlock's interests are with future technologies, however. Improvements in day-to-day operations are also of immediate concern. "We've got to make sure our current engineering and operations efforts are organized before we go leaping into the future," he insists. "For instance, we've just brought a brand-new editing room on line for our sports department and we're following it up with one for news next year. We're talking about suites that are second to none in the U.S.

"Technology isn't everything, of course, and there is no substitute for content. But on something like the *Today* show bumpers, we've added a new excitement to the display of information—the presentation of upcoming stories in a bordered box with an image behind them. It's like what we did with the three next batters up in our World Series coverage—it provides the viewer with more information, using the latest technology to present it."

But there is still more to do. "Our priorities are pretty clear," concludes Sherlock. "We need some new lighting systems in our studios, some new studio cameras for our news operation, a news control room this coming year, improvements in our current switching central operation in Burbank, and probably some more new mobile units like 'Van-Go,' the 45-foot truck with extension that went out on the road for the first time last December. We've always claimed that we're the innovative leader in sports programming . . . it's going to be truer than ever.

Stanley S. Hubbard

President, Hubbard Broadcasting Co., United States Satellite Broadcasting Corp.

"I see 1983 as a very strong year for broadcasting. But I think some of the shine will be off cable TV, because the competition is getting heavier, the profits lower," predicts Stanley S. Hubbard, president of Hubbard Broadcasting Co. "Some big operations will not be able to stand the pressure and there will be a shake-out because the national advertisers are becoming aware that cable cannot deliver the large, definable audiences," he adds.

But Hubbard, who is also president of U.S. Satellite Broadcasting Corp., believes 1983 may be the year in which large sections of the industry come to understand the promise inherent in DBS. "I know that I am sailing

Hubbard Broadcasting's Hubbard

into stormy waters with this statement, since large interests in the industry will be subject to change if DBS becomes a full-scale operation."

Hubbard Broadcasting was one of the first organizations to get a license and, very recently, a construction permit for a DBS system. Here is how Hubbard views DBS: "The total cost of the DBS network we envisage has been estimated to be about $380 million. This includes three satellites in orbit, to supply three channels each in each of the four time zones, with one six-channel satellite as a spare. The satellites should perform for 10 years, so the cost can be amortized at $38 million a year. With three active channels, the cost per channel will be about $13

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"I think we made a very right decision on AM stereo and I don't think this Commission was capable of choosing which was best." —*Harris*

million a year." Hubbard thinks this is by far the least expensive way to send a program to every part of the country.

"We broadcasters, before too long, will have to bite the bullet and prepare ourselves to live in one way or another with DBS. I predict that in about 10 years networking of affiliated broadcast stations, as we know it today, will no longer exist. The broadcaster will have to join with DBS, and there will be ways to do this. The networks themselves will come to DBS because the higher profits will be there."

Larry Harris

Mass Media Bureau Chief, Federal Communications Commission

Broadcast deregulation has been a success so far and will continue in both technical and nontechnical areas, according to Larry Harris, chief of the FCC's Mass Media Bureau. Harris disagrees hotly with those who say the Commission should continue to regulate technical matters.

"Where else are you going to deregulate?" he demands. "The marketplace is quite capable of choosing which system it wants. Why should this agency put its arbitrary judgment on what the public wants?"

Despite the controversy over the FCC's AM stereo decision, Harris stands firm. "I think we made a very right decision on AM stereo," he insists, "and I don't think this Commission was capable of choosing which was the best system."

Even if the FCC had selected a single system, Harris says, litigation could have delayed AM stereo by three or four years. He points to the AM stations already broadcasting in stereo as proof that the marketplace decision has not slowed the advent of AM stereo. Technical deregulation does not imply any abdication of responsibility on the part of the Commission, Harris claims, because the Commission still outlines technical requirements for any broadcast service.

"We don't just say we don't care, you can put out anything you want," he explains. "There are basic technical requirements that every system must meet. It's the old AT&T argument. Suppose we said only one kind of telephone was acceptable? This country tried that for 60 years and didn't like it."

Ownership rules are another deregulatory priority for this year, Harris says. Crossownership rules will be reconsidered, perhaps giving broadcasters an opportunity to get involved in the new technologies. TV deregulation is also high on the list. In addition, Harris says that the Commission will look at the operating maintenance logs "with an idea of either modifying them or getting rid of them." Relief for daytimers is another priority. "Hopefully," Harris explains, "we'll be able to find a way to extend their operating day. I'm not sure how we're going to do it yet, but we are looking at it carefully."

FCC's Harris

On the legislative front, Harris sees little impetus in Congress for repeal of Section 315 and the Fairness Doctrine, despite FCC requests that Congress remove those restrictions.

Commenting on another Congressional move, Harris admits he would have preferred to see the FCC remain at seven members. "I think seven commissioners made a lot of sense," Harris argues. "It spread the workload, and as a bureau chief I found it very workable."

Even with authorization of new technologies, broadcasting should continue to be healthy. Says Harris, "I still think over-the-air broadcasting as we know it today is going to continue to grow and be a very viable service."

Edward O. Fritts

President, National Association of Broadcasters

NAB will be "a major player" in developing the rules and regulations that will define the new communications technologies, asserts Eddie Fritts, president of the National Association of Broadcasters. The association will not wait on the sidelines, but will move to expand its influence at the FCC and in Congress, Fritts says.

"We certainly hope we are able to make sure that broadcasters can participate in the new technologies without being penalized for having been broadcasters," Fritts comments. "In many communities, the broadcaster is the

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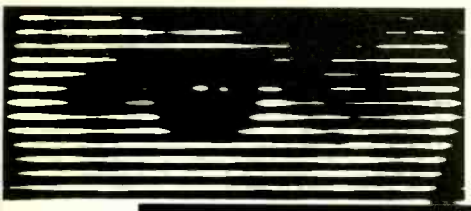

"Technical standards and the integrity of the spectrum are just far too serious to turn over to the 'marketplace' to decide." —*Fritts*

only one willing to take the risk and provide the necessary programming and other expertise. To preclude broadcasters from participating would certainly be an error."

Other areas for NAB lobbying efforts will be deregulation and First Amendment rights, Fritts says. The association's First Amendment Committee, he notes, "will be taking a very aggressive posture on behalf of broadcasters for full First Amendment freedoms." In terms of deregulation, Fritts says, "Broadcasters are the most overburdened with paperwork of any industry in the country. Radio has been released from some of those shackles, and we would like to see the same take place for television."

NAB's Fritts

Technical issues are another matter, however. As Fritts sees it, "The whole reason for being of the FCC originally was to make sure that the spectrum was utilized efficiently and that interference was kept to a minimum. . . . We think it's absolutely ridiculous to let the marketplace decide technical standards." Such issues, Fritts feels, still require the supervision of the Commission. "Technical standards and the integrity of the spectrum are just far too serious to turn over to the 'marketplace' to decide," he asserts.

Despite FCC chairman Mark Fowler's repeated urging of a spectrum fee as a fair price for broadcast deregulation, Fritts thinks broadcasters can have deregulation and avoid the fee, too. "If it's the sentiment of broadcasters to oppose a spectrum fee," he says, "I think they can keep one from happening." More lobbying is needed to insure favorable action in Congress, however.

What about recent reports that some in the NAB want to merge with the NRBA? "That may have been erroneously reported," Fritts replies, but adds in the same breath that the existence of two associations offers "some degree of confusion" on Capitol Hill. "I would like to, if possible, explore what common ground we might be able to find with NRBA," Fritts suggests, "and if a merger happens, I think that would be great."

Fritts says broadcasters will see no sudden changes at the NAB now that he has taken over the helm from former president Vincent Wasilewski. "There may be a new slant in some areas," he admits, "but basically it's the same team with a new coach."

David Henderson

President, Outlet Broadcasting

"The over-the-air system is quite healthy, thank you," says David Henderson, president of Outlet Broadcasting. Henderson feels cable will pose little more of a threat in 1983 than it did in 1982.

"We operate in both Orlando and Columbus, OH, which boast extensive cable penetration," Henderson notes. "But we don't see that that penetration is affecting us economically at this time, and we don't perceive that it will in 1983."

Outlet's Henderson

Further down the road, Henderson says, "the name of the game is programming." Cable hasn't proved able to develop programming that can attract large numbers of viewers, Henderson contends, pointing out, "The single most attractive feature that's delivered by cable is distant-signal over-the-air television, which tends to suggest that the public wants more of what it's had." Even a popular service such as HBO, which may fragment viewership somewhat, leaves the economics of the broadcast marketplace intact because it doesn't compete for advertisers, according to Henderson.

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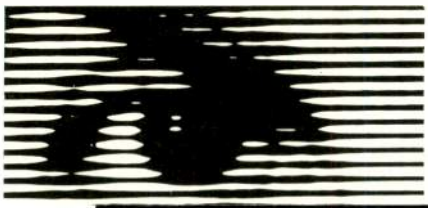


"Our major effort . . . is to continue to develop our newsgathering capability . . . a responsibility that cannot be transferred." —*Henderson*

Rather than threatening local television broadcasters, DBS will prove a threat to cable, Henderson believes. "The copper-wire technology of cable is on the verge of obsolescence," he points out, noting that satellite delivery is a more efficient and cost-effective method of signal delivery than cable.

To be positioned to compete well in the marketplace, however, broadcasters must pay close attention to their local audiences.

"I think our major effort as station operators," Henderson reveals, "is to continue to develop our newsgathering capability. That's a responsibility that cannot be transferred to someone outside of the market, such as a cable network or imported signal. Information is a very fundamental part of the local service that we provide. It may very well be the lynchpin." The second priority, he continues, is to develop a high-quality entertainment package with an emphasis on original, local programming.

On the national level, deregulation continues to be a high priority for broadcasters. Henderson is apprehensive, however, about technical deregulation.

"Spectrum management is obviously necessary because of the competing interests involved," he insists. "I'm not interested in seeing the sound engineering judgments that have been incorporated into the rules dismissed or put away." A better target for deregulation, in Henderson's book, would be the prime time access and financial interest rules, as well as the ownership limitations. He suggests a quid pro quo whereby the Commission might rescind the financial interest rule in return for a promise by the networks not to program prime time access in the absence of PTAR.

James N. Perkins

President, Hearst/ABC

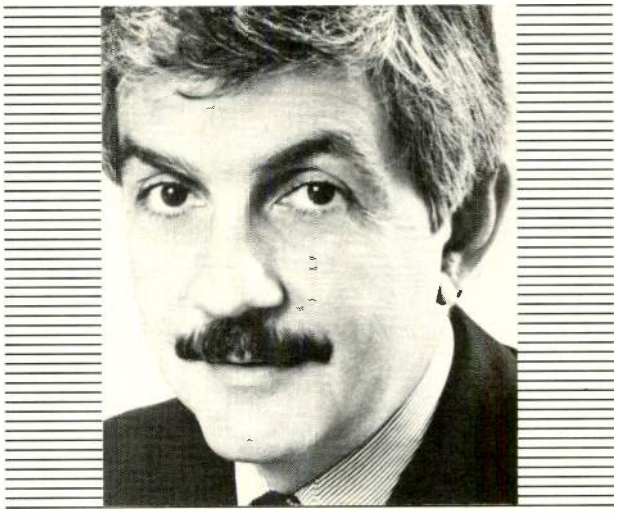
Nineteen eighty-three will not be a milestone year, according to Jim Perkins, president and chief operating officer for Hearst/ABC, the cable TV program service. It will not compare with 1976, a banner year for cable in the use of satellites and the beginning of significant cable deregulation, he adds.

Nevertheless, Perkins is bullish about 1983 and that in itself is significant, considering that cable programming services came under a cloud last year when CBS Cable threw in the towel, triggering all sorts of shake-out jitters. The Hearst/ABC executive believes that the media overreacted to the cancellation of CBS's ambitious arts cablecasting venture. In addition, industry analysts have set arbitrary goals that get a lot of attention, but don't mean much.

"Nobody said we had to be profitable by 1984 or else," Perkins states. "We were told by the pundits that when cable reaches 30 percent household penetration, advertising would take off. Well, the 30 percent came and went and nothing happened. Now the analysts need to create new benchmarks."

The Hearst/ABC response to the CBS postmortems was to "put *our* money where *our* analysis is" and announce the expansion of its popular *Daytime* women's program. Despite the interest by cable operators in pay tiers and pay-per-view, Perkins remains confident that advertiser-supported cable networks can and will succeed—on their own schedule.

Taking a broader view of cable TV than the next 12 months, Perkins states that two-way systems are the only operations with a future. Of the metro markets only six need cable to remove interference, so "improving the signal can no longer support cable." As for diversity of programming, with LPTV and DBS on the way, cable may be challenged.



Hearst/ABC's Perkins

So what does cable have to offer? "The basic change will be in the use of information and the speed of information transfer, the more immediate the better," Perkins predicts. Interactive TV then is the key to get information and the next generation of cable operators will be dealing in data bases as well as entertainment and news.

What this means to the cable network companies is the need for two forms of information—entertainment services and data base services. And just as cable operators have set up local origination programming, they will also set up local information sources, such as universities. If this projection sounds far-fetched, Perkins points to today's video games as an example of human-computer interaction that could not have been perceived 20 or 30 years ago.

"There are lots of uses of cable that even the most far-seeing of us cannot perceive now," he notes.

"There are lots of uses of cable that even the most far-seeing of us cannot perceive now."

—Perkins

Andrew F. Inglis

President, RCA American Communications, Inc.

"Until recently, and with certain exceptions, the broadcast industry generally has not made widespread use of communications satellites for program distribution to affiliates," comments Andrew F. Inglis, president of RCA American Communications, Inc. The reasons for this, he explains, are: an extensive, in-place terrestrial distribution system that predates satellite distribution; and highly complex distribution requirements that require major switching centers and the necessity for two-way telecommunications capability.

An exception has been the Public Broadcasting Service, which has successfully employed satellite distribution of programming. Also, ABC has begun to use satellites for distribution of programs to some of its affiliates.

Americom's Inglis

"Today, however, the television networks are seriously studying the use of satellite systems as the primary mode of program distribution. This new interest is based on a growing recognition of the advantages of satellite distribution and steady advances in satellite technology and cost effectiveness," says Inglis.

The broadcast radio industry has been in the forefront of adopting satellites as a means of program distribution. In 1982, RCA Americom signed contracts with ABC, NBC and RKO radio networks to provide its Audio Digital Distribution Service (ADDS) to several thousand affiliates. Service will start early in 1983.

The timing and ultimate configuration of television network distribution systems have not been fully determined. "We expect that satellites will play an increasingly important role in these systems and that over a period of several years they will become dominant as compared with terrestrial microwave systems," he predicts. The ultimate systems will be hybrid, that is, they will employ both terrestrial and satellite transmission facilities with the satellite portion being composed of both C-band and Ku-band. The end result will be an improvement in the quality, flexibility, and cost effectiveness of the service.

Alan Henry

President, Gulf Broadcast Group

Alan Henry, president of Gulf Broadcast Group (owner of five FM, one AM, one AM/FM and three TV stations including KTSP-TV, Phoenix, and WTSP-TV, Tampa/St. Pete), looks for three things when evaluating a station: the facility, the market, and the management. It's in the latter area that he sees the most need for industry-wide improvement: "Broadcasting is still a labor-intensive industry in which good management—people management—is becoming more and more important. The problem is that there is a real paucity of good managers available. People come out of training programs thinking they can just step into a career in broadcast management. But they don't know about people, and that's the key."

On the other hand Henry is quick to point out that "it is time for broadcasting to become more of a business and less of a show. If you can't read a financial statement, you simply don't know how to operate any business, let alone a broadcast station.

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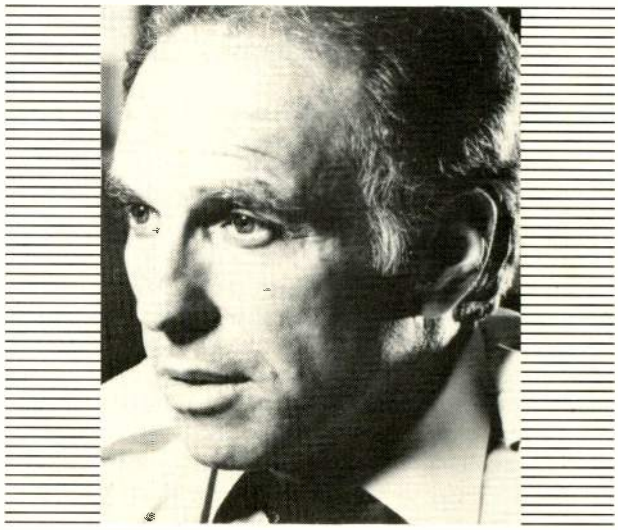

Gulf Group's Henry

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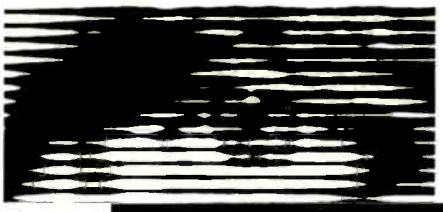

"If you can't read a financial statement, you don't know how to operate any business, let alone a broadcast station." —*Henry*

accomplish that. We don't have any politics around here—politics takes too much time. I'm accessible to everyone who needs me. My managers communicate with me at least once a day, and we keep information and concerns flowing back and forth. But as long as the station is showing profits, I don't interfere."

Henry has some outspoken opinions on AM Radio: "Gulf is basically done in the AM Radio market—even if the FCC's 7-7-7 rule is repealed. AM is going through a tremendous reappraisal of who and what they are. Standalone AM stations in the larger markets—the ones group owners are interested in—cannot compete against FM music programming; AM stations enjoy an average 2.1 share-of-market whereas FM stations have a 4.4 share. So the real place for AM is in smaller markets where the local entrepreneur can make a successful living. Unfortunately this is the type of operation that does not do well in the group ownership environment."

Despite the fact that AM has seen an almost 60 percent drop in profits recently, Henry is confident that it will make a comeback. "The real future for AM," he asserts, "is in satellite-distributed programming. DJs outside large markets will practically disappear in a few years, and the large programming services will tie into local operations through automation systems. For the group owner, this is great—they'll pay *us* to carry their programs!"

As for the long-term future, Henry insists that broadcasting be viewed as a marketing effort—whether promoting the music format of Gulf's radio stations or the TV news of its TV operations. "The market in TV isn't really defined yet, despite all the studies," he concludes. "If we're in business to make money, we're going to have to treat the business of broadcasting as any other business. We need in-depth marketing studies—face-to-face interviews, focus groups with one-way mirrors, real marketing surveys.

"At Gulf we think we have some of the answers; people are more aware of events these days, and local news and public affairs programming help fill a need that entertainment extravaganzas can't. But it all depends on what the research shows—and we're still waiting for the studies to reveal it."

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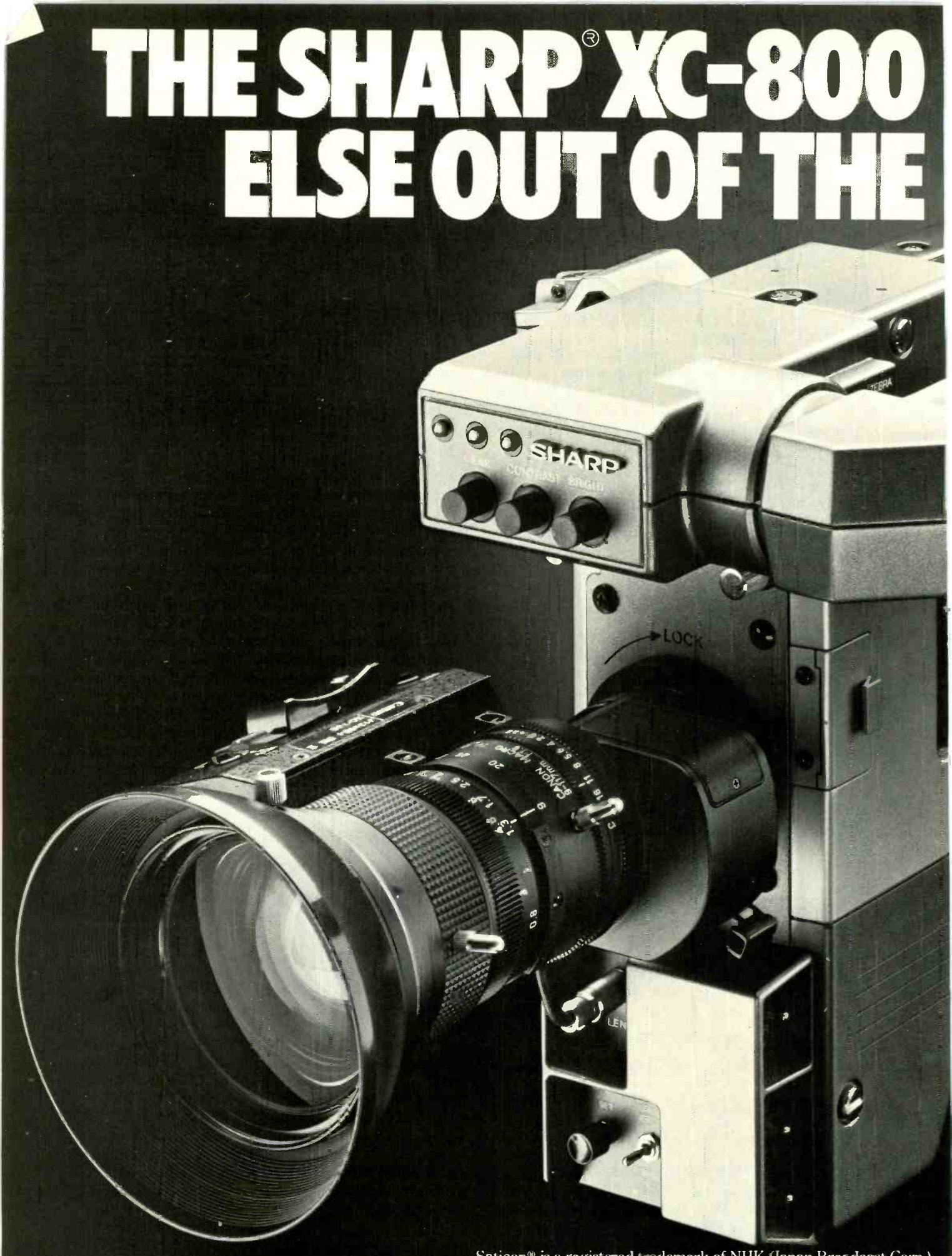

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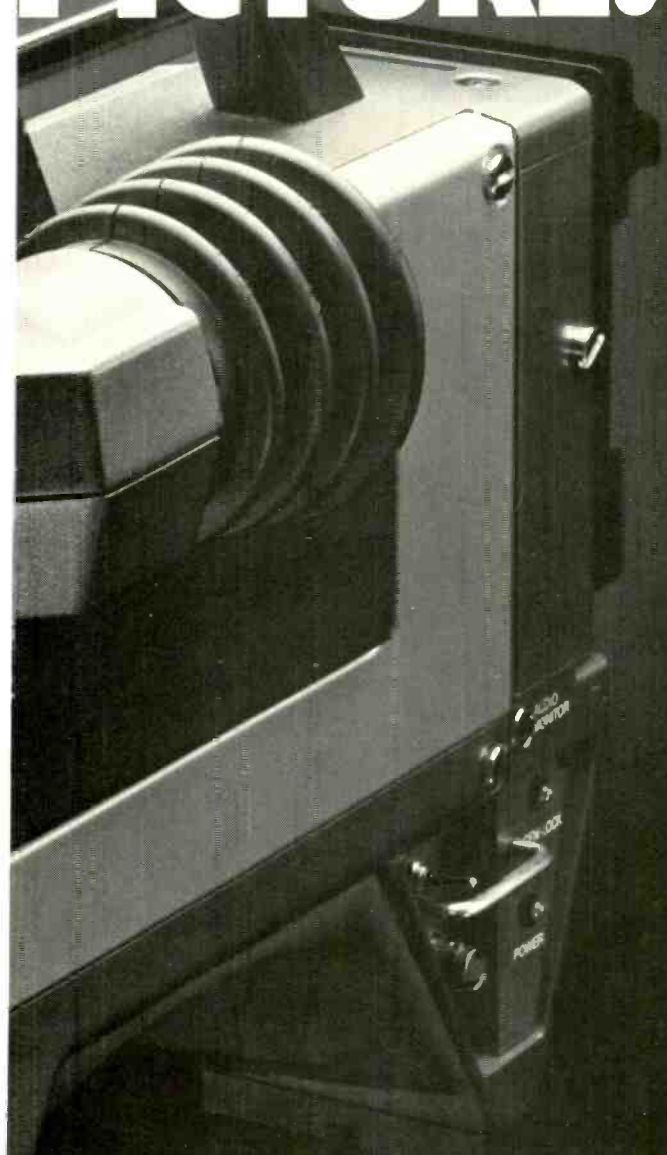

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SPECIAL REPORT:

Special Effects — the New Sound

Part I: A New Dimension to Digital Video Effects

ADO, Mirage, a new system under development by Bosch—the latest generation of digital video effects processors incorporates z-axis control for real-time three-dimensional effects.

TECHNOLOGICAL LIFE CYCLES are a reality for both users and manufacturers. A new idea is introduced in prototype at NAB, becomes a production model the following year, is accepted by the networks and a few large teleproduction facilities by the following NAB, becomes a "must have" item throughout the industry shortly thereafter, is subsequently reintroduced as a slightly less versatile but more affordable "workhorse" system in ensuing months, and then begins to lose interest by the next year as the manufacturer and user start looking around for something new.

With graphics equipment, the cycle is somewhere around five years. At the 1977 NAB Show, digital effects processors made their first appearance in the U.S. market—the Vital SqueeZoom and the NEC/Grass Valley DVE, joined shortly by the MCI/Quantel DPE-5000.

Now, five years later, the technology has begun spilling down into the lower-cost systems (although Digital Video Systems tried the low-cost approach with add-on processing for its framestore/synchronizer system early in the game, it was evidently too early for widespread acceptance). Today virtually any station or facility can afford a DCC/BIAS Digifex for only $38,000. Or the Quantel DPE-5000SP at $65,000. Or the single-channel ADDA VIP for around $50,000. $126,000 will buy a two-channel NEC E-Flex processor. But for limited applications, the Harris frame synchronizer with compressor/positioner, priced at only $29,500, may be quite enough. All are quite a jump from high-end digital video effects systems, which can run over $400,000 for fully equipped five-channel systems.

And this year's NAB show can be expected to produce even more low-cost systems—like the new Chyron approach to digital manipulation of its character generator output. It's probably safe to say that virtually every manufacturer of digital equipment is at least seriously contemplating the investment of programming time needed to make the equipment capable of digital effects (the hardware, of course, is already there).

Five years later it is also not surprising to find a certain boredom creeping in. What were once dazzling wonders of the video world have become almost commonplace—like a character generator. "The digital effects processor is used so often people sometimes don't realize it's there," notes George Hamilton, MCI/Quantel's VP of engineering. "It's just another tool which the production people have available to them—the 'box that hooks up to the switcher that lets them move things around.'"

The impetus for something new and different, for the next brilliant step in the evolution of digital systems, is plainly at hand. And the change has been as exciting as digital effects themselves were when first introduced. We are speaking, of course, of three-dimensional effects.

Elements of 3D manipulation

When digital effects first came out, they offered for the first time the ability to escape the 4x5 ratio which, once laid down by the camera, had been all but inviolable for the lifespan of the image. The next step was plainly to add the software that would permit systems to escape the two-dimensional boundaries of the image.

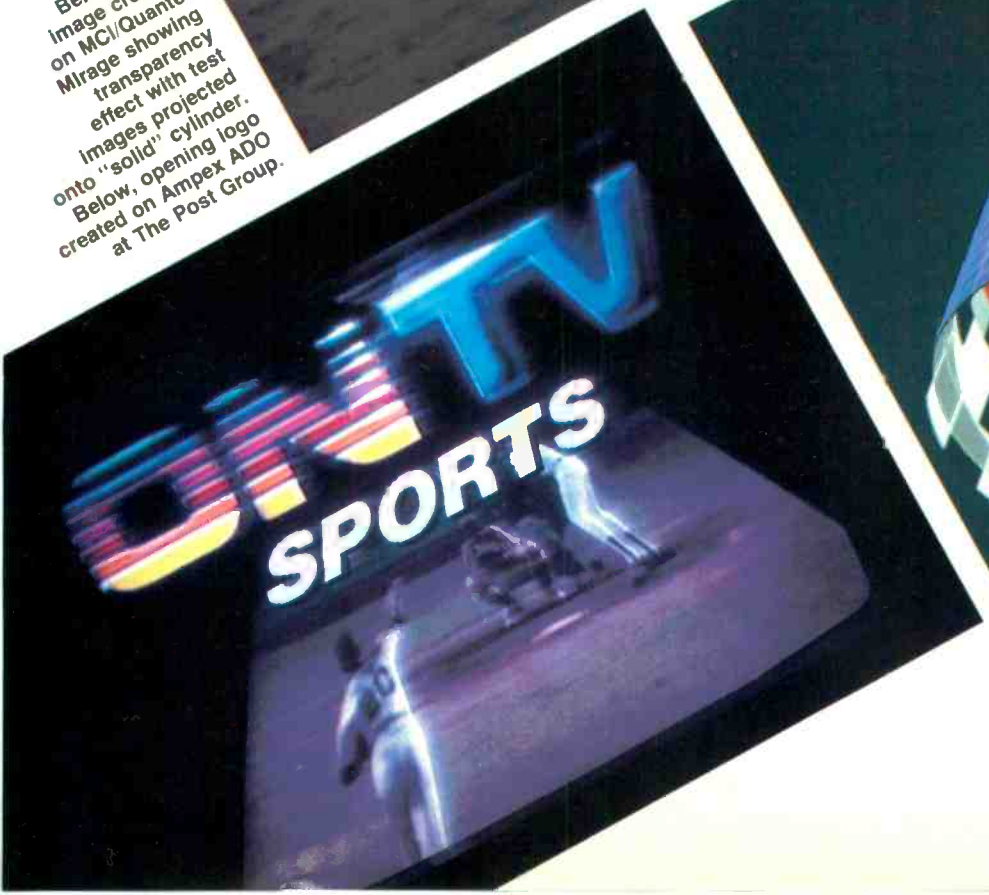
If the truth be known, the impetus probably came not from inside the industry itself, but from the rather more aggressive computer graphics field which had already pioneered the development of digital art/paint systems (the story of how Ed Catmull, Alvy Ray Smith, and other graduates of the Utah University Computer Graphics Program went on to develop the Ampex AVA is already quite well known).

But while the TV industry was still catching up with these developments of the 1960s, computer graphics itself had forged ahead. The same group which had written the

the New Look, for the '80s!

At left, frame from Levi Strauss commercial created by Robert Abel & Associates using custom-written software for the Ampex ADO system at Compact Video. Above, image created on the brand-new Bosch 3D graphics system.

Below right, image created on MCI/Quantel Mirage showing transparency effect with test images projected onto "solid" cylinder. Below, opening logo created on Ampex ADO at The Post Group.



programming that led to AVA had gone on to develop 3D modeling programs using a Z-buffer framestore—programs that allowed representations of mathematical models on the X, Y, *and* Z axes. Major credit must be given here to Dr. James Blinn, who wrote many of the programs while at the New York Institute of Technology, where he stopped over between the Utah Graphics Program and his current position developing spacecraft simulations for NASA's Jet Propulsion Lab.

In computer graphics, the 3D modeling is accomplished with three sets of algorithms. One defines the object in three-dimensional space by plotting the points and lines that form its boundaries and assigning them to the x, y, and z coordinates. This provides a perspective model of the object in outline (wire frame) form, often displayed on a vectorgraphics terminal, which permits the model to be manipulated in real time; this is the basis of most CAD/CAM systems. Another program is used to remove the "hidden lines"—parts of the model that would be blocked from view if the object were solid. Forms—especially polygonal building blocks—can then be combined to form more complex objects.

As any good Renaissance artist could have pointed out, however, perspectives and forced-line renditions are only half of what constitutes the illusion of depth; the other is the shading and reflection caused as one part of the object blocks another from the viewer's perspective. Again, a mathematical model of light reflection was developed for the computer, allowing not only the precise mathematical prediction of the blocking and shading, but also predicting what happens when the light source is moved or the model is rotated or the viewer's perspective changes.

No small amount of computing power is required for the creation of these images, a typical arrangement being a 4000x4000 element framestore arrangement yielding a total of 16,000,000 pixels; sometimes four framestores are used, one each for R, G, B, and Y. As the computations are processed (typically in a resolution-free, floating decimal point basis), the pixels for each part of the high-resolution display are fed to a film recorder. Each framestore addresses the three color elements of the recording camera separately, and a high-resolution film image is created.

TV applications

For TV equipment manufacturers looking at the developments in computer graphics systems, the broadcast applications must have appeared strikingly obvious. Only one thing stood in the way: the TV system would have to be able to handle images in real time—live video, the stuff of the medium. Otherwise the technology would never be able to find a place in the day-to-day news/sports production environment. CAD/CAM systems with real-time vectorgraphics displays did not offer enough visual excitement; but processing was much too slow on the full-color systems.

A "simple" solution was fortunately at hand, achieved by simply reprogramming the framestore. Since television doesn't need the 4000x4000 line resolution of the more extensive computer graphics systems, thought manufacturers, why not take the processing power and memory of a three-framestore program, juggle the programming slightly, and use the processing power and speed to create live, 500x500 line resolution images? The essential elements of 3D manipulation could thus be maintained, but accomplished in real time.

System details

The first of the new units which broadcasters saw was the Ampex Digital Optics package introduced at the 1981 NAB. ADO was an unusual entry-level product from Ampex, which hadn't been in the digital effects business before. But it could have been predicted based on the company's development work with AVA.

ADO is a completely standalone effects processor, with a maximum of four channels. A "global" combining unit, which will allow all four processors to work on the same effect simultaneously, or split up the processing among different workstations, will probably be at the Ampex booth at this NAB. What makes ADO so exciting, however, is not the number of channels, but the software option that gives each channel two inputs. They can be front and back, inside and outside, top and bottom—the effect itself determines how the rotation and perspective are interpreted. But working together, the two inputs of each channel can be used to create true 3D, z-axis effects.

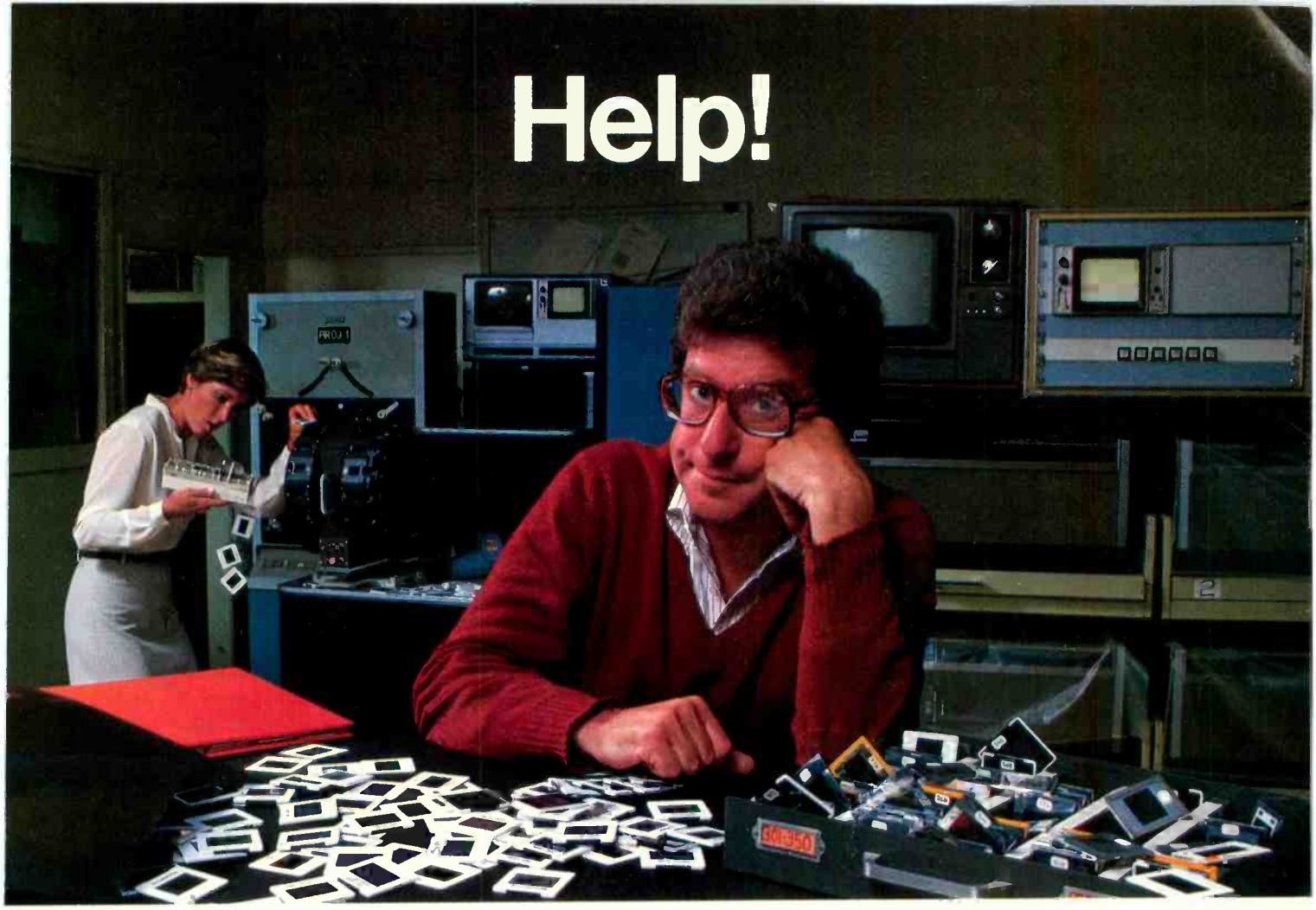
The front end of ADO consists of a control panel with pushbuttons for selecting operating modes and storing effects, a joystick with horizontal and vertical moves as well as a rotating knob used for controlling the third axis, and a CRT which displays the status of the effect.

Besides the basic perspective effects (the amount of perspective is controlled by the joystick knob), ADO offers rotation around any axis, complete control of size and position, variations in the viewing angle, selection of the horizontal aspect and vertical skew, adjustment of the axis position, and so on. All of this happens in real time as the operator maneuvers the joystick, or the effect can be preprogrammed and executed on command at any predetermined speed. The net result is the dizzying array of perspective changes which characterizes three-dimensional manipulation. (What ADO won't do, it should be observed, is handle curved surfaces; in the ADO image, all lines remain straight.)

Achieving these effects in real time is the major accomplishment of digital effects systems. In the case of ADO, the processing is based on a 13.5 MHz sampling frequency, with the video treated in component (Y, R-Y, B-Y) form. The ratio between the luminance samples and the two color difference samples is 4:1:1; but apart from this, ADO is fully compatible with the new international digital standards set by SMPTE and EBU (the international standard calls for a 4:2:2 ratio).

At this sampling speed, ADO has approximately 70 nanoseconds of processing time to digitize the incoming video, write it into the framestore, manipulate it, and write it back to analog again. To accomplish the task, each finished frame is actually computed from two separate fields, the first contributing horizontal picture information, the second, vertical information. Effects processing thus manipulates H and V components separately.

ADO, in the field the longest, has chalked up an impressive list of users—among them MTI in New York City and The Post Group in Hollywood, both teleproduction/post-production facilities with extensive graphics capabilities. One of MTI's most impressive feats



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on the system is a rotating three-dimensional cube, each face composed of live, moving video.

ADO's most significant role thus far is probably the creation of a spinning, 3D mirror effect for the latest Levi Strauss commercials—produced by Robert Abel and Associates using the ADO system at Compact Video. Abel actually "cheated" and obtained the Ampex source codes, then rewrote the program to handle not only the front and back sides of the rotating pair of blue jeans, but also the edge view. The software was then married to the film-created effects elements, and the images fed into ADO, which produced the finished effect; the edge seen in the commercial is unfortunately not available to standard ADO users. Abel is thus well on his way to the perfect special effects creation of the not-too-distant future when film-created images will be married in video-generated special effects.

No mirage!

MCI/Quantel's entry into the world of 3D effects came rather prematurely; at the same 1981 NAB Show when Ampex unveiled ADO, Quantel literally reprogrammed the DPE-5000 overnight to be able to create 3D-like effects. By the 1982 show, this "dimensionalizing" option had been added to the basic DPE software package that permits rotations, flips, and tumbles.

But Quantel had something far more exciting at NAB—its entry into the highly sophisticated 3D computer graphics world: Mirage. Even more than ADO, and certainly more than the dimensional effects of the DPE, Mirage added an astonishingly real "extra dimension" to *real time* effects with tricks that simply couldn't be produced by anyone else's system.

Like ADO, Mirage incorporates an A/B input into the effects channel, so that the object being defined can be provided with a front and back, left and right side, and so on. But the approach to image manipulation is completely different. In ADO, the entire raster is treated as a whole—shrunk, resized, rotated, and so forth. To achieve the cube-like effect, for example, four separate rasters are used, each reformatted and aligned with the others to give the cube-like appearance. But with Mirage, the system already comes preprogrammed with basic shapes such as cubes and spheres. The raster image is "projected" onto the mathematical form, and the effect is created by manipulating the algorithms which define the shape's boundaries; the video simply rides along.

This is where Mirage comes so close to the computer graphics programs discussed earlier. The x,y,z coordinate shapes are defined on a graphics workstation almost identical with a CAD/CAM system. In addition to the cube and sphere there are a cylinder and a "square cylinder," a twisted, Mobius-strip-like figure, a page turn, and several others. The enterprising user can design his own basic forms out of algorithms at the workstation, but for now this is mostly left to the programmers at Quantel.

With these basic shapes the graphics artist then creates the specific effect desired on a DPE-like control panel. Taking the sphere as an example, the front and back can be views of a world map, so that the effect is of a globe. It can be made any size and rotated at any speed and the operator can also assign transparency levels to the object—a capability that is particularly effective in doing page turns or in using the spinning globe effect.

Since the raster curves to fit the shape and the mathematical model itself is manipulated, curved lines are a basic part of Mirage's repertory. Transitions can also be set up between effects, with the computer interpolating the data between the preselected model shapes, so that one form flows into the other.

As for resolution and sampling speed, Quantel says the system resolution is "compatible with the 13.5 MHz digital standard." Says Harrison, "Mirage is just a pixel-mapped framestore linked with some very speedy processing equipment."

How many of these systems will be sold at $300,000 still remains to be seen. Broadway Video in New York City will take delivery of the first unit later this year. ABC has been "working with Quantel" on the Mirage system, according to Julie Barnathan, presumably for use initially with its Olympics coverage. And the company claims a brisk business in the product line—more interest, in fact, than it can currently meet with a realistic production schedule. "But 3D effects aren't like standard digital effects," reminds Harrison. "A standard processor can do all sorts of routine tasks; 3D is something else."

A new star

Development work on real-time 3D systems for television still has some surprises in store, however, and waiting in the wings is a brand-new development from Bosch, the FGS-4000, that may put everything else to shame. It's not a product yet, nor even a prototype, but it will probably be introduced at this year's NAB. Its impact lies in having abandoned pixel-mapped framestore characteristic of other digital effects systems in favor of real-time vectorgraphics—a breakthrough not only for the television industry but even for computer graphics.

Vector displays, unlike conventional raster displays, do not move the electron beam over the entire surface of the CRT each time an image is created. Instead, the beam traces over only those points representing the object to be formed. Other mathematical programs then remove the hidden lines of the wire frame model, as described earlier, while other programs add color and shading. The basis of this approach is the ubiquitous polygons which can be used to form any shape imaginable—including curved surfaces if enough extremely small polygons are used.

The significance of the Bosch development is that these effects are created in *real time*. This puts the Bosch system in a league with the famous Evans & Sutherland vectorgraphics processors—originally developed to perform military flight simulations. But only the most advanced of these systems has ever been able to claim real-time processing.

Because no framestore is being loaded, processing of the 16-bit data occurs extremely fast—at a 14 kHz processing speed. Only after the data has been created and manipulated is it stored for later recall—in two 24-bit deep framestores, capable of offering 1000-line resolution if necessary. This enables the system to create completely smooth, anti-aliased figures and moves as quickly as the joystick can be moved.

This system has only been shown once—at the recent SMPTE show, in a carefully guarded suite. This is largely because it is still in an almost experimental stage. Images

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consisted primarily of 3D letters and graphics being manipulated through a keyboard control and also by means of a joystick. The images were completely three-dimensional as far as the hidden line perspectives were concerned, but work is still continuing on the color shading programs. Also undetermined is whether the system will ultimately be able to handle live video as well as real-time manipulation of the forms—considered by most as a "must" for a system that will cost in the neighborhood of $300,000. Otherwise FGS-4000 will simply be the world's most sophisticated, but also most costly, character generator.

Nor will the Bosch development be the final word. At least one manufacturer of a high-end digital effects system not previously in the 3D arena can be expected to show up at NAB with something "very new and exciting." And work has already begun on lower-cost 3D systems as well. NAB will likely see the addition of an inexpensive, line-by-line kind of 3D digital image processing added to a system which currently has an open effects bus just waiting to be programmed.

In the words of Meryl Lipman of The Post Group, "everyone's going to want three-dimensional effects, the same as they want ordinary digital effects today. First come the people who just want to be new and different and be the first to try a new system. But the real work begins when the dust settles. That's when the creative part starts." Certainly the technology has now come of age!

Part II: Audio Effects Get Digitized

Digital audio effects are becoming more and more popular in production—everything ranging from simple delay and reverb to digital time compression to computer-accessed effects banks.

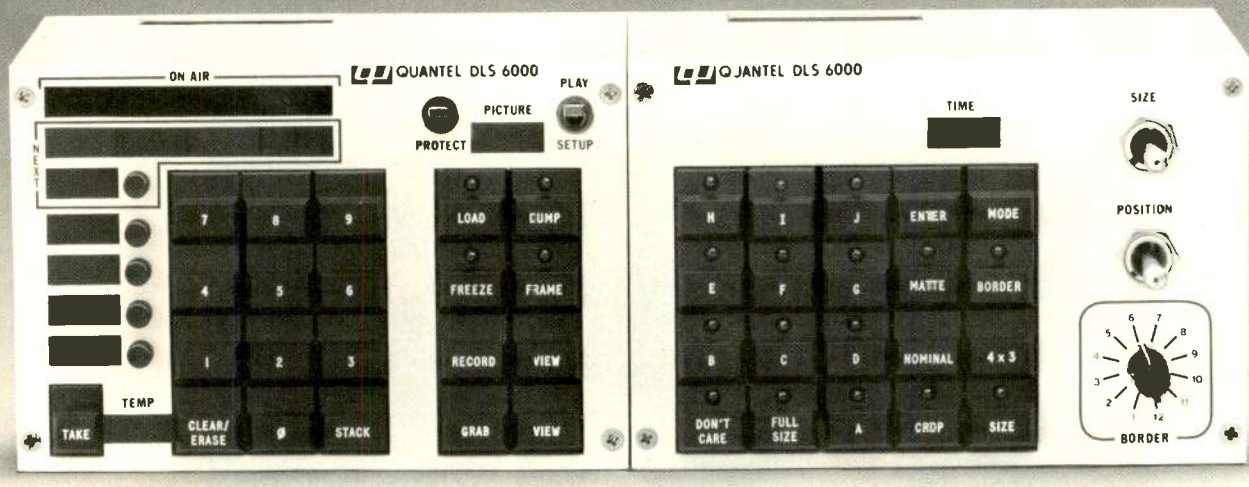
WHEN DIGITAL SPECIAL EFFECTS devices were introduced to broadcasting in the early 1970s, most broadcasters viewed them as "jazzy little extras," novelties that weren't necessary for the continued high-quality performance of the station.

The first systems used were basic digital delay units, and for those in radio, for many years digital delay was little more than a device that offered profanity protection.

In the new radio and television production environment, however, the situation is now quite different. With

At the Sound Shop, ACCESS effects are retrieved from the computer at right and manipulated by the control console.

The Quantel DLS 6030.



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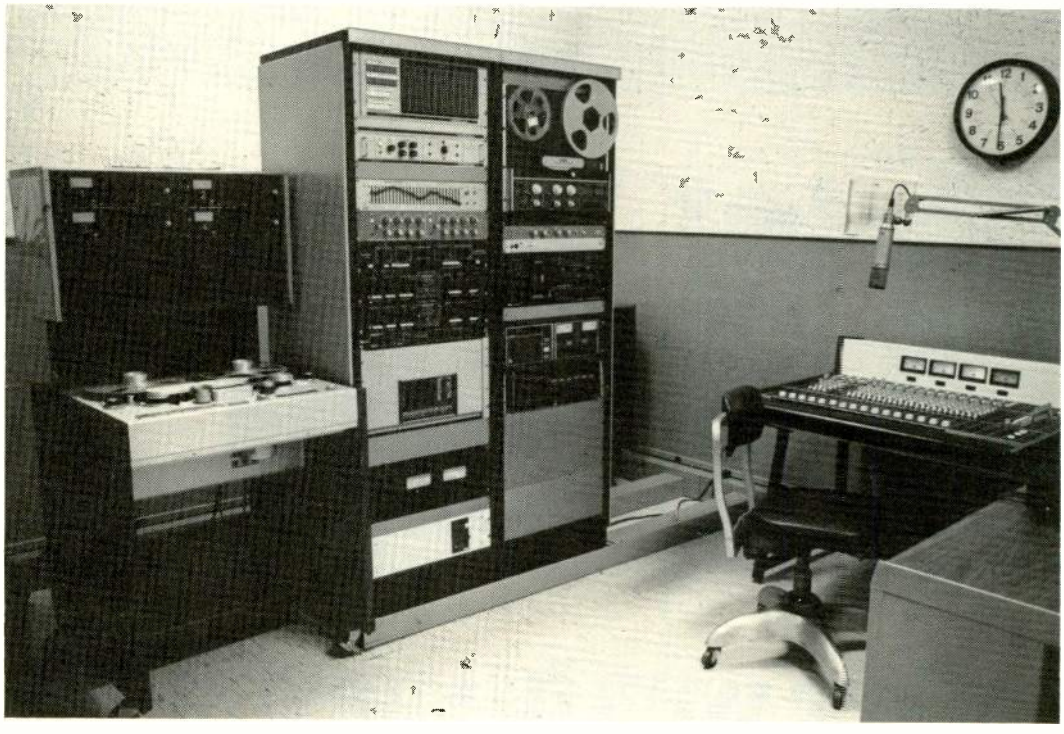

Production room rack at WKEE-FM includes the DeltaLab DL-2 digital delay, used for commercial production and post-production.

the influx of music recording equipment and techniques into broadcasting, the need for more sophisticated effects has become apparent. Multigeneration reverb, even infinitely repeatable reverb with absolutely no degradation in the sound (which could not be said for analog systems), is just one of the benefits of the new technology. Even beyond digital delay and reverb, digital processing is adding a whole new dimension of time compression and other effects to the audio engineer's palette.

Digital development

The engineering development underlying the digital systems is straightforward. Clearly any digital system must begin with an analog-to-digital converter which translates analog signals into digital codes using one of two current encoding/decoding schemes: pulse code modulation (PCM) and delta modulation. Each scheme has its proponents in terms of cost and quality, related in part to differences in sampling rates (the number of times the audio signal amplitude and frequency are read digitally each second). The PCM systems sample at 38 kHz, while the delta systems operate at a minimum of 250 kHz, 15 to 20 times the highest frequency.

The digital representation of the analog signal is then sent to a digital memory for storage and manipulation of the digital data in various ways. The signal is then converted back into analog through a D/A converter that reverses the encoding process.

Keeping all the elements of the digital processor synchronized also takes different approaches in different systems. DeltaLab synchronizes the D/A and A/D converters and the digital memory to a common "clock" so that the number of samples per second and the organization of the samples in the memory are all geared to the same speed. And, while the PCM scheme (an absolute value system with a clock rate of 12x40) works on 12-bit processing, with binary words representing the amplitude, the delta modulation technique is a rate-of-change (or one-bit) system in which the sampling rate *is* the clock rate. In conjunction with this, a voltage-controlled oscillator is used to set the digital bit rate and sampling clock. Different input voltages permit the varying of the clock in a two- or three-octave range in delta modulation.

New digital applications

Of the new generation of digital effects devices on the market, the most popular appear to be those that combine the various effects capabilities once found in separate units. Examples are Ursa Major's SST-282 Space Station, a unit which combines digital delay and reverb.

Another example, one of the digital devices used at WKEE, Huntington, WV, is Delta Lab's DL-2, which offers several effects in one rack unit—delay, reverb, echo, doubling, chorusing, and flanging—in addition to a digital memory.

The in-house production of commercials and promotions has reached a level of such complexity that the digital effects are a necessity. A commercial WKEE did for a local computer store featured a computer talking to the consumer and explaining its usefulness. This required that WKEE take a real voice, then phase it, delay it, and add some reverb to make it sound synthesized. Without the digital effects there would have been no commercial.

Another popular unit for adding digital effects during production is the Eventide Harmonizer, the latest generation of which has a new de-glitch circuitry. Steve Lushbaugh, program director at WMMR, an AOR station in Philadelphia, is one of a growing number of innovators putting effects to work during production. Lushbaugh uses the Eventide unit for his song parodies. "It's a fun part of our programming. I find for this kind of application I need the precision and ease of a digital machine that I can plug in, as opposed to messing around with a couple of tape machines."

The parodies are achieved by recording the left and right channels of an album out of phase onto a four-track

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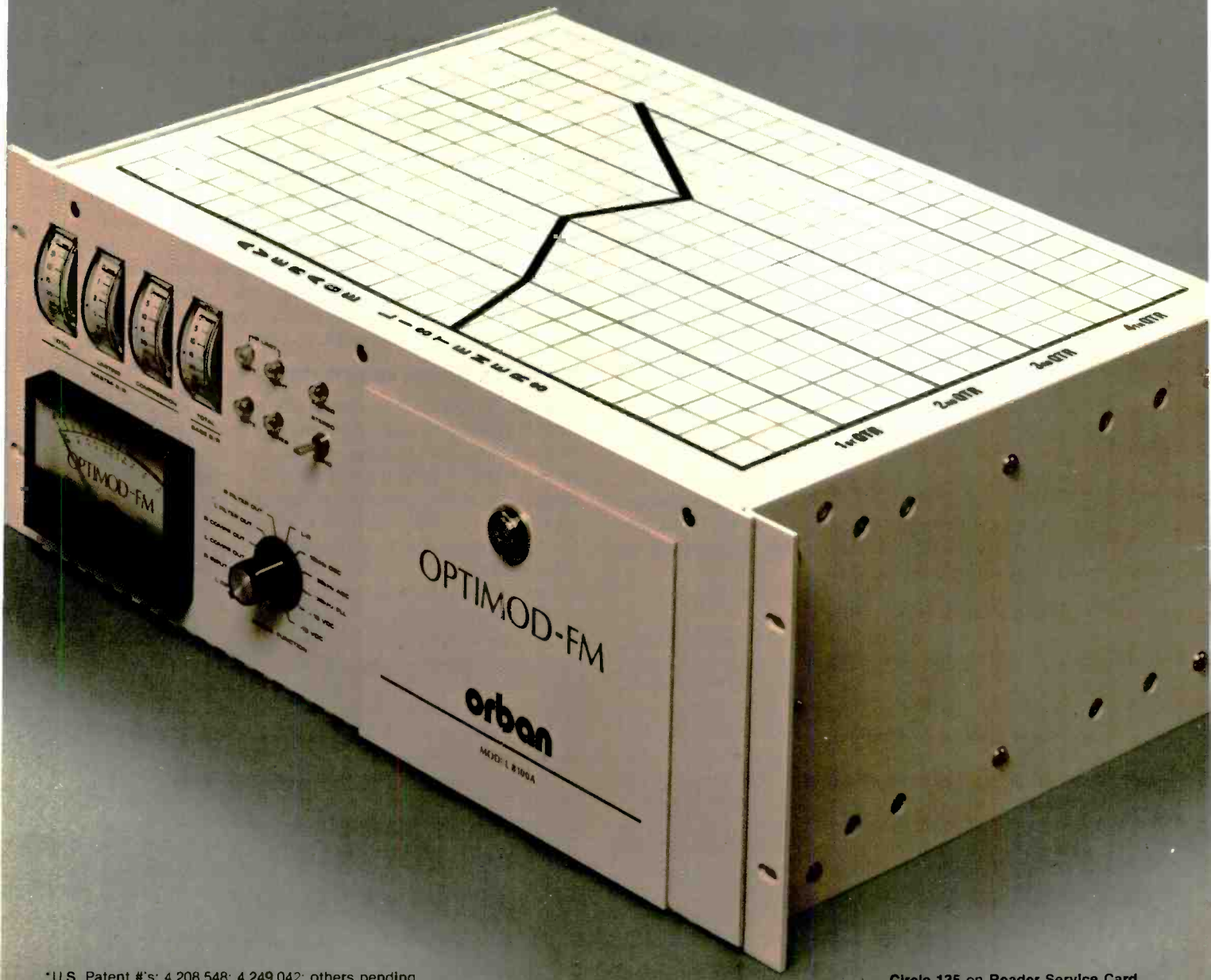

*U.S. Patent #'s: 4,208,548; 4,249,042; others pending

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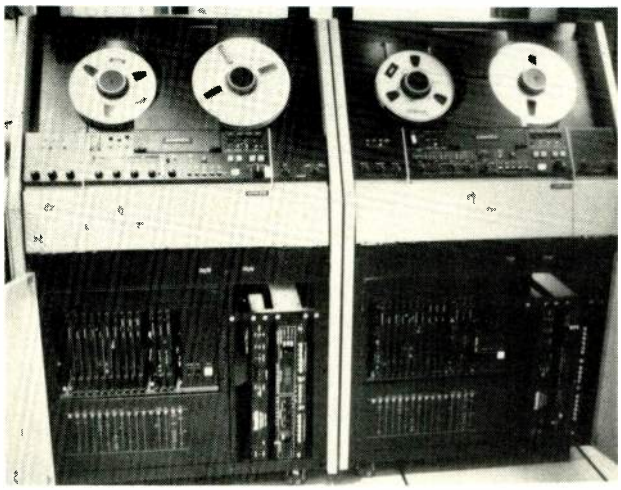
tape recorder, which usually causes the vocals to drop out, or to fade enough so that they can be covered with new vocals. What is left is essentially an instrumental track. Lushbaugh writes new lyrics and sings them to the tune of the original song (a current title is "Only Lunch Can Break Your Heart" by Neal Younger, for the daily lunch time program). The new vocals are processed through the harmonizer to match the processing (any delay reverb or flanging) done by the original artist. Or, if the vocal range is something that he's not comfortable with, he can change the pitch of his voice or the instrumental track to bring them together.

This example addresses the reality that, in the highly competitive radio, TV, and TV commercial business, the mix of creative personnel with the new technology can lead to a crucial advantage.

But though the technological development of digital effects systems has been welcomed by the creative sector, this in itself will not make them widely used in the broadcast industry; for radio and TV stations and production facilities there has to be a financial payoff. Lou Mueller, chief engineer of WKEE, claims "they give us an added



Time compression at WNEW-TV is done with an Eventide Timesqueeze installed in Ampex VPR-2Bs.

selling advantage over the competition. The draw to potential advertisers is substantial. For some, digital devices might still be a luxury because of the cost, but for us special effects are useful tools that provide a substantial return on the investment."

Altering time with digital audio

Digital effects per se is not the only area under development in digital processing, however; time compression is under full-scale attack. Lexicon's Model 1200, for example, allows the playback of recorded audio or videotape and film at a faster or slower rate without altering the original pitch. The unit can compress the audio at up to 25 percent without signal degradation. This permits the shortening of running time to add tag lines, or simply to lend an energetic atmosphere to the presence of the show in question. Older television programs can now be shown with more commercial time, without editing, by simply running the show faster and compressing the audio. Radio drama can benefit in a similar way with the resurgence of some of the old syndicated shows. A keypad is provided for entering the original running time and the percent of compression or expansion desired, as well as for control of any variable-speed tape recorder.

The way in which the 1200 accomplishes its task is somewhat complex. It is a result of "intelligent splicing" which removes the redundant properties of vocal sounds by sampling the audio at a very high rate. Inside the unit is a Z-80 computer as a backup to the integral high-speed pitch processor. The pitch shifter maintains the relationship of one pitch to another so that if two pitches were one octave apart in the original, they would retain that relationship even though their absolute pitch had changed. This is possible because the pitch processor is linear in the frequency domain (i.e. for a given pitch change, all frequencies are multiplied by a constant).

The actual shifting of pitches is accomplished by storing the information at one rate, and retrieving it at a different rate. The pitch-shift ratio is the difference of the pitch when there is a change from its record speed to its playback speed. If it is played back at twice the record speed, the shift ratio is two; if played back at half the record speed, 0.5 is the shift ratio. The pitch-shift ratio is the constant by which all frequencies are multiplied.

Future systems enhancement is also easier with this technology. There are eight audio expansion programs and eight compression programs in the standard 1200 unit, with the capability of adding more if necessary through the installation of additional software in the form of read-only memories, or with the addition of hardware such as replacement of printed circuit board modules.

Another popular time-altering device, with the addition of an outboard computer, is the Eventide H949 Harmonizer. Called the Timesqueeze, the system consists of the H949, Eventide's tape controller, and a Hewlett-Packard HP85 desktop computer with proprietary software. The desired play times are entered and the computer makes all timing, speed, and pitch ratio computations.

Computers expand audio horizons

Since computers have long been processing information digitally, and since they are fast and cost-efficient, they are naturally assuming a major role as the special effects scenario is played out. The use of computers aids in the storage and retrieval of sound effects as well as in creating them. The Synclavier is a well-known device used for special effects in music recording and commercial sound effects generation. It is essentially a computer-driven synthesizer, with memory for storage and recall of musical passages and audio effects.

Another computerized effects system is ACCESS (Automated Computer Controlled Editing Sound System). There are two in existence, the original at Neiman Tillar Associates, an audio production house in Los Angeles, and the other at the audio arm of Reeves Communications, the Sound Shop, in New York City.

Neiman Tillar designed the user application software for the system, whose hardware was provided by Mini Micro Systems. At the Sound Shop, the computer terminal and separate control console is interfaced to audio and videotape machines through a BTX Shadow controller. The digitized sound data is stored in standard IBM magnetic disk data storage packs with each pack holding 40 minutes of digitized sound. The system currently accom-

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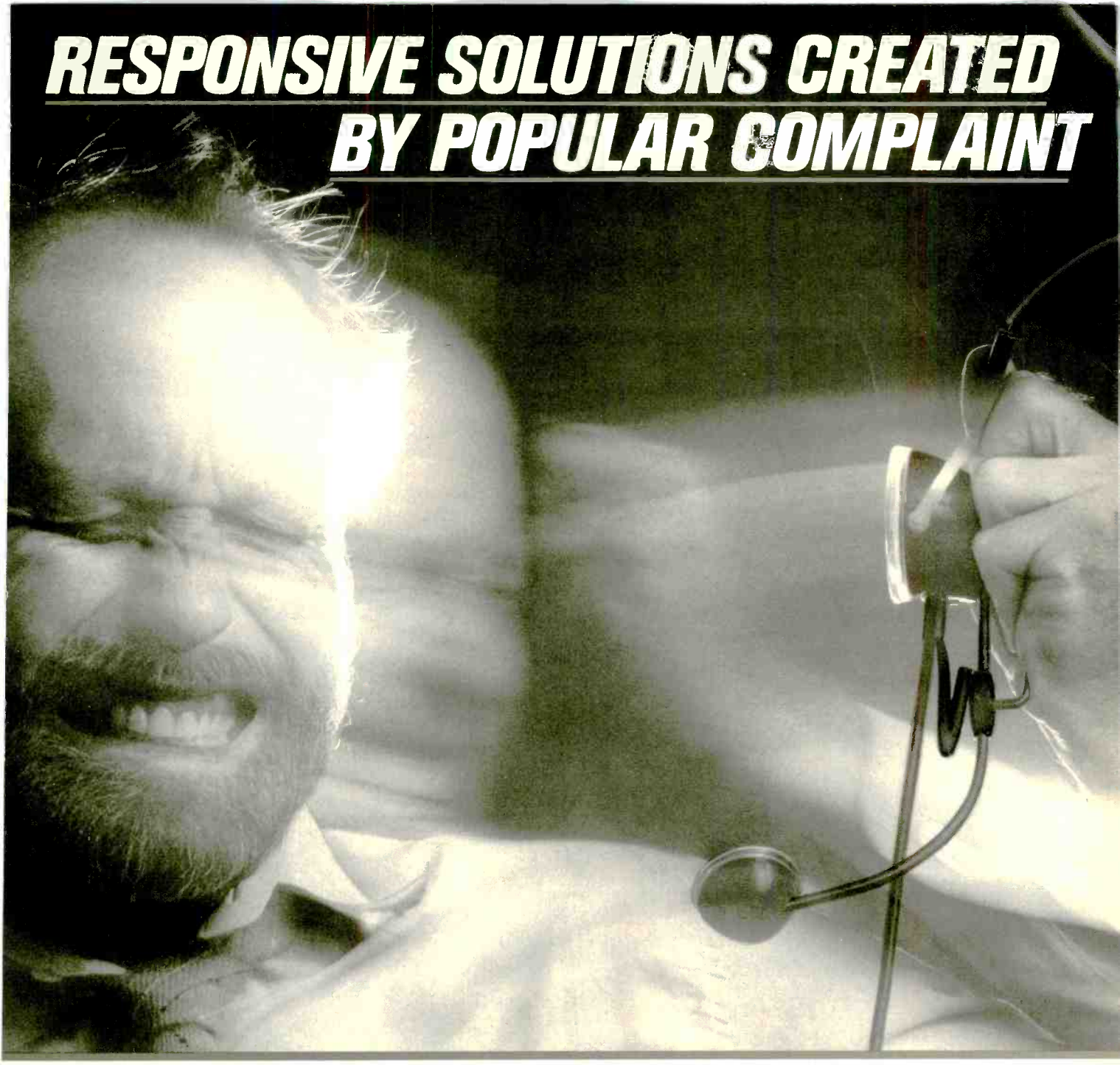

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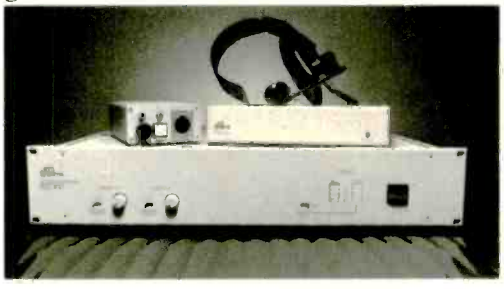

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The audio time compressor/expander from Lexicon is a dedicated computer with keypad control of all playback parameters.

modates seven packs, providing four hours and 40 minutes of digital effects on line at any time. This all adds up to something on the order of 30,000 to 40,000 stored effects, which are instantly retrievable and can be modified in volume, intensity, length, and equalization.

The data is stored and indexed in the computer by name and number and can be easily accessed. Once the effect is found, the sound engineer listens to it and, if he doesn't like the effect, he skips over it. If he likes the sound, he pulls it out, and tells the computer to insert the effect on the tape at the specified SMPTE time code. The duration is determined by entering time code points for the effect's beginning and ending.

The modification of the effect is accomplished at the custom-built ACCESS console, which has the facility for up to 24 tracks of audio assignment, three-band equalization, and slide faders to control gain and pitch. The effect is retrieved and auditioned while the gain, pitch, and EQ are adjusted. If the sound is satisfactory, the engineer lays it on tape and enters it into the computer, which locates it in the index next to the original, unmodified effect.

A list of all edits and effects executed are listed by time code on a computer printout for easy reference. The list states the name of the effect, its duration, and index location in the computer.

Digital effects can save money

The drawback of such sophisticated equipment is, of course, the price tag. Advanced, dedicated computers are expensive to buy, and the expense is difficult to justify unless the facility has a heavy schedule of commercial production or other creative audio work.

There is, however, a viable alternative which puts digital effects capability within range of any who work with audio—simply the small digital effects boxes mentioned earlier. Several companies make quality units with prices ranging anywhere from $400 up. The small delay and reverb units have many effects contained within them and offer the fine control and reliability of digital processing.

The bottom line is that there is no excuse for claiming the bottom line doesn't permit the purchase of digital effects. With a little creative application, the devices can work to improve the financial picture rather than be a drain on it. The investment return has proved to be there in the form of commercial production and post-production, or simply in distinguishing one station's sound from all the others. The potential is there for any application in any market. In short, digitize and be recognized. **BM/E**

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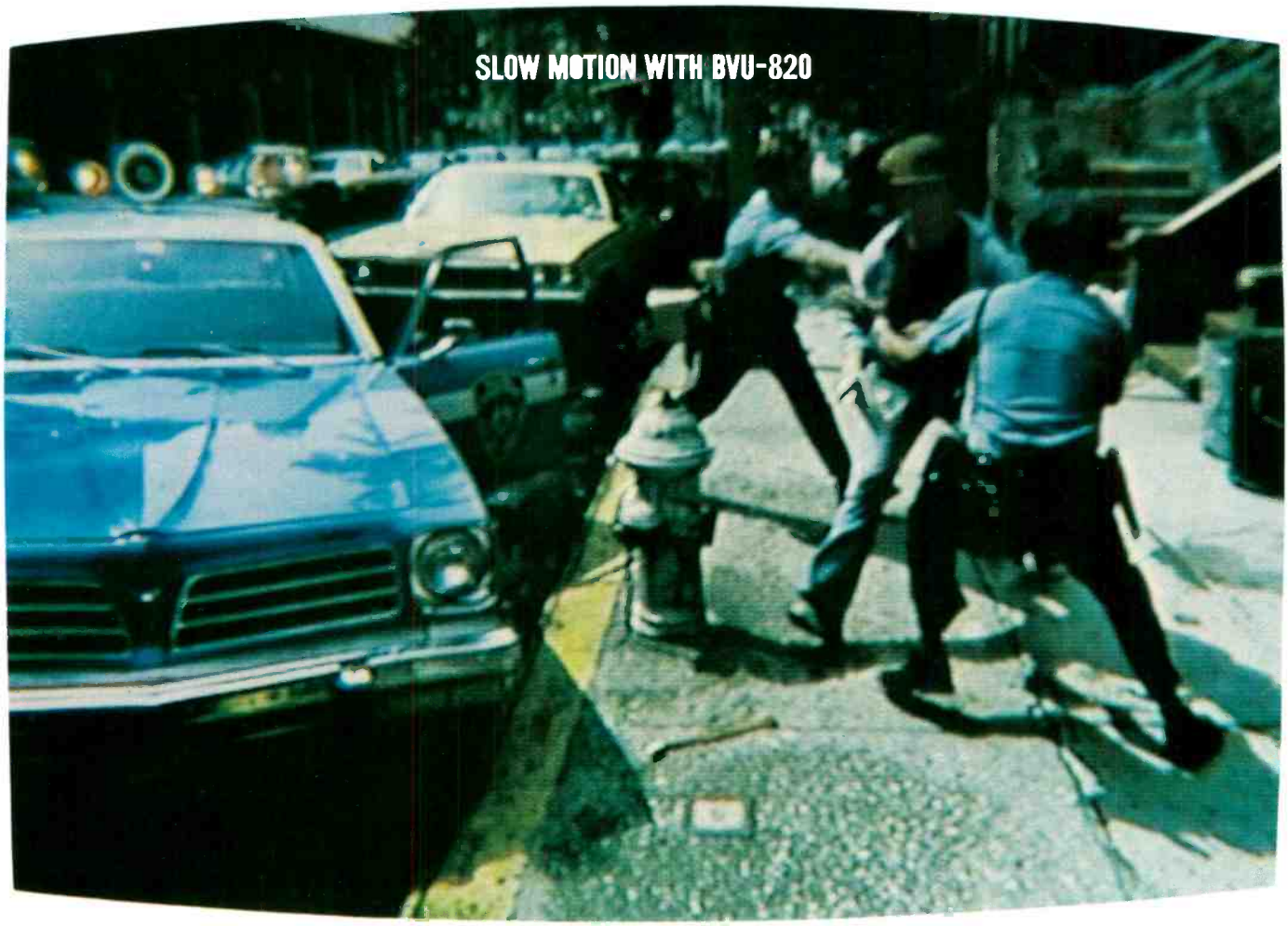

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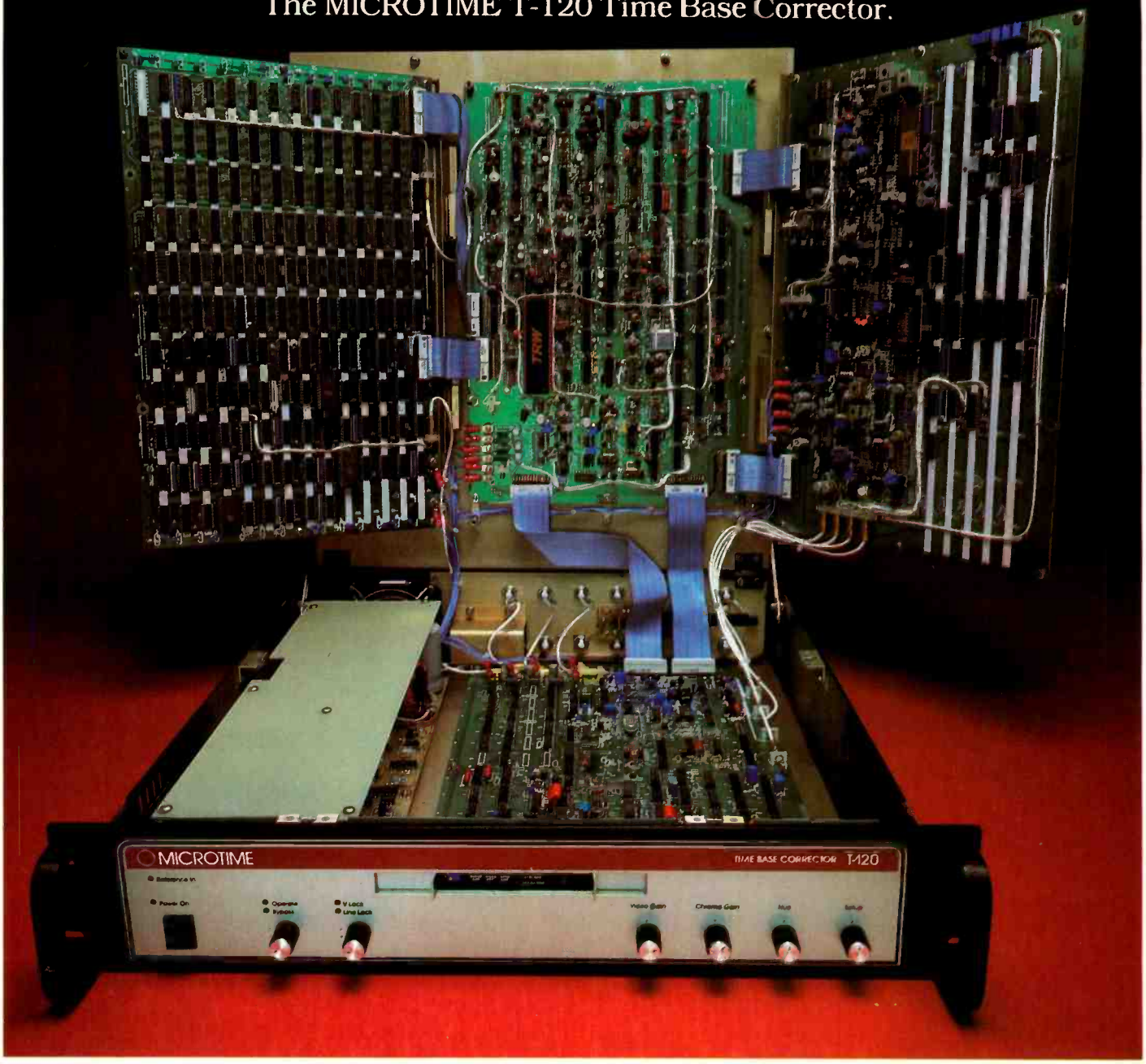

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SMPTE 1982: Broadcasters Discover a New Sense of Reality

IT WAS BUT A YEAR AGO that the industry was buzzing with the idea that an all-digital TV plant might not be that far away. International sampling standards were in the midst of being set; digital VTR development was thought to be proceeding smoothly; manufacturers of various digital "boxes" appeared to agree that a digital interface standard was just around the corner. At the same time, the course appeared to be set for HDTV, computer graphics, broadcast teletext, and a number of other new technologies discussed at the 1981 SMPTE meeting.

But a funny thing is happening on the way to the digital studio. The industry is apparently detouring through the analog component route originally suggested by manufacturers of small-format recorders (Hawkeye, Betacam, Lineplex—take your pick); and the ETA of the all-digital plant is being delayed—five to 10 years, some fear.

Nowhere is this new thinking about digital more clear than in ENG/EFP applications. Merrill Weiss of KPIX, San Francisco, is just one of those who is exhibiting a new sense of reality about digital. A year ago, when Weiss traced out the steps he was planning in getting to the all-digital studio, he foresaw a need for a quite separate ENG department. Since then, he has revised his thinking to show an improved interface between analog and digital, thanks to the advent of more compatible analog component equipment. Although the performance of today's ENG equipment doesn't measure up to what is to be expected in the digital post-production suite, the advent of improved tape could satisfactorily close the gap between 4:1:1 and 4:2:2 digital systems.

Nor is digital TV the only technology apparently being downgraded. Last year the goal for HDTV was 1125 lines of resolution—something equivalent to 35 mm film in quality. This year the target seems to have shifted to something far less idealistic—upgraded 525-line compatible TV.

Even more telling, at last year's Los Angeles SMPTE conference, computer graphics were all set to invade TV-land. This year in New York, only a few systems that had crossed the border could be sighted.

A new sense of reality (or perhaps even conservatism) has emerged, and the transition to tomorrow's radically changed broadcast or production plant is going to be anything but smooth.

The analog components

Indeed, as broadcasters began to plot the all-digital studio using the new international standard (4:2:2 component sampling as opposed to the traditional composite signal), they recognized that when interfacing with analog equipment it would be desirable to work with analog component signals.

Analog components? At first the concept seemed unrealistic. But it was quickly realized that the new small-format recorders used in one-piece recorder/cameras are already of the component type—luminance signal is recorded on one track, chrominance signals on another. And these new recorders began to catch the attention of all-digital planners as a necessary part of the plant of the future, especially for ENG and EFP applications, since no one can yet envision a compact, portable digital VTR.

So while the SMPTE committee working on half-inch tape standards failed to recommend either the Beta- or the VHS-based format for standardization, a new Working Group on Component Analog Video Standards has just been formed to see if agreement can't be reached on the coding scheme used in the recorders.

Despite the speed with which these developments have been taking place, it appears that analog component signals are now part of a broadcaster's life. The question becomes, of course, which form of analog components is best—frequency multiplexed components such as the YIQ frequency-modulated signals of the Matsushita (Panasonic)/RCA format, or time-multiplexed components, represented by the Sony Betacam approach (R-Y and B-Y signals). The Bosch Lineplex format, developed for its quarter-inch recorder, uses similarly derived color signals, but, through expansion of the luminance signal and compression of color signals, it intermixes both on the same track. A full picture is read out of the two lines.

The case for analog component signal processing for ENG/EFP applications was spelled out by RCA's C. Robert Thompson in the SMPTE session on small-format recorders. In the analog composite domain, recording is by color subcarrier, which is, of course, bandwidth limited. The secret of producing outstanding picture quality on small-format recorders is the elimination of color subcarriers. For high-grade NTSC signal recording, Thompson says all active lines, both luminance and chrominance, must be recorded.

The Hawkeye approach, which records the Y FM signal and the I and Q FM signal on separate tracks (see "The 5 mm Difference," *BM/E*, March 1982, p. 191), delivers full NTSC bandwidth—4.2 MHz for luminance, 1.5 MHz for chrominance I, and 0.6 MHz (6 dB down as per FCC specs) for Q.

Thompson also pointed out some of the differences between the RCA and Sony machines. Whereas Sony offers a higher head-to-tape speed as a result of a larger drum diameter and thus has an edge in regard to wavelengths recorded and magnetization depth, RCA's wider track width (on its larger cassette), which is 175 microns, compared to 73 for Sony, offers a larger magnetization volume and an inherently greater video channel capacity:

Sony three-tube Betacam.

1.89, compared to 1.0. For audio, ChromaTrak offers an even greater ratio of advantage, Thompson said.

T.E. Mehrens from Sony revealed, however, that the high head-to-tape speed of the Betacam allows the recording of the newly developed compressed time division multiplex component recording format; luminance is recorded on one track while R-Y and B-Y color difference signals are compressed 2:1 in time and alternately recorded on a second track. In the playback process, R-Y and B-Y signals are restored to their original form and delayed 2H. The time difference is compensated by a digital retiming built into the BVW-10 player unit.

And Sony evidently means serious business when it comes to capturing the recorder/camera market; it showed for the first time a working model of the BVP-3 camera—a three x ⅔-inch tube version of the Betacam camera head fully interchangeable with the current three-stripe version. Weight of the new camera is 9.5 pounds, bringing the total system in at 17 pounds without lens. Performance specs are impressive: more than 600 lines resolution, 58 dB S/N, and sensitivity rated at 2000 lux at f/4 with 89 percent reflectance. Power consumption is only 11 W.

The SMPTE small-format recorder session afforded attendees the opportunity to learn something about the Bosch quarter-inch Lineplex system, unveiled last April at the NAB convention. Henry Zahn of Bosch said Lineplex leapfrogs the confusion generated by the two incompatible half-inch formats. According to Zahn, while the Bosch recorder works with much narrower tape, it does not sacrifice signal-to-noise. By doubling the recorded wavelength and halving the track width, a 3 dB S/N improvement can be achieved for a given surface area.

Taking advantage of the fact that the density of the chrominance recorded signals in NTSC is three times less than that of luminance, Bosch elected to use a signal expansion and compression technique to record equal densities by expanding luminance by a factor of 1.5 and compressing chrominance by two.

Two tracks are used to record odd and even tracks of multiplexed luminance and chrominance. By displacing heads, two horizontal line intervals are located in parallel in correspondence with appropriate picture elements.

The Bosch camera/recorder became a real contender at the SMPTE conference. Bosch had a working unit of the below-16-pound complete system producing superb pictures in its Sheraton suite. The company also showed an edit controller for two recorder decks, indicating full system possibilities. Although Bosch wasn't taking orders, it indicated it would be ready by the next NAB.

Ninety percent single-piece by 1988

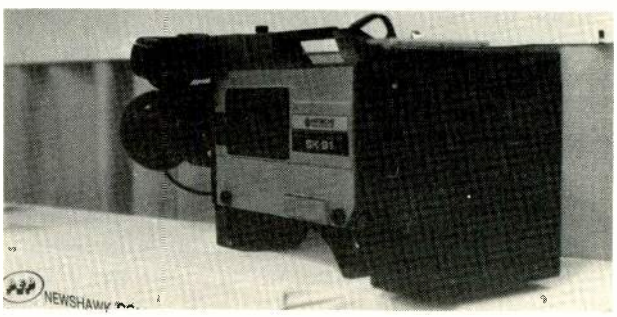
Nor were the Sony, RCA, and Bosch recorder/camera systems the only ones on view. At Panasonic a spokesman said he expected that single-piece camera systems would dominate the market—rising as high as 90 percent within the next five years. Naturally the company hopes to corner some of this market with its ReCam system.

Ampex, too, has entered the field with ARC (Ampex Recording Camera), with both recorder and camera sections OEM-manufactured and of no relation to the BCC camera line or Ampex-manufactured VTRs.

Ikegami, too, is making use of the Matsushita-developed recorder, coupling it with the Ikegami HL-83 single-tube lightweight ENG camera. Craig Sloss of Ikegami says the company is not permanently "married" to this recorder, however, and points out that the HL-83's side-mounting bracket allows for the attachment of virtually any small-format recorder. "Why weigh the cameraman down with half-inch?" says Sloss. Ikegami, which has sold 3500 HL-79s in the U.S. alone, is off to a running start with its small-format program, having made a major sale to WNEV-TV along with Panasonic (see *BM/E*, November 1982, p. 18).

Hitachi made news by showing not one but *two* fully engineered recorder/camera units: the SR-10, using the half-inch "M"-format (Matsushita) recorder, and the SR-1, incorporating a high-quality quarter-inch format recorder. Both units on display used the new Hitachi SK-1 high resolution MOS image sensor camera head, introduced at NAB, but Thomas Califano said the SR-10 (M-format) would also soon be available with a three x ⅔-inch tube camera. The separate recorder portion would be pin-compatible with either the solid-state camera or the tube camera. Hitachi showed a complete system in the M-format, including an HR-50 standalone field recorder and a complete editing system.

The SR-1 is *not* the color subcarrier-under system shown in prototype form at earlier NAB shows, but a full professional-quality quarter-inch unit taking the analog component route with a luminance channel and a multiplexed I/Q channel. Developed under a research contract to Nippon Television, sample units are being made available to the U.S. networks, and the format structure has



The Hitachi SK-91 with PEP/Frezzolini-adapted VHS-C recorder.

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been submitted to the SMPTE, in case the formats standards group decides to retackle the problem of proposing standards. Although the SR-1 has not yet been committed to production, that decision is not far away, Califano intimated.

Finally, as if the two half-inch and two quarter-inch formats just discussed did not offer enough choice, JVC has come along with another possibility (one which Julie Barnathan at ABC says is just as interesting to him as any of the others). The VHS-C format is a *standard* VHS recorder, except scaled down so the cassette is little larger than a pack of cigarettes. The field recorder clips onto any camera and provides, if not full broadcast quality, then at least ENG-acceptable signals. Then, for editing, the tape is taken out, placed in a special adaptor, and played on a standard VHS player for editing.

JVC is offering the recorder as a package with one of its industrial-grade cameras, but both Frezzolini and PEP have also jumped on the bandwagon. Available through both is a VHS-C recorder made to attach to ENG cameras by using the clip-on bracket which normally mounts an on-board battery.

"Ordinary" VTRs and cameras

In all the excitement over the small-format recorders it is easy to miss a major new development in one-inch VTRs—the Ampex VPR-5. Weighing in at just 15 pounds, the recorder offers full bandwidth field recording in a package smaller and lighter than portable ¾-inch decks. First shown at the IBC conference (see *BM/E*, November 1982, p. 18), this was the VTR's U.S. debut. An Ampex spokesman said the VPR-5 was developed in part in response to the lightweight one-piece units.

Developments were shown in cameras, too. Though not in the single-piece market, CEI/Panavision Electronics (the newly formed merger offering film-style products to the TV industry and TV technology to filmmaking) brought out the new 310SP, a "special performance" model of the CEI 310, featuring its microprocessor control system. This camera is definitely intended for the EC market, according to national marketing manager Alan Sheffield, but it doesn't overlook the needs of the traditional EFP production. Processing is the key to achieving the "film look," with the incorporation of four different clip levels to achieve smoother transitions. Sheffield also said the Foton studio camera—"automation that's affordable to all stations"—is now in full production with first deliveries due soon.

Both RCA and Hitachi showed new portable versions of their automated studio camera systems, designed for full integration with master setup panels.

Among lens manufacturers, Canon led the way with two new models for ⅔-inch cameras. The first, according to Jack Keyes, VP, is an "economical" 15:1 zoom priced at $2100 and therefore filling a gap between low-quality/low-priced zooms and premium quality models. Maximum aperture is f/1.8 from 9.5 to 112 mm, and f/2.3 out to 143 mm. Canon's other new lens is a 15X zoom for 2/3-inch studio-type cameras.

Angenieux, too, had a brand-new lens—a 10-120 mm, T/2 model designed for cine cameras. The 15x9 ENG/EFP lens and the 14x7 lens for half-inch tube cameras introduced at last year's NAB were also prominent.

PHOTO: RICHMOND JONES

A lively display of new camera technology at CEI/Panavision Electronics.

Jack Dawson, VP of Fujinon, made no startling product introductions, though he revealed that Fujinon manufactures close to 95 percent of all beam splitting and dichroic filter assemblies used on every manufacturer's cameras. Dawson also promised major new developments come NAB time, with perhaps some additions to the electronic cinematography prime lens line by then.

Among pickup tube manufacturers, EEV has a new ½-inch tube for the new generation of cameras such as the Hawkeye, but the tube isn't in mass production yet and the company is taking a wait-and-see attitude as far as half-inch is concerned. Amperex, which introduced its 80XQ half-inch tube at NAB, is also cautious about the market; spokesperson Lee Nowell doesn't see much happening with half-inch cameras yet.

News as king

One way of reading the increased emphasis on realism is increased attention to bottom-line profits. And with some stations reporting 60 percent of their revenues as coming from local news operations, manufacturers have been targeting newsgathering as never before; news is king when it comes to revenues, and the news director has become a major station influence.

The development of single-piece recorder/cameras is only the tip of the iceberg. Harris, for instance, brought its line of ENG microwave gear—a rarity at SMPTE shows, with SMPTE itself confessing that transmission is not its area of expertise. Even rental houses with regular network news clients may be getting into the act (it's still impossible to rent a microwave system from any of the major rent-

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al centers, including Camera Mart and Victor Duncan). The problem, according to John Sullivan, who owns a rental company in Boston, is that systems are relatively expensive and demand for them, though heavy for occasions such as election night, just isn't there year-round.

Editing systems, which *are* traditional at SMPTE shows, also showed this trend towards the smaller system designed primarily for news. Karen Mills, product specialist at EECO, demonstrated EECO's brand-new entry into the editing field (they've been OEM manufacturing for Ampex and RCA until now). The IVES-1 (Intelligent Video Editing System) costs only $5500 for a two-machine system (successors to the IVES line, such as IVES-2, may be available by NAB). The system has an internal AFV switcher for split edits, a black burst generator for "striping" tape, and a CRT with full information about the status of the edit, including time code displays, while the editing console has a unique thumbwheel-like joystick with extremely positive response.

Meanwhile, Joseph Horning, describing the new Datatron ST-3 moderately priced editor, claimed "people are saying they find this system 20 percent faster because of the dedicated keyboard and positive keystrokes without having to use a dialog with the machine." Moderate pricing in this case is under $40,000 for a basic three-machine editor plus special effects switcher interface, but the system can be expanded to five machines plus interface. Perhaps best of all, says Horning, the ST-3 uses the same interface cards as the Vanguard, so it comes onto the market already fully interfaced with most VTRs.

Still an attention-grabber among editing systems, Control Video's Lightfinger is now in a "Plus" version that includes list management. Its advantage lies in the operator interface, since the editor merely touches an interactive screen to call up the various editing capabilities—completely eliminating mechanical machine remote control.

Even Control Video, a technological innovator for the past several years, is taking a more realistic approach. Whereas the system was being marketed to film-makers until fairly recently, the marketing effort in this direction has now taken a back seat to the TV market push. With Harris said to be experiencing some difficulties with suppliers of the film-rate time code generators used in its EPIC-based film-style editor, this leaves really only Convergence with its ECS-104 contending for the still rather small number of film producers who are shooting film, transfering to tape for post-production, then going back to film for release using the automatic shot log generated by the video editor.

CMX/Orrox, whose FLM-1 film editor is also being heavily promoted by Laumic, appears to be ideally positioned for those film-makers who simply want to apply electronic technology to the editing process—especially with the new Kodak Datakode development (see the discussion under "Film and tape").

Editing systems being designed more and more for the expediencies of news operations are only half the story,

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Every broadcaster knows the problems of on-air telephone links. The garbling when announce-feeds go out simultaneously through the board and the phone. Or the mysterious cutoffs in the middle of an important interview when line noise or sibilants generate 2600 Hz for a disconnect signal.

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however. For since more and more news operations have their own technical areas within the station and roll their own material to air directly from their own VCRs, several companies have come onto the market with cart deck controllers designed not for massive program automation systems but for smaller, news-style operations. One of the most prominent was the Lake Systems La-Cart, which handles up to 30 machines, including U-Matic and Type C decks—Control Video OEMs the system's finger-control interactive CRT.

Also eyeing this market, however, is Vital. Jim Moneyhun, the automation project manager, confided that the SAM automation system was being seriously thought of for post-production as well as newsroom origination applications. The time code-based operation, and use of a DEC mainframe, make tailoring to fit any applications a simple task.

Videomedia, too, has a new product offering in this area. STC-1 is an expandable remote control system operating over twisted-pair wiring and capable of controlling virtually any kind of tape transport. Again, the emphasis is on somewhat smaller applications than the massive station automation systems which became available a few years ago but were rejected.

Systems such as Videomedia's, almost unthinkable at a SMPTE show a few years ago, are suddenly very popular. Even Microtime, which introduced a simple videocassette automation controller to the cable industry last year, may be planning to market actively to broadcasters soon.

IVES, the new low-cost editing system from EECO.

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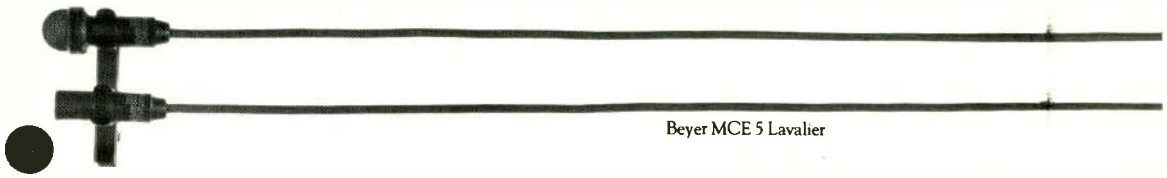

Beyer MCE 5 Lavalier

Beyer M 260

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With lavalier mics, small is not enough.

Electret condenser lavalier mics like SONY's ECM-50 have proven useful for on-camera miking situations because of their reduced size. And while many of these mics offer good performance in a compact size, the Beyer MCE5 also provides extended frequency response (20 to 20,000 Hz) and durability in an even smaller format (diameter: 7 mm / length: 23 mm).

To optimize its compatibility with a variety of broadcast and film applications, the tiny black MCE5 is available in different configurations for powering interface and includes a system with accessories like windscreens, expansion mounts etc.

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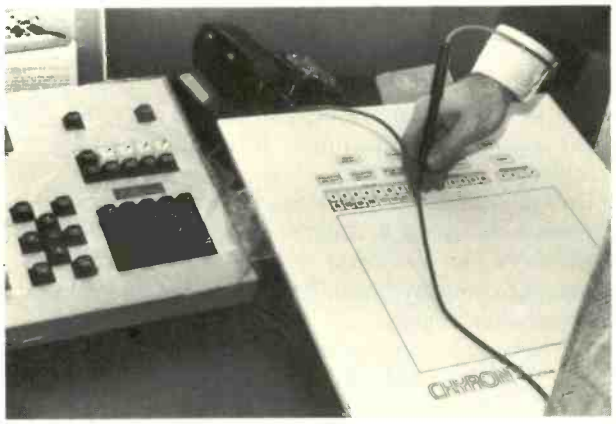
Quick and dirty graphics

As noted at the beginning of this report, even the high-priced, ultrasophisticated world of electronic graphics is facing up to the realities of the current broadcast and production environment. Let there be no mistake, of course, that in larger markets and for networks the high-ticket graphics devices will continue to make their impact. Units such as the MCI/Quantel DPE line and the Mirage system, the Ampex ADO, Bosch's new 3D effects generator, the Vital SqueeZoom, and the Grass Valley DVE are going to continue to draw crowds with their dazzling effects packages (including the movement towards three-dimensional effects as an industry-wide trend—see the report elsewhere in this issue). And electronic still stores such as the ADDA ESP, Ampex ESS, and MCI/Quantel DLS will also continue to make inroads. But the real push is towards the low-cost systems, the systems that will interface immediately with current stations or facility operations, systems that expand current capabilities without forcing a commitment to extensive new hardware.

At the top of this list of companies is Chryon, which continues to expand the software of its Chyron IV—now able to manipulate the character generator output in simple digital effects patterns. "If someone already has our character generator," observes Dave Buckler, "why should they have to invest in a digital effects system?" Chryon's new package also includes camera-based font compose and the digital art/paint system first previewed at NAB. The character generator can thus become the basis of a complete electronic graphics system for only an extra $6500.



Add-on graphics module for the Chyron IV.

Also high up on the list is Bosch, which has come out with a graphics generator that can be used either stand-alone or tied to a character generator such as the Compositor I. According to president William Butler, the low-cost system offers the artist 16 colors per image chosen from a field of 65,000. Automatic filling is offered, as is full cut and paste and a wide choice of electronic brush and pen styles. Up to 64 images can be stored on each replaceable 10-megabyte cartridge.

With the move towards lower-cost systems so preva-

lent, digital art/paint systems may be in for a hard time of it—especially sophisticated units such as the Quantel Paint Box; it's still a show-stopper, since it does things which no other system can, but besides networks and larger teleproduction facilities, who will be willing (or able) to pay the price tag?

On the more affordable scale, companies such as Via Video are still trying to drum up interest. Via announced at the show that Videograf, a Highland Park, NJ-based production company, would become its east coast service/demonstration center.

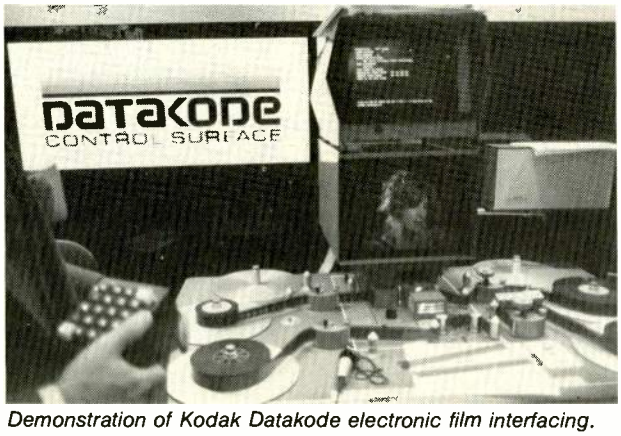
A newcomer to computer-graphics-for-television, Online Computer brought out the Cyber-Limn system. Ten Z-80 microcomputer chips are run together in parallel arrangement to add considerable graphics depth at minimal cost.

Film and tape: the gap closes

With film and tape busy borrowing each other's techniques and technology, the once-formidable split in SMPTE's personality is closing fast. Perhaps the most-talked-about breakthrough in the film-tape area came from Eastman Kodak, which announced that it will soon begin producing film stocks with a "functionally transparent" magnetic coating called Datakode, which covers the entire underside of the film in a physical marriage of film and tape technology. Kodak envisions Datakode as a tool for automating those aspects of film post-production that it terms labor-intensive and basically uncreative, and demonstrated its use on a film editor equipped with a magnetic read head.

Exactly what information will go on the magnetic coating and how film equipment will interface with it is not final, but it is certain the film industry will waste little time in supplying the answers. The Motion Picture Association of America (MPAA), in fact, formed an ad hoc committee to explore the new technology's potential shortly after Kodak first demonstrated its feasibility last June. Ed DiGiulio, president of Cinema Products and chairman of the committee, says equipment will be available to exploit Datakode by the time Datakode is available—the second quarter of 1983, according to Kodak. Users will be able to get the coating on a variety of 16 and 35 mm stocks.

The most obvious application of Datakode is the recording of time code for ease in post-production. As Kodak's William Peck noted, standards will be required for both the code format and the content. DiGuilio says the manufacturers involved in the MPAA committee have already agreed that SMPTE time code is best for the purpose, and have also agreed to record the code at the film standard of 24 fps.



Demonstration of Kodak Datakode electronic film interfacing.

Kodak, which steadfastly maintains that film will remain the production medium of choice, also introduced a new film stock at the show—5294, a 35 mm color negative film rated at 320 ASA; the 16 mm version, 7294, will be available in the second quarter of this year.

The interplay of film and video was the subject of many discussions at the show. Tom Mann of Image Transform, for instance, is a strong advocate of video post-production for film material because of the speed of the process and the availability of broadcast-quality special effects. He urges remaining at 24 fps for the whole process, thereby eliminating the likelihood of bad edits created by the 3:2 pulldown problem. Mann is also involved in the Image-Vision "higher definition" TV system, which gives increased video quality with unmodified cameras and VTRs.

A major problem in film-to-tape transfers is turning out to be a lack of standards, for which Kodak has proposed two solutions: the use of Kodak's telecine analysis film (TAF), and the Eastman Color Monitor Analyzer (ECMA) for gray-scale alignment of telecines, which Kodak found highly variable in a survey of 20 transfer facilities. TAF is designed as a film tool for telecine alignment; ECMA is a sensitive light meter with digital readout.

On the exhibit floor, A.F. Associates, at SMPTE for the first time, showed a Marconi B3410. Response was reported as good, especially from film people. AFA's Rich Lunnis conceded that the Rank Cintel flying spot scanner has plenty of vitality left but asserted, "There's no doubt that CCDs are the future technology." CCD telecines are gaining acceptance, Lunnis said; at any rate, the telecine field provides "plenty of work for everyone."

On the other side, Rank Cintel steadfastly maintains the superiority of its flying spot telecine, the Mk III, which it says avoids black stretch and noise problems found in CCD models, and gives true live-frame still images. Rank had literature on its telecine color corrector, Amigo, expected to be ready by this spring's NAB.

Across town, TVC Video was putting the solid-state Bosch FDL-60 telecine to work at its brand new post-production facility—spawned by TVC film labs and designed by A.F. Associates. TVC actually installed the first FDL-60B2 units to hit the market—capable of A/B roll transfers. The Dubner color corrector, also capable of A/B roll operation, was being converted while the show was in progress. Typical of today's post-production facilities, TVC offers full-service editing with Chyron IV + font compose graphics, an MCI/Quantel DPE-5000 digital effects system, Neve audio console, and CMX 340X editing.

Color correction was a hot topic at the Magnasync/Moviola booth, where the low-cost Videola telecine was interfaced with an L-100 color corrector from Corporate Communications Consultants (which had a full color correction system set up in its own booth). With the L-100, the Videola color corrects from film to video or video to video. Magnasync/Moviola claims to be unthreatened by

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Marconi's B3410 solid-state telecine at the A.F. Associates booth.

the high-end electronic telecines; it says its simple mechanical system appeals to a larger market than its competitors'.

Audio worthy of video

Another reality in television broadcasting is the growing interest in upgrading audio quality. This trend was apparent not only at SMPTE, but at the AES convention held two weeks earlier in Anaheim, CA. Two of the reasons broadcasters and teleproduction houses are moving into pro audio equipment are the growing sophistication of audiences and the increased availability of so-called component TV receivers. And there is now hope that multichannel television will eventually emerge from the standards-making process. Better sound will be simply good business.

At the same time it's good business for the audio equipment makers who have seen the music recording industry go flat to go after the video market. Finally, the technology and hardware to mate quality audio with video are available at increasingly lower prices.

The scenario, as SMPTE speaker Paul C. Buff of Valley People, Inc., outlined it, is "more for less . . . more sound/less cost, more manipulation/less operational complexity, more control/fewer controls. No processing function need be limited by human speed or cost."

A down-to-earth design of an audio mobile van for use with remote TV broadcasts—some broadcast live internationally—was described by Steve Colby of WGBH, the Boston PBS station (see *BM/E*, November 1982, p. 43, for a detailed description of the WGBH bus). For a vehicle, the GBH engineers decided against the more-familiar truck or tractor-trailer combination in favor of a used motor coach. A bus was chosen not only for the large amount of space available in the interior but for the ample storage capacity underneath and for the more-than-adequate suspension system.

Another manufacturer deeply committed to the audio-for-video movement, Otari, showed its 5050B-II quarter-inch reel-to-reel recorder. Product manager John Carey said the transports are specifically designed to interface with video editors and SMPTE code-based controllers; and he said he expected more and more business from the TV market segment, including both production houses and stations.

Audio Kinetics showed not merely the synchronization of ATRs with VTRs but automated audio sweetening and sound effects assembly using its powerful software programs, Q-Lock. AK also showed how dialogue is replaced automatically in the popular TV program *Hill Street Blues*.

Dolby, too, pushes more and more towards the video end of the marketplace with its noise reduction modules for both Ampex and Sony VTRs. Delivery is expected to begin shortly on the new Ampex units which not only reduce noise but generally improve the entire audio section.

Digital audio debate

It seems clear now that in both the television and motion picture industries digital audio has a future for program production and post-production. The present barriers to wide use of digital audio—high cost, interfacing problems, scarcity of needed equipment links, and so forth—are going to give way to the large-scale development activity now going on in production operations. Only 3M brought its digital audio recorder to the show; but several more can be expected at NAB.

Intense work on digital video will ease the coming of digital audio in a number of ways, says Birney Dayton of the Grass Valley Group, including the provision of pathways of wide bandwidth.

David Spencer of Walt Disney Productions described this very elaborate plant, based on four multitrack digital audio machines (3M), nine videotape machines, and a distributed processing control network. Spencer emphasizes the necessity of having SMPTE code tracks on both the audio and the video machines, so that all could be tied to house sync. Each frame of the code on the digital audio machines is assigned to a specific number of samples, so that video and audio are exactly synchronized.

Spencer also notes that the great quality improvement inherent in the digital audio, the ability to dub it as often as wanted without loss, and its time-base structure were all important in the digital choice.

Another large digital audio installation is at Lucasfilm, the production plant in San Rafael, CA where *Star Wars* episodes are created. It was built to be an audio processing station for all the functions of sound editing, synthesis, and mixing, for film sound production. The raw sounds are digitized and stored on computer-style discs. They are kept in digital form until they are at the output of the plant, when signals are recorded in analog form on six-track master.

Again, the elimination of generation loss is very important, as is the complete automation of the mix and edit process. The editor, by pointing to the list of segments on the computer readout, assembles premix segments automatically.

Ken Davies of the Canadian Broadcasting Corporation gives a number of reasons for looking forward to the all-digital video studio: transparency, capability of many generations, and very sophisticated processing. He notes

"The Electro-Voice Sentry® 500 is a monitor by design."

Greg Silsby talks about the New Sentry® 500 studio monitor...

Everyone expects a studio monitor system to provide a means of quality control over audio in production.

True, other audio test equipment can supply you with valuable data. But that data by itself is incomplete and only displayed in visual form.

Only a true studio monitor speaker system can deliver an accurate indication of audio quality in... **audio**! After all, this is the language of the trained ear and doesn't require a complex interpretation process.

I believe the Electro-Voice Sentry 500 Studio Monitor System will meet your every expectation.

What's a "studio monitor?"

The term "studio monitor" is often a misnomer. It's easy to tack a label on a box and call it a "studio monitor" without including the best precision engineering available, and careful attention to application design. Too often, these all-important considerations are traded-off for such marketing reasons as high cosmetic appeal, a particular type of popular sound, and low component manufacturing cost. While all of this may translate into high profit margins for the manufacturer it does nothing to produce a reliable standard for audio testing and evaluation.

Linear frequency response

The Sentry 500 follows the well-established Electro-Voice tradition of combining the most advanced engineering and manufacturing technology available. The Sentry 500 has been carefully thought-out and built to meet the specific needs of the audio professional. Like the smaller Sentry 100A, the Sentry 500 provides linear response throughout its range (40-18,000 Hz ± 3 dB). In fact, because the two systems share this linearity, program material may be mixed on one, sweetened on the other, with complete confidence in quality. Acoustic "Time Coherence" (the synchronous arrival of acoustic wave fronts from both high and low-frequency drivers) has been maintained through careful crossover design and driver positioning.

Constant Directivity

The Sentry 500 is a Constant Directivity System, benefitting from years of E-V experience in the design and application of constant directivity devices. Utilizing a unique E-V-exclusive high-frequency "Director", the Sentry 500 provides essentially uniform coverage over a 110° angle from 250 Hz on up to 10 kHz and 60° dispersion from 10 kHz clear out to 18,000 Hz! And it does this on both the vertical and horizontal axes. This means the "sweet spot", once a tightly restricted area large enough for only one set of ears, has been broadened to allow accurate monitoring by the engineer, producer, and talent—all at the same time. That's what we call Constant Directivity.

A monitor by design

To qualify as a truly accurate test device, a monitor speaker system must faithfully reproduce the wide dynamic range required by today's music and current digital recording techniques, and do it with low distortion. This is no problem for the Sentry 500 which combines the high efficiency of an optimally-tuned Thiele-aligned cabinet to the brute power handling of Electro-Voice Sentry components. Consider what you get with proven E-V components in the Sentry 500: the Sentry 500 will deliver 96 dB at one meter with only one watt and yet will handle 100 watts continuous program material with 6 dB of headroom. That's 400 watts on peaks! The same Super-Dome®/Director combination which maintains uniform dispersion of linear response out to 18 kHz also handles a full 25 watts of program power or 5 times the power handling capacity of most "high powered" tweeters. After all, tweeters should convert electrical energy to acoustical energy—not to smoke and fire.

The Sentry 500 is another no-nonsense Electro-Voice Sentry design with the incredible performance and credible price you've learned to expect from EV. I'd like to tell you the rest of the Sentry 500 story and send you the complete Engineering Data Sheet. Write to me: Greg Silsby, Market Development Manager/Professional Markets, Electro-Voice, Inc., 600 Cecil Street, Buchanan, Michigan 49107.

Greg Silsby

Market Development Manager, Professional Markets

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that the changeover would be expensive, but urges the industry to begin it. On digital audio, says Davies, both the video and the audio can be synchronized from a common 4.5 MHz clock, allowing digital audio to become a necessary part of the studio.

The vexing questions of standards and interface specifications for digital audio are getting attention from Alistair Heaslett of Ampex Corporation, chairman of an Audio Engineering Society committee which is offering the industry a forum for standards discussions. The group has centered discussion on a proposal from Sony, Studer, and EBU for an internal interface code specification of 20 bits, with four more bits available for expansion. This would allow interchange of audio signals processed in the digital domain, which will often involve bit multiplication; without more capacity than the 16-bit standard, the "round-off" necessary would be very deep. Commenting later on the proposals for using twisted-pair cabling to link digital audio equipment, Heaslett said that cables with a characteristic impedance around 100 ohms were capable of handling the necessary bit rate.

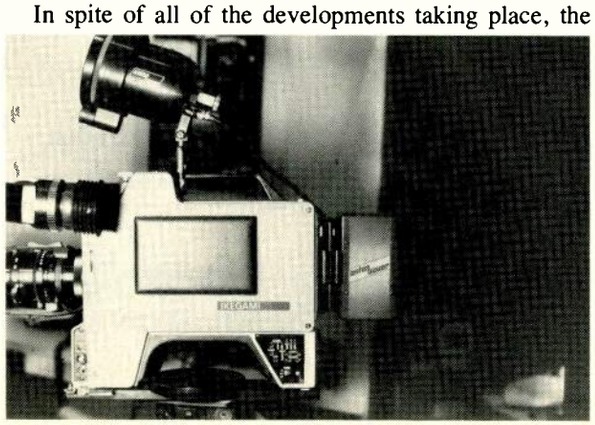
Getting a grip on production

The exchange of ideas leading toward efficiency, versatility, and a control of production costs was the order of the day for makers of lighting, power, and grip equipment. The interplay between manufacturers and broadcasters engendered an often uneasy, but nevertheless firm effort by both factions to meet the challenges of future production needs.

Ken Licata, a leading cinematographer, agreed with many other people when he said, "There is a need for a more intensified move to miniaturization, especially with HMIs. We need 6K and 8K luminaires that are smaller, lighter, and more efficient, both for film and television."

The manufacturers, including GE, Thorn, and Sylvania, emphasized their efforts in that direction, as well as in incorporating "general lighting" (i.e., commercial, industrial, and consumer) into the broadcast market. Another point the manufacturers stressed was that broadcasters will begin to see an increasing number of solid-state electronics in the base of light sources, especially for application as ignition devices. Through a good deal of research and development, redirected infrared technology has been resurrected and is undergoing current rapid changes involving coatings for filtering and directing light sources.

In spite of all of the developments taking place, the users of luminaires still had a good deal to say to the manufacturers about the practicality of actually using the lights. Apparently the sentiments of many were reflected in the words of David M. Clark, an Emmy award-winning lighting designer, who said, "The HMI and CSI are still developing. Manufacturers need to be more aware of the practical implementation in the field."



Anton/Bauer "sandwich" for camera/light power distribution.

Conversely, it came out that video operators could learn to be more flexible in their use of lighting techniques and could use the excellent equipment they now have to greater advantage. John Leay, a video engineer from Imero Fiorentino, suggested, "Video camera operators and producers need to use the potential of the new cameras more. Let them operate at lower light levels, because they were designed for it. Lighting for video and lighting for the theater are the same thing. We have to learn to let the technology develop and help the user work."

In its booth, Anton/Bauer contributed to the inexorable move to miniaturization with the introduction of an adaptor plate that is sandwiched between the battery and the camera, permitting the light and the camera to be powered by the same battery. Along with others in the power field, the company is concerned with developing a 14 V light that will accept the higher voltages that cameras require, without burning up the light.

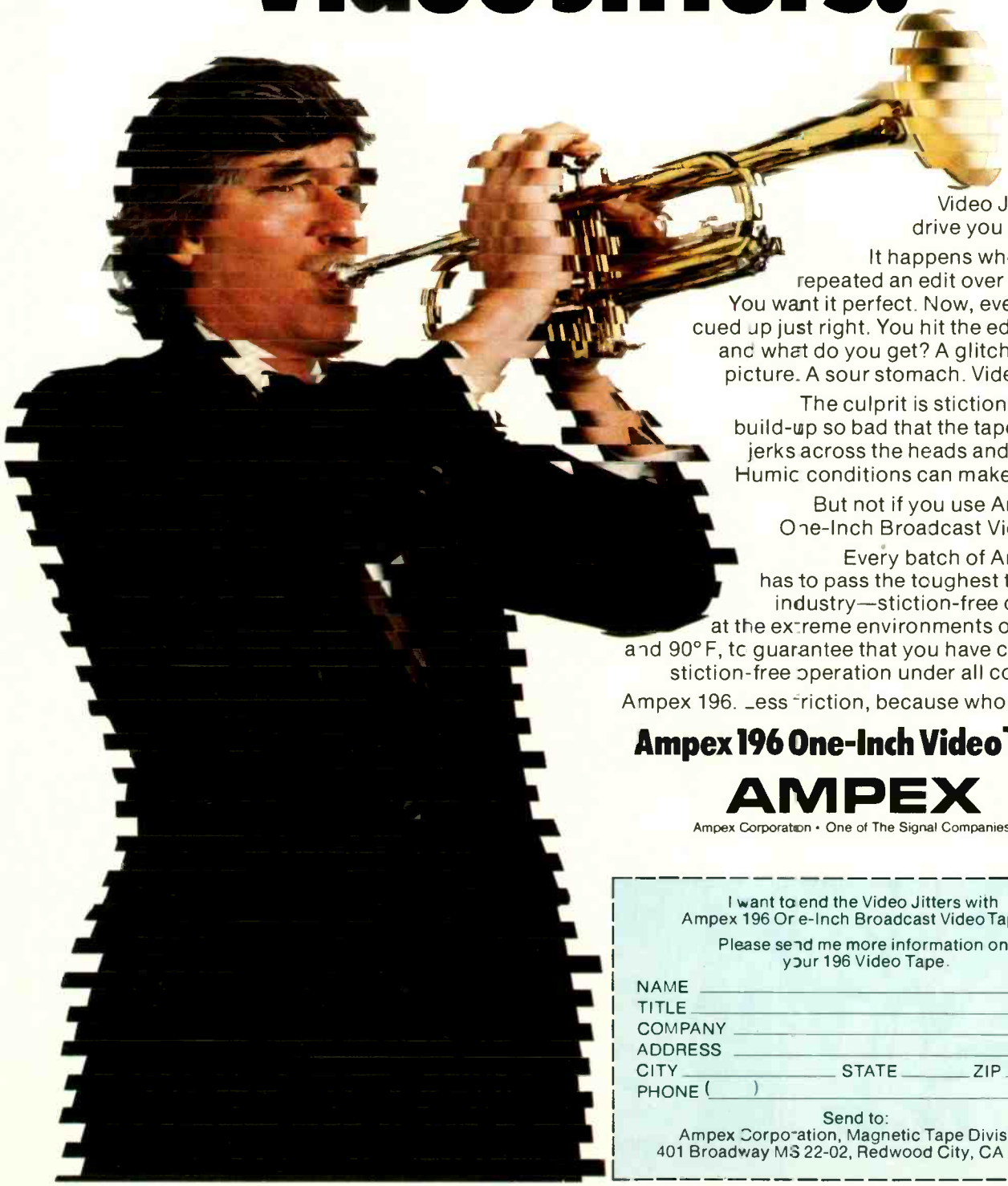
Designing equipment which is more cost effective and versatile includes fashioning new grip systems as well as lights. Pole-operated lights with tilting and panning capabilities that are easier to use have been called for by television stations, and they are beginning to appear in the new lines of grip equipment now available.

Worthy of special notice was the new remote control pan/tilt head from Matthews Studio Equipment—invented by the same person who devised the Continental Camera and Tyler rigs. It's been said that slip-rings are not suitable for broadcast applications, but you couldn't prove it by this system, which has a full 360 degrees of pan and tilt by using rings. Besides this, one of the system's other special features is its truly instantaneous response to the operator's remote controls—there is no detectable lag from any of the remote control options, including joystick and convention pedestal handcranks. To realize the system's true value, imagine it mounted on the Matthews Tulip crane hung out over a parade route and getting intimate POV shots without the operator ever leaving the ground!

Cinema Products' Steadicam was also on display in a new, streamlined version. The company says the Steadicam Universal Model III will operate with any camera, video or film, with no modifications. Its integral monitor—smaller in size but with a larger screen—is now viewable from any angle, and adjustable angle scales on the unit allow users to repeat shot sequences precisely.

In conclusion, looking at the SMPTE show as a whole, it reflects an industry which is more than ever aware both of the limitations imposed by the current economic climate, but also of its optimistic future. The digital VTR (subject of an upcoming special feature in *BM/E*) may not be as close as many supposed, and implementation of digital standards may not happen tomorrow. But the industry is keenly aware of the direction it must take, and the impact which today's decisions will have on the industry's future. **BM/E**

Ampex Announces the Practical End of Video Jitters.



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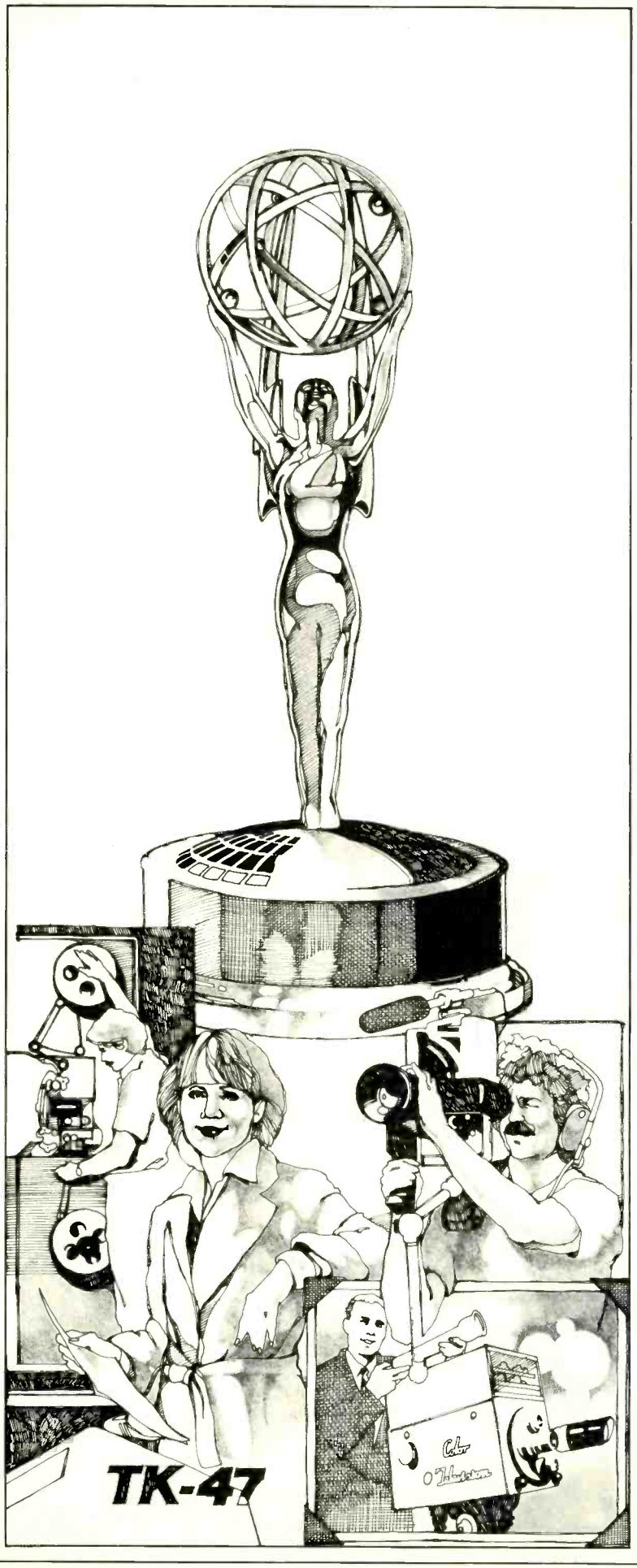

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RCA

Industry Needs Survey Indicates Close-to-the-Vest Year in Store

COMING OFF A YEAR of increased, but cautious spending, broadcasters are likely to play their purchasing cards even closer to the vest in 1983. According to the annual *BM/E* Survey of Broadcast Industry Needs, when all the figures are in, 1982 should show an increase over 1981, despite the general economic recession. Some three-quarters of the television, radio, and teleproduction facility respondents reported that last year's spending exceeded that of 1981, with most putting the increase under 25%.

This year appears to be more uncertain. Responses indicate moderate increases in TV equipment budgets, satisfactory gains for radio equipment purchases, and a slight increase in teleproduction facility equipment outlays.

The ranges of dollar amounts earmarked for broadcast equipment were wide, but the mean figures provide a benchmark. For example, the 1982 television equipment spending ranged from $10,000 to $1.5 million and the mean worked out to be $300,000, although responses from small market stations predominated. The mean for 1983 is $324,000, which is an eight percent increase. In the radio responses, the 1982 equipment purchases ranged from under $10,000 to $300,000, and the mean was $22,500. The 1983 projection is for a 13 percent increase, to $25,500. As for the teleproduction facility figures, '83 is essentially flat, with a mean of $55,000, compared with $54,000 for 1982.

It is difficult from the results to tell precisely what portion of this year's spending will be for added capacity and what portion will be for replacement. Despite the small increase in TV budgets, it appears that these stations will be spending more on expansion than replacement. For radio stations and teleproduction facilities, the split is essentially even between expansion and replacement.

Basics head equipment priorities

The table of equipment priorities depicts a year devoted to the basics in both radio and television. Those products that have moved up in the ranking of priority level tend to be bread-and-butter equipment. However, it should be noted that in previous years the survey asked for level of interest in the many new products to be seen at the NAB Show. This year, in an effort to pinpoint real buying trends rather than interest in future needs, the survey asked for ratings related to near-term purchase priorities. As a result, there were significant shifts in the order of importance reflecting the difference between what are front burner purchases and what are back burner. For example, topping the list of 26 radio/audio products is cart decks, with a priority level response of 74. (Priority level is calculated by adding all of the checks for "high" and "moderate" purchase priority on the survey form, two points for each high priority and one point for each moderate.) The next three products—consoles and mixers, mics and accessories, and test equipment—all moved up the ranking ladder since last year, again reflecting the difference in this year's format. Rounding out the top five is audio processors, which was number one in interest level last year.

In order to find out if broadcasters are ready to put their

Who Participated

The annual Survey of Broadcast Industry Needs was mailed to a cross section of *BM/E* readers at television and radio stations and teleproduction facilities. One-third of the TV responses came from group stations and a quarter from independents. Half of the TV returns were from network affiliates. For radio, not quite a fourth represented group stations and just under a half were independents. Forty-one percent were network affiliates. Station size was evenly distributed. TV responses came from stations employing less than 10 people all the way up to enterprises of over 150. Radio station returns were bunched at places employing 30 and under.

Engineering department staffs followed the same pattern. TV stations ranged from departments with under five to those operating with over 75. Most were bunched at under 25 on the engineering staff. Radio engineering staffs, of course, were much smaller—virtually all had staffs of five or less.

Radio Equipment Needs

Rank '83*	Rank '82**	1983 Purchase Priority ††	
1	4	Cart Decks	74
2	3	Consoles, Mixers	67
3	7	Microphones, Accessories	64
4	5	Test Equipment	59
5	1	Audio Processors	51
6	14	Monitor Equipment	39
7	10	Turntables	39
8	9	Remote Pickup & STL	37
	6	Satellite Earth Stations	37
10	8	Noise Reduction Equipment	35
11	NL†	Power Supplies, Batteries	34
12	2	Studio ATRs	33
	15	Monitor Speakers	33
14	NL	Time Compression Systems	31
15	23	Business Automation	29
	13	Telco Interface Equipment	29
17	11	Antennas	27
18	19	Reverb & Special Effects	24
19	14	FM Transmitters	23
20	16	AM Transmitters	21
21	NL	Digital ATRs	18
22	16	Studio Automation Equipment	16
23	18	Field ATRs	15
24	NL	Mobile Vans	13
25	20	AM Stereo Equipment	12
26	22	ATS Equipment	10

* In 1983 respondents were asked for *purchase priority*.
** In 1982 respondents were asked for *new product interest*.
† NL means new listing from previous year.
†† Weighted total of high and moderate priority.

Definite Purchases of High-Priority Radio Equipment

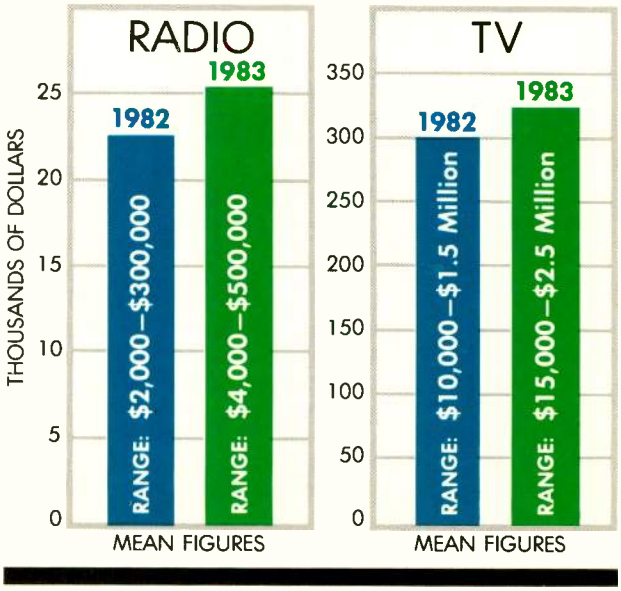
Rank	
1	Consoles, Mixers
2	Microphones, Accessories
3	Cart Decks
4	Turntables
	Remote Pickup & STL
6	Test Equipment
7	Audio Processors
8	Satellite Earth Stations
	Monitor Speakers
	Antennas
11	Monitor Equipment
	Studio ATRs
	FM Transmitters
14	Power Supplies, Batteries
15	Telco Interface Equipment
	AM Transmitters
	Field ATRs
18	Noise Reduction Equipment
	Business Automation
20	Reverb & Special Effects
	AM Stereo Equipment
22	Time Compression Systems
	Digital ATRs
	Studio Automation Equipment
	Mobile Vans
26	ATS Equipment

money where their priorities are, the survey asked respondents to indicate which of the "high" priority items they will actually purchase in the next 12 months. The will-buy list is a bit different from the interest level table.

Heading the list of near-term purchases are consoles and mixers. Microphones and accessories are second, followed by cart decks. Turntables and remote pickup and STL tied for fourth place. Test equipment wraps up the top five.

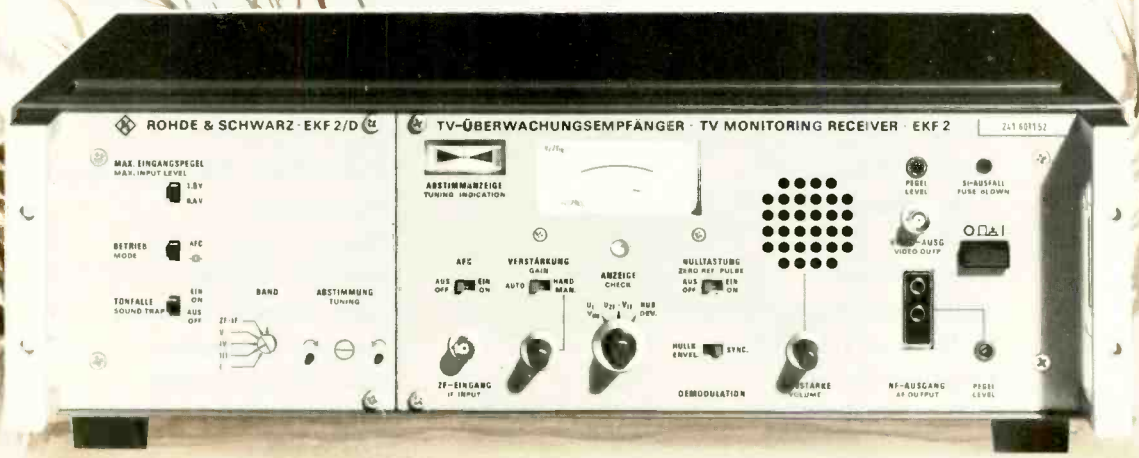
Heading the 42-product TV list in priority level this year is ¾-inch VTRs, followed by video monitors. Both these products moved up five rungs on the ratings ladder since last year. The third position goes to time base correctors, which is not surprising, considering that ¾-inch tape recorders ranked so high. ENG cameras slipped slightly, but are obviously still a high priority for TV station purchases. Test equipment, up five notches to fifth, underscores the bread-and-butter year ahead. As in the

Annual Station Budgets



It Stands Alone

The Rohde & Schwarz Precision TV Demodulator Type EKF2/D



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Circle 148 on Reader Service Card

RS82-4

TV Equipment Needs

Rank '83*	Rank '82**	1983 Purchase Priority ††	
1	5	VTRs, 3/4-Inch	74
2	6	Video Monitors	71
3	6	Time Base Correctors	66
4	2	ENG Cameras	59
5	10	Test Equipment	54
6	3	Studio/Field Cameras	53
7	14	Character Generators	51
	21	Lighting Equipment	51
9	9	Digital Effects Devices	48
10	4	Satellite Earth Station Equipment	46
	11	Frame Synchronizers	46
	NL†	Power Supplies, Batteries	46
	18	Simple VTR Editor/Controllers	46
14	20	Production Switchers	43
	21	Time Code Equipment	43
16	25	Routing Switchers	42
17	1	VTRs, One-Inch	41
	21	Audio Consoles, Equipment	41
19	16	Multisource Video Editors	39
	15	Noise Reduction	39
21	6	Electronic Still Stores	36
	17	Image Enhancers	36
23	11	Studio Cameras	31
	30	VTRs, 1/2-Inch	31
25	13	Microwave for ENG	30
26	NL	Recorder-Camera Combos	28
27	25	Telecines	27
28	27	Master Control Switchers	25
29	21	ENG/EFP Vehicles	23
30	29	Remote Control Systems	19
	NL	Weather Radar, Graphics	19
32	NL	Digital Art/Paint Systems	18
	27	Switching Automation	18
	31	Slow Motion Recorders	18
35	33	Automation Systems	17
36	31	Transmitters, VHF	13
	35	VTRs, Quad	13
38	32	Transmitters, UHF	12
39	NL	Teletext Equipment	11
40	35	CP Antennas	8
41	37	ATS	7
42	NL	LPTV Equipment	5

* In 1983 respondents were asked for *purchase priority.*
** In 1982 respondents were asked for *new product interest.*
† NL means new listing from previous year.
†† Weighted Total of high and moderate priority.

radio/audio section, the emphasis on purchasing priorities brought the bread-and-butter products to the top.

Like the radio responses, the line-up of video equipment that will actually be purchased in 1983 differs somewhat from the interest level table. Video monitors beat out ¾-inch VTRs for the top spot. Time base correctors and test equipment tied for the number three position. Satellite earth stations and ENG cameras round out the first five. One-inch VTRs did not rate as high on the interest level table this year, winding up in a tie for seventeenth, but was sixth on the list of equipment to be purchased.

Definite Purchases of High-Priority TV Equipment

Rank	
1	Video Monitors
2	VTRs, 3/4-Inch
3	Time Base Correctors
4	Test Equipment
5	Satellite Earth Station Equipment
6	ENG Cameras
7	VTRs, One-Inch
8	Lighting Equipment
	Power Supplies, Batteries
9	Character Generators
	Digital Effects Devices
	Frame Synchronizers
	VTRs, 1/2-Inch
14	Studio Field Cameras
	Production Switchers
	Audio Consoles, Equipment
	Electronic Still Stores
18	Simple VTR Editor/Controllers
19	Time Code Equipment
	Routing Switchers
21	Multisource Video Editors
	Studio Cameras
	Microwave for ENG
24	Recorder-Camera Combos
	Telecines
	Master Control Switchers
	ENG/EFP Vehicles
28	Noise Reduction
	Remote Control Systems
30	Image Enhancers
	Slow Motion Recorders
	Transmitters, VHF
	VTRs, Quad
	Transmitters, UHF
	Teletext Equipment
	CP Antennas
37	Switching Automation

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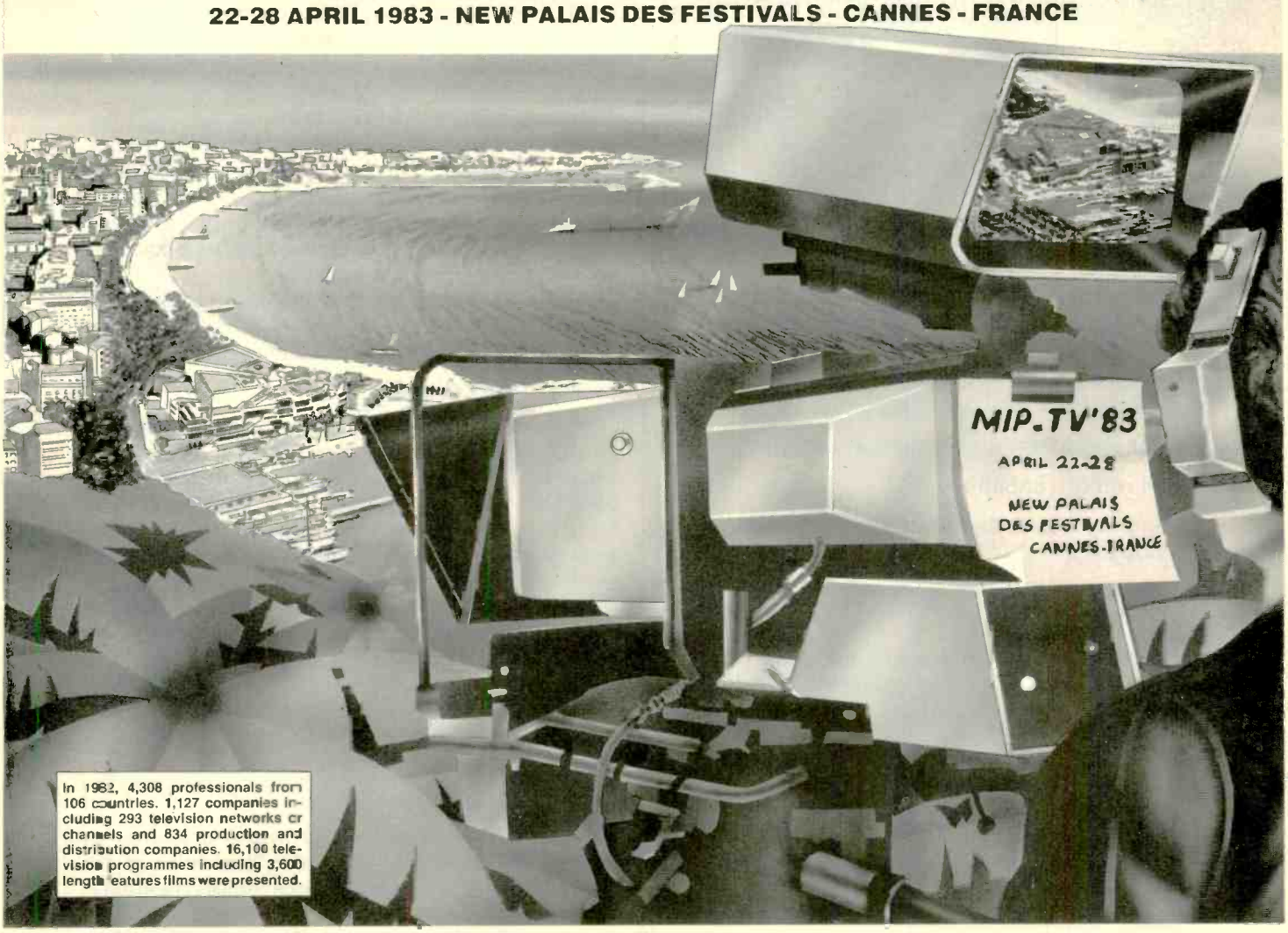

In 1982, 4,308 professionals from 106 countries. 1,127 companies including 293 television networks or channels and 834 production and distribution companies. 16,100 television programmes including 3,600 length features films were presented.

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Industry Needs Survey

Increased interest by TV stations and teleproduction facilities in audio is reflected, to a certain extent, by the appearance of audio consoles in the top 20 interest level rating for the first time. In addition, audio consoles is tied for tenth place on the list of high-priority equipment that will actually be purchased in 1983.

What the buyers demand

Asked "What will be your main criteria when evaluating the equipment to be purchased?" respondents once again put reliability at the top of their demands along with performance features. Even in a year of close-to-the-vest buying, price comes in behind reliability and performance features.

TV station respondents gave equal weight to reliability and performance features—over 60 percent for each. (Readers could check more than one criterium.) Price was checked by a fourth. A sign of the microprocessor-control times, ease of operation was the least important factor, getting a mention from only eight percent on the television returns.

Among radio respondents, reliability just edged out performance features, 66 percent and 62 percent, respectively. Fifty-two percent checked price among evaluation criteria in radio equipment purchasing. And over a third put ease of maintenance as important. Since the removal of the licensed engineer requirement, the high marks for reliability becomes understandable.

Yet, teleproduction facilities also put reliability ahead of performance features—64 percent to 55 percent. Some 45 percent of this group included price as important.

Impact of radio license

When the FCC eliminated the First Class Radio Operator license, most radio station engineers complained, while radio station managers generally expected little impact. One of the special questions on this year's survey asked radio respondents if FCC requirements and equipment maintenance are being handled by an outside technical service. The answer to both is an overwhelming no from managers and engineers responding. Less than 14 percent said that maintenance is partly done by outsiders.

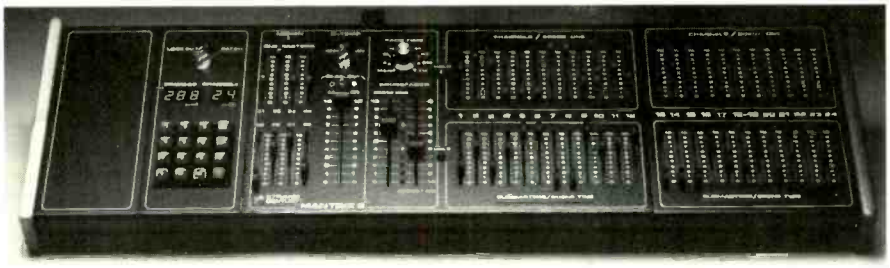
Another radio question was "How old is your present transmitter?" While approximately four in ten are three years old or less, over half are 10 years old or more. It's not surprising then that most of the respondents said they will buy a new transmitter within a year.

Recorder-camera vote

Although recorder-camera purchase priority was not high up on the interest-level table, evaluation of the competing half-inch and quarter-inch formats is apparently intense, judging from the high response to a set of questions on this subject posed to TV respondents. They indicated a preference for the VHS format at present. While a fair number of the respondents said that they will buy recorder-camera units of some type in 1983, most do not intend to take the plunge for another year or two. And despite all the talk in the industry about the need for a standard recorder-camera format, only a few respondents said that their purchases depend on setting such a standard. **BM/E**

broadcast EQUIPMENT

Improved Lighting Console from Strand Century 250



The Mantrix lighting control console has greater capabilities with the addition of the Mantrix 2S. Designed for the lighting of television and live performance, the 2S features overlapping submasters to provide manual access to lighting groups. With one switch, the new console can be operated in either a two-scene preset mode with 56 overlapping submasters or in a four-scene preset with eight overlapping submasters. The unit features an electronic patch module, permitting dimmers to be assigned to channels at proportional levels for greater control.

The console also offers a split crossfader with assignable fade rates from one second to four minutes. It can control up to 288 dimmers on 12 to 48 channels. Display windows preview patch assignments and indicate the dimmer size: 2.4 K, 6 K, or the new CD80 12 K.

■ *FOR MORE INFORMATION* ■

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MCI/Sony Enters Compact Console Market 251

The JH-800 is a portable, 12-input mixing console with four VCA controlled subgroups. It is intended for location recording. Features include dual stereo mix buses, fluorescent bar graph metering, balanced transformerless

line and microphone inputs, and three-band equalizers on each input. Multiway and XLX connectors and two built-in stereo compressor/limiters are also standard.

The unit includes four sends for foldback and effects in recording situations, or for feeding stage monitors. The JH-800 is 9.5 inches high, 23 inches wide, and 24 inches deep.

Integrated Sound Systems Offers New Mixer 252

The new Model 5990 is designed for radio production work such as commercials, voice overs, and prerecorded programs. It can also be used by small radio stations as a broadcast mixer, or in mobile vehicles.

The 5990 has three modular input sections which accept a phono and line level input. Each input has three bands of equalization, and on the back panel there are separate stereo send and receive jacks. Two separate mic sections are provided with three-band EQ and individual pan switches.

Frequency response is 20 Hz to 20 kHz, ±0.25 dB with IM and harmonic

EQUIPMENT

distortion at less than 0.01 percent. The S/N is 80 dB for the phono and mic and 90 dB for the auxiliary inputs.

Swintek Offers Wireless Mics 253

Swintek now offers a choice of wireless hand-held microphones and finishes. The choices include the Beyer M500 ribbon capsule, the Shure SM57, SM58, and SM78 dynamic capsules, or the SM85 electret condenser capsule. Finishes can be ordered in chrome, black chrome, or gold.

High-efficiency integral antennas are standard, although helical rubber units are also available. All mics incorporate the company's "dB-S" companding system which delivers over 80 dB dynamic range. The VHF/UHF high band is used to avoid interference from CB and business radio, and to prevent the mics from interfering with video equipment. Range is 1000 feet. Battery life is typically 10 hours using a 9 V alkaline battery or the THR-B nicad.

■ *FOR MORE INFORMATION* ■

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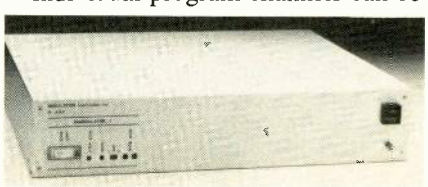
Modulation Associates' Satellite Receiver 254

Modulation Associates has just introduced what it calls an Optimized SCPC audio satellite receiver for use in state and regional radio networks. Designated the R-SAT, the receiver is designed for networks of under 100 affiliates.

With its "optimized" demodulator and a 3.7 meter antenna, the R-SAT allows satellite power to be cut from 80 W to 10 W. According to the manufacturer, this provides space segment cost reductions as well as savings on the overall uplink costs.

Individual program channels can be



uplinked independently from diverse locations, allowing shared use of a common transponder with national networks. Two SCPC satellite links can be used for stereo delivery to AM stereo affiliates.

Numark Combines Amp, EQ, and Mixer 255

The MA4700 is a sound control amplifier that provides 70 watts per channel at four ohms and 60 watts per channel at eight ohms, with outputs for two speaker systems. It also has a bridging circuit that will accommodate any external amplifier for more power. A multicolor high-speed LED is used as an input level meter as well as an output power meter, and a peak hold button holds the display at peak level for reference.

The unit has a built-in low noise preamp and features slide controls, cueing circuit for headphone monitoring, and a talkover switch. Also built in is a five-channel stereo equalizer. Included in the 19-inch rack-mounted unit are handles and rack adapters. Frequency response is 10 Hz to 30 kHz, with THD at 0.08 percent and IMD at 0.3 percent. The MA4700 is priced under $500.

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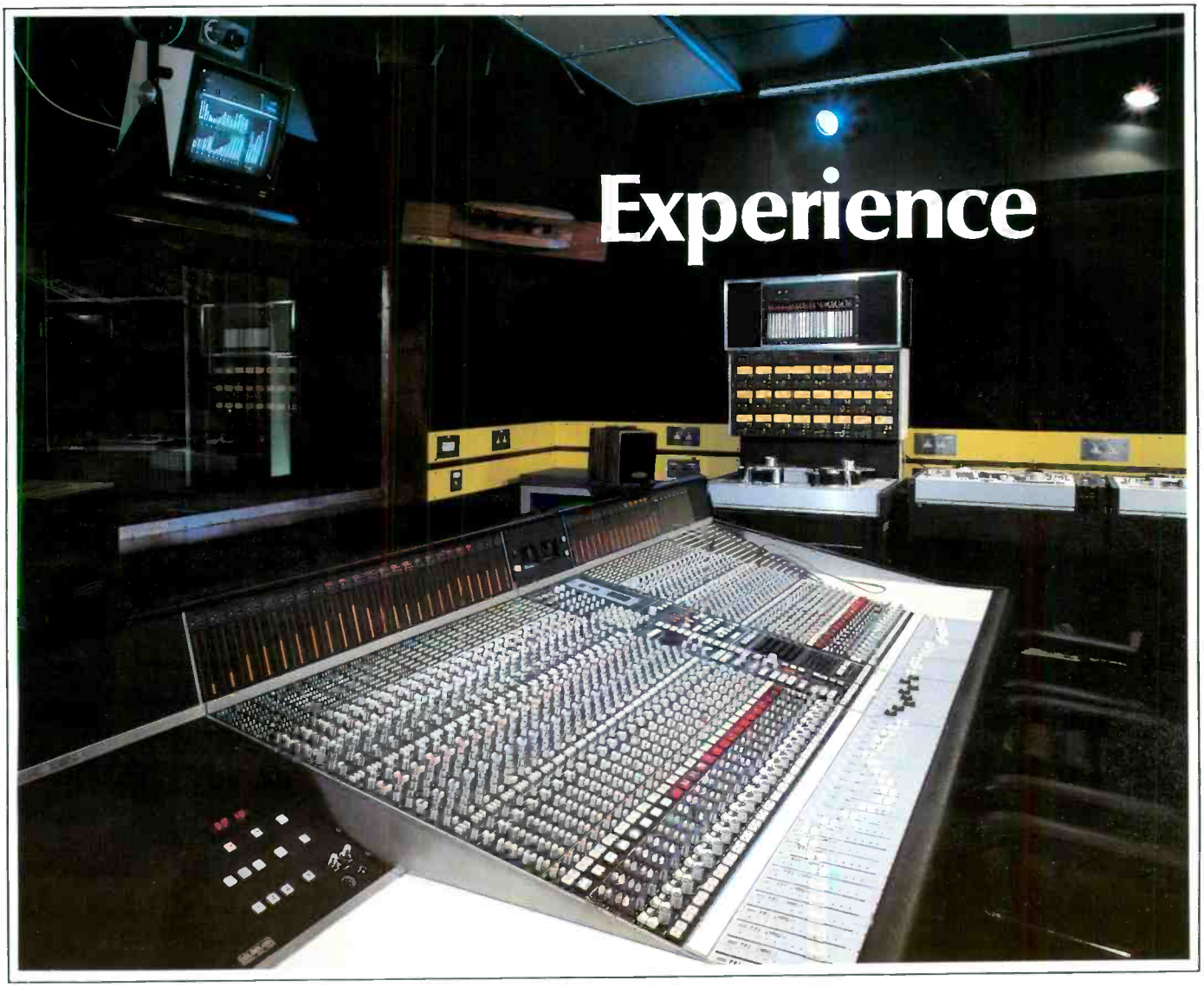

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