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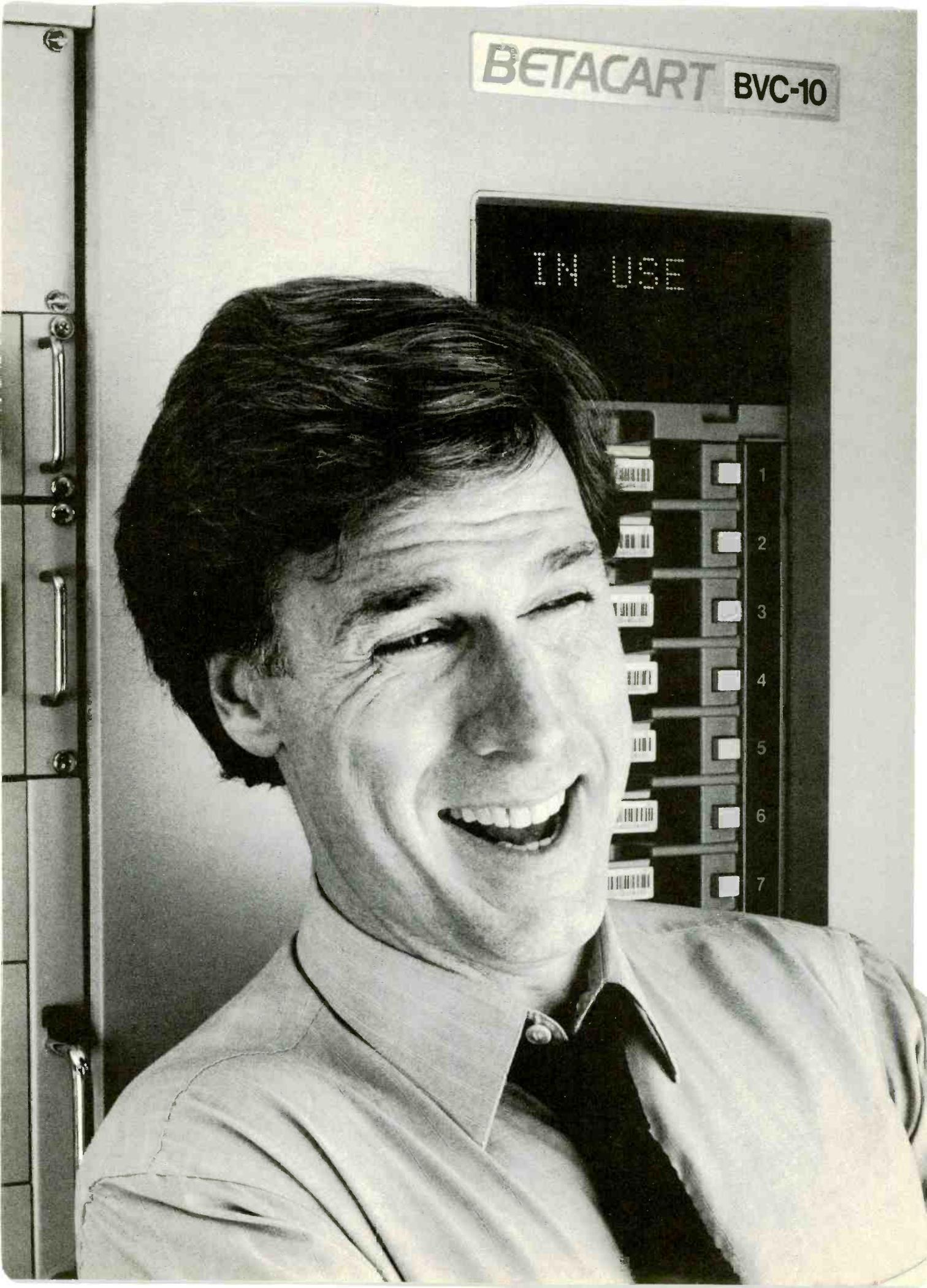


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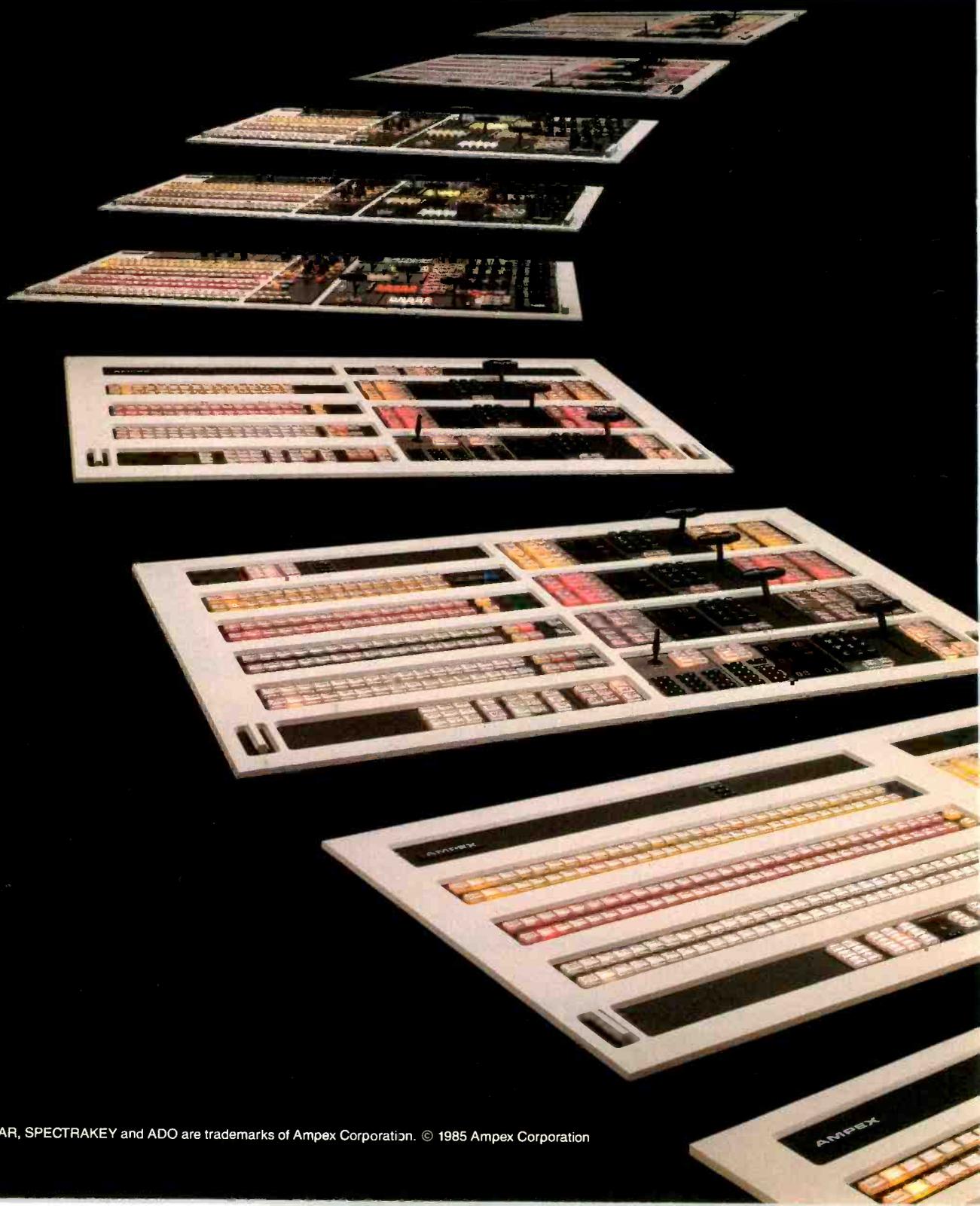
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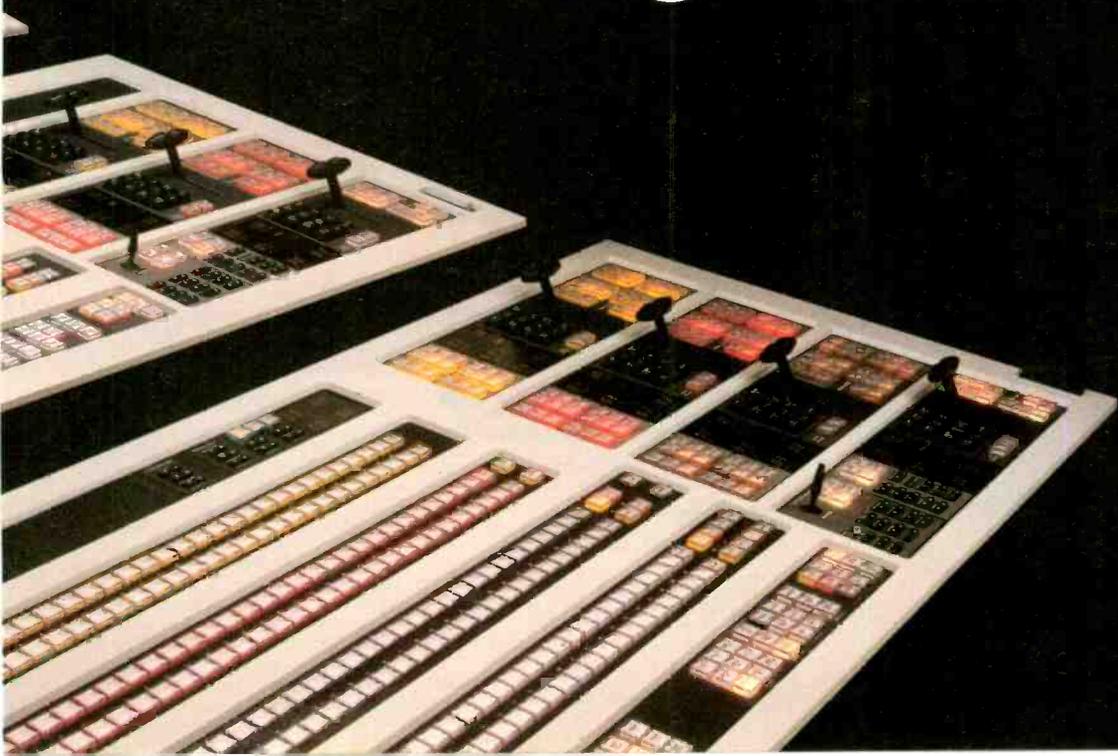
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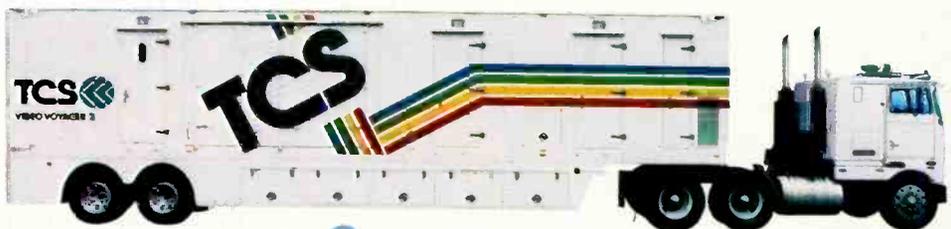
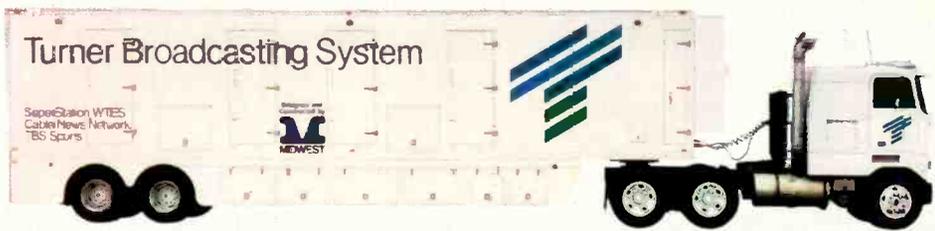
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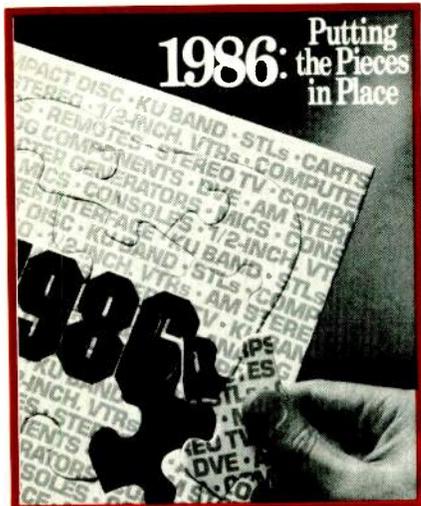
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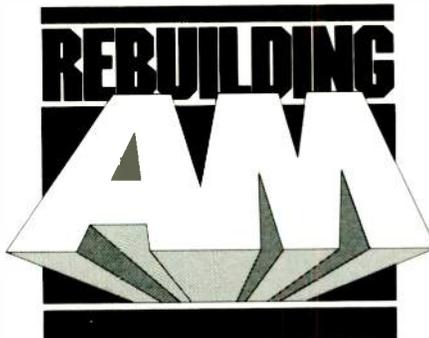
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“Our survey showed a small but solid commitment to AM stereo and an overwhelming move to multichannel sound in TV broadcasting.”

Big Bucks for Bullish Broadcasters

We've been awed by some impressive budget figures allocated for broadcast equipment purchases in 1986. As a result of our recently completed 1986 Survey of Broadcast Industry Equipment Needs (see page 73), we learned that some 150 radio stations—large and small—would be spending nearly \$8 million; that some 38 group broadcasters were ready to shell out \$9 million; that 102 TV broadcasters would be spending \$90 million; and that some 40 teleproduction houses—many of them small—plan to spend \$12.5 million. These are big bucks. In addition, over 35 percent of all radio stations responding to our survey will be moving into a new or expanded facility in 1986.

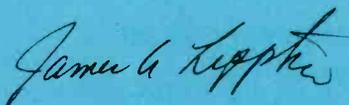
What is in back of this investment and expansion? What justification is there? Obviously business must be good and is foreseen to remain that way. Although our survey questionnaire—filled out, incidentally, by over 600 broadcasters and teleproduction experts—did not ask such questions, we did find out about increases or decreases in business activity.

Radio broadcasters will be doing more local news, more and higher quality production work, and more remotes—the latter particularly in the smaller markets. Very few reported decreases or no change. Quite a few revealed hefty increases—generally 20 percent or more.

All TV broadcasters report they will do more local news—generally 20 percent more was cited, but those in ADI markets 11-50 say 30 percent. They will also engage in more satellite news-gathering—as much as 50 percent more in the larger markets, and tapering down to 10 percent for the smaller markets. TV stations expect local programming to increase. In the smaller markets, much of it will be as a result of coproductions. The large TV markets, ADIs 1-10, expect to be doing a lot more work for industrial-commercial clients (50 percent) and more programs for home cassette distribution (50 percent).

Most teleproduction houses—large and small—plan to be doing more of everything. Big increases—from 30 to 50 percent—are expected in industrial-commercial business and in producing material for the home cassette industry.

Our survey showed a small but solid commitment to AM stereo and an overwhelming move to multichannel sound in TV broadcasting. We had expected to see stronger support for AM stereo, as a means of supporting the drive to AM improvement. This is not happening, but by the end of 1986, the number of AM stereo stations will likely double, bringing the total in the nation to about one-third. If one eliminates the smallest markets—those ranked 200+—perhaps as many as 40 percent of AM stations will be stereo. The number of multichannel sound TV stations will exceed 50 percent by the end of 1986. We take all of this as strong evidence of bullishness.



James A. Lippke
Editor Emeritus



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Technicians Down in 1985 Employment Stats

Employment in the broadcast industry rose by over 2000 persons or 1.2 percent last year, according to figures released by the FCC for stations with five or more employees, but the total number of technicians at such facilities fell for the first time in years.

In 1982, '83, and '84, technicians increased by 3.6 percent, 0.6 percent, and 5.2 percent respectively for an average of over 900 new persons per year. In 1985, however, the total fell by 58 to 31,234.

Among the four other job categories tracked by the FCC, officials and managers rose by 704 or two percent, professionals by 412 or almost eight-tenths of a percent, sales workers by 724 or 3.4 percent, and office/clerical by 250 or one percent.

Women and minorities continued their gradual increase in the technical category. Women now constitute 13.2 percent of technicians, up 0.5 percent, and all minorities account for 18.8 percent, up 0.5 percent.

NAB & NRBA Merger Almost Ready

The NAB and NRBA have agreed to an historic unification that will assimilate the radio organization into the NAB. The NAB board of directors has approved the move, and the NRBA is expected to do the same this month.

Arrangements for the merger include adding 12 NRBA members to the 37-member NAB radio board (the television board numbers 17) for one-, two-, and three-year terms, after which the positions will disappear and the members can run for reelection. An NRBA director is to be added as the eighth voting member of the NAB's eight-member executive committee for at least three years.

In addition, NAB bylaws will be changed to allow either the radio or television boards to act on a motion if the joint board votes it down three times. This includes matters that need financial backing.

The radio side of NAB lost



Peter Caesar works in his studio with the new Quantel Harry digital cel recorder, the first such piece of equipment in the U.S.

Caesar Video Installs Digital Animation Studio

Caesar Video Graphics of New York City has installed the U.S.'s first Quantel Harry along with an IMC Animation Stand, NEC SP-3A CCD color camera, and V.4 software update for two

Quantel Paintboxes, reportedly making it the first all-digital animation studio. Among the studio's first assignments was keying Paintbox elements in Harry to create a logo for HBO.

ground, however, in a change that will make the total number of television board votes equal to the radio board's despite the differing number of board members.

NRBA station members will reportedly be able to enter the NAB for the same dues as they paid the NRBA.

The NAB plans to hold the Radio '86 convention as scheduled, with added emphasis on engineering.

The NRBA originated in 1959 as the FM Association of Broadcasters, later called the NAMFMB, to promote the then-fledgling FM band. In 1975 it started taking AM members and changed its name to the National Radio Broadcasters Association, meanwhile setting itself up as an organization that would promote radio's interests specifically and not restrain itself

for television's concerns. The association's membership then expanded from 329 to its current 1800 figure.

Bosch and Philips in Joint Venture

Robert Bosch GmbH, Stuttgart, and N.V. Philips Gloeilampenfabrieken, Eindhoven, the Netherlands, announced this past January 30 their intentions to form a new joint venture company, Euro Television Systems, GmbH (ETS). The new company will be made up of four groups from within the two existing companies: the Bosch Television Broadcast Division (Darmstadt, FRG), Bosch's Video Equipment Division (Salt Lake City, UT), Philips' development and production facilities (Breda, the Netherlands), and

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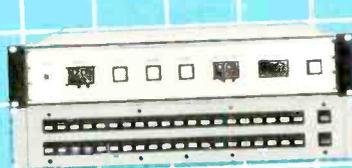


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Philips Television Systems, Inc. (Mahwah, NJ).

According to the announcement, "The purpose of the joint venture is to widen the two firms' technology base, to strengthen their ability to compete internationally, and to extend their market positions." ETS will be responsible for marketing profes-

sional television studio broadcast equipment worldwide and will be headquartered in Darmstadt, FRG.

In a report published on page 14 of *BM/E's* January issue, erroneous information indicated that Philips' U.K.-based Pye TVT, Ltd. had been closed down. This was not the case. Instead, just one part

of the Pye TVT operation had been shut down—in particular, the studio systems operation.

The merger of divisions from the two companies appears to bring together significant resources. Bosch's Salt Lake City operation has been extremely successful with its electronic graphics system, the FGS-4000, and related products, its routing switchers, and machine control systems. Philips Television Systems has great experience in marketing its highly respected LDK Series television cameras. Bosch's Darmstadt operation has enjoyed good results with its FDL-60 digital line array telecine here in the U.S. Worldwide Bosch is known for its cameras and videotape recorder systems and has been working hard at achieving acceptance of its Quartercam camcorder systems. With these and other products from the two companies, ETS shapes up as a potentially formidable TV systems supplier.

As yet, no announcements have been made about how the two companies' products lines might ultimately be integrated or whether or not there will be any attempt to integrate them. Clearly, the two companies can benefit from a sharing of each others' bases in leading TV technologies. Whether this will be reflected in new products or in changes in existing products is as yet uncertain.

Slower Growth Seen for Independents

Independent television stations, which have lead the industry in growth in recent years, are facing increasing pressures that may slow their growth, according to an INTV survey conducted by Frazier, Gross & Kadlec, Inc., the Washington, DC financial and marketing analysts (see "Outlook '86" in this issue). A panel where the survey was formally presented at the Los Angeles INTV convention concurred that independents have joined the rest of the broadcasting industry in its mature phase.

The survey described the phenomenal increases that television

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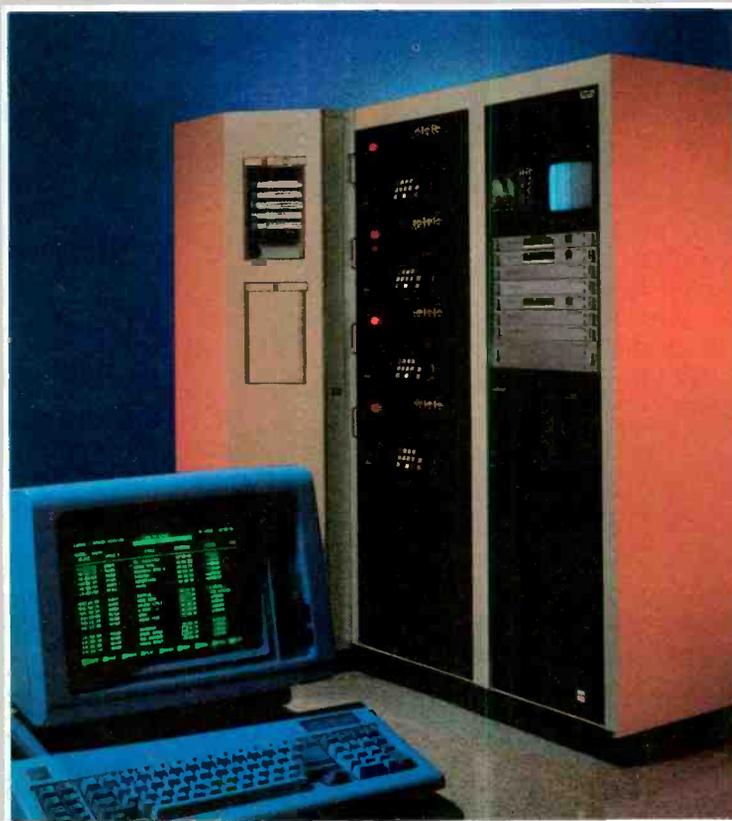


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NBC's Super Bowl coverage came to you courtesy of this new 45-foot truck built by Centro Corp. of San Diego. To meet a four-month deadline for construction, the interior of the trailer was built as a self-contained shell and was then slid into the custom chassis. Seen inside are Sony BVH-2000 VTRs, a CVC 100 switcher, Convergence 204 editor, Ikegami TM-10 monitors, Neve stereo board, Di-Tech routing switcher, and Tektronix 1410R generator and 528A waveform monitor.



independents have made. The number of stations has jumped from 120 in 1980 to 283 last year, reportedly due to rising spending

in television advertising—especially spot and local ads—over the past 10 years. As many markets grew enough to support a fourth

channel, indies also grabbed bigger audiences, rising from 10 percent shares to 21 percent and even higher in lucrative major markets. The INTV survey predicts independents will increase their share “at affiliates’ expense” to an average 25 percent in five years, and double their \$2.5 billion revenues by 1990, capturing 30 percent of all television advertising.

Independents’ future, however, is also seen to be more rigorous. The deletion of must-carry (see news story below), financial interest and syndication rules, and rising programming costs, which now take up over half of independent budgets, are putting pressure on profits, as are weakening advertising budgets and continuing inflation. New indies in particular face tough going since revenues may be lower than expected and costs higher.

At last month’s INTV convention in Los Angeles, the panel

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tion in Los Angeles, the panel which heard Charles Kadlec, head of Frazer, Gross & Kadlec, present this survey agreed with its results and reinforced the warning that independents face stiffer times ahead. Milton Maltz, president of the Malrite station group, noted that continued success for independents will depend on business savvy although many people have entered the industry recently just to buy and sell stations.

Must-Carry Still Proving Difficult

How to counterattack after cable's victory over must-carry (see *BM/E*, January, 1986 News section) continues to prove a difficult problem with no clear answer yet emerging.

The issue received heavy attention from broadcasters and lawmakers at the INTV convention in Los Angeles, with debate centering around whether action by the

FCC or Congress would be more successful, and whether to try reviving must-carry or dropping compulsory copyright.

Congressmen at the independent broadcasters' convention seemed united in their appraisal that an imbalance has been created, but they differed in tactics about how to deal with it. Senators John Bryant (D-TX) and Slade Gorton (R-WA) suggested the FCC is best equipped to take action; both have already introduced legislation linking local carriage with compulsory licensing. On the other hand, Rep. Barney Frank (D-MA) said more deregulation, eliminating compulsory cable, is the solution; he too has introduced a bill.

Rep. Don Ritter (R-PA) warned that he thinks Congress may not be able to come up with a legislative solution. A Congressional aide noted that any action which is politically viable in Congress

might not be able to survive a court review.

As for the FCC, it seems willing to try out a solution, but it is very conscious of having to fit any action to the court decision which struck down must-carry. There is also a question of whether the Commission has the authority to determine when the compulsory copyright statute applies.

On another front, the prospects for working out an agreement between cable and broadcasters seem to have improved. James Mooney, president of the National Cable Television Association, met with the NAB's joint board of directors recently and reportedly asked for no duplication of network signals, no carriage of signals with low ratings, no mandatory teletext or MTS, and recognition of First Amendment rights for cable. The meeting is said to have moved both sides closer to the bargaining table.

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News Briefs

The FCC strongly notes that it is not now nor was it ever considering banning religious programming on radio or television. The Commission says that due to rumors, it has received over 16 million pieces of mail and "a corresponding number of telephone calls" on the subject since 1975, when it unanimously denied someone's petition to freeze religious applications.

The NAB and the Association of Maximum Service Telecasters are considering a series of **demonstrations of advanced television systems**. The two groups believe that showing improved NTSC, an enhanced 525-line scanning system, and HDTV would help get the word out on potential TV improvements to the public, Congress, and even the FCC. Also it would make broadcasters needs in this area known to those groups and to manufacturers . . . The FCC has amended

its rules as of January 1 to include evaluation of **human exposure to RF radiation**. The Commission will now routinely look at a station's environmental effect when a CP is applied for or a renewal is filed. Concerning the latter, change in a station's surroundings, such as construction of nearby businesses or residences, will be evaluated.

FCC commissioner James Quello is again talking about getting rid of **First Amendment restrictions** on broadcasters since there are so many other means of news access. In exchange, broadcasters would pay spectrum fees . . . The University of Oklahoma has obtained an **archive of political commercials** containing 25,000 films and tapes, believed to be the largest of its kind.

The Television Information Office has produced an 11-minute videotape portraying "the kinds

of people who make television stations tick." The show presents department heads from a variety of stations and covers 10 areas of the field . . . According to a Gallup poll for the National Council for Families and Television, 73 percent of the surveyed **parents with kids** under 18 said they watched TV with their progeny, with five and a half hours as the average shared viewing time for that group.

Network radio racked up a 13 percent increase in revenues in the first 10 months of last year over the previous year, according to the Radio Network Association.

The NAB convention in Dallas will feature **Willie Nelson** at the closing brunch and **Stan Freberg** at the radio luncheon on April 15. **Dr. George H. Brown**, the former head of RCA engineering who worked on the NCTA color system, will receive the NAB's Engineering Achievement Award.



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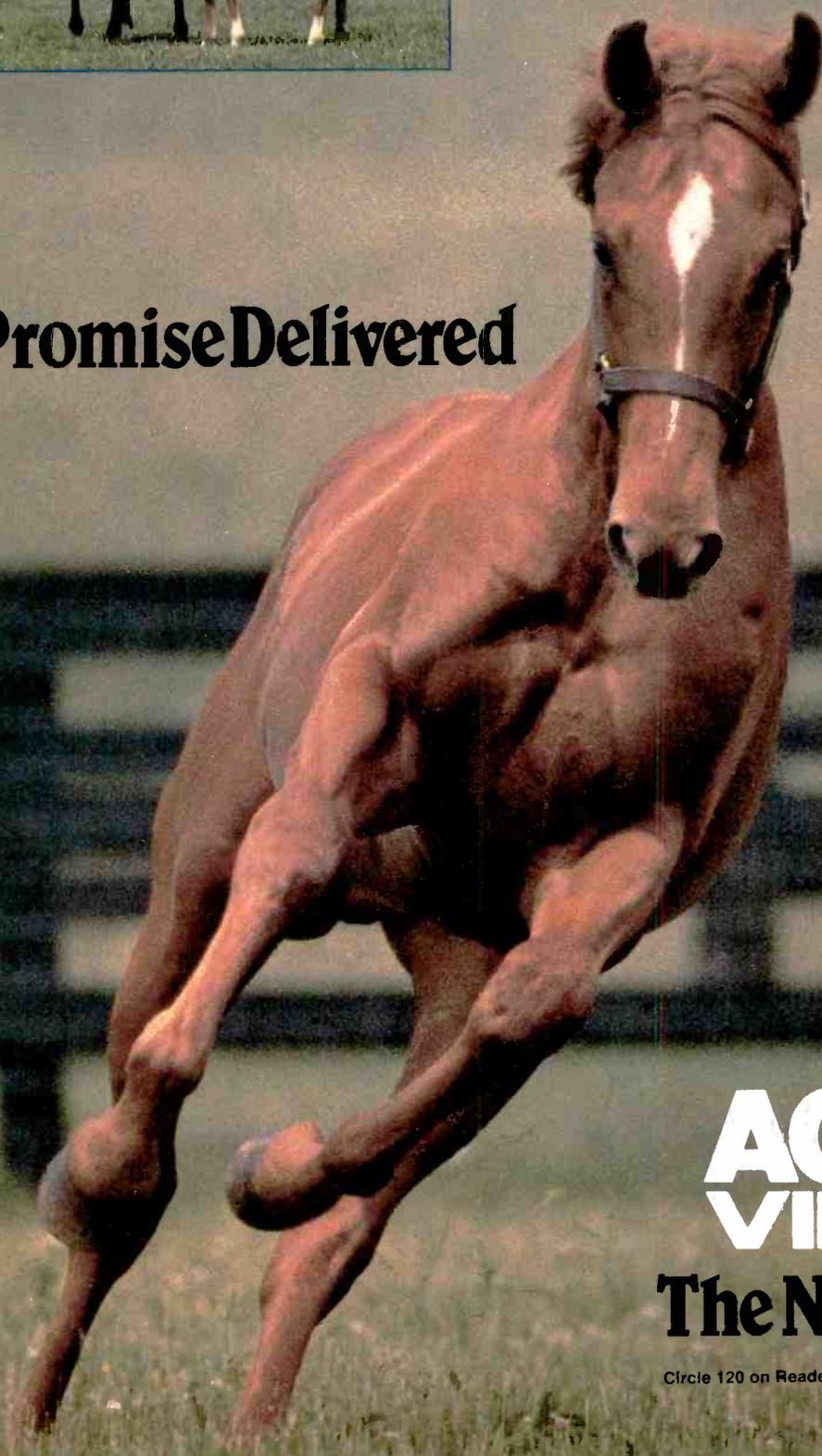
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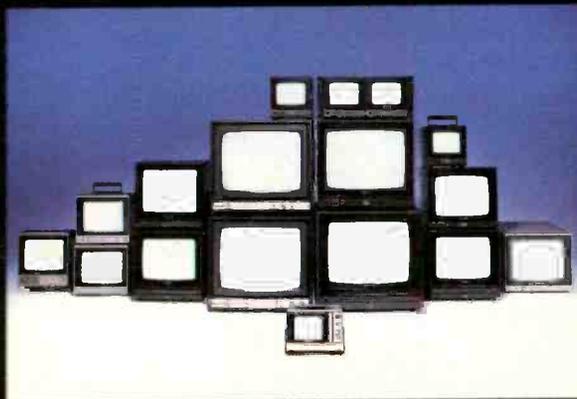


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REBUILDING



This is the year the broadcast industry stops mourning the ceath of AM radio and finally begins specific actions designed to convince listeners that reports about the death of AM, like stories about the death of Mark Twain, are exaggerated.

FCC Mass Media Bureau chief James McKinney has targeted AM improvement as a special consideration, and has been involved in a series of "town meetings" concerning AM. The NAB is moving full speed ahead with its AM Improvement Committee, and is encouraging stations to go stereo with a multimedia presentation showing stereo's benefits for overall upgrade of AM audio and transmission. Even radio manufacturers, who have long relegated AM to a "back burner" position in favor of high-fidelity FM, are excited about the prospects of introducing high-fidelity AM receivers into cars and homes, providing they can get some technical guidelines, and occasional compromises, from broadcasters.

While at long last the time to get excited about AM has arrived, there is still much work that needs to be done to improve and rebuild AM before listeners will once again be willing to accept it on par with FM. High-fidelity receivers are a must, and several existing broadcast policies—preemphasis and processing are two—must be reexamined if they are to become a reality. Improvements to antennas and broadbanding must also be explored, along with the possibility of widening the AM spectrum itself. There are problems such as RF lighting interference to deal with, and McKinney has promised that FCC rule changes affecting several of these concerns are on target for 1986. Perhaps even more crucial is the continuing reluctance of much of the AM community to convert to stereo, as a result of unresolved conflict.

This month, *BM/E* begins a series of articles detailing the exciting potential ahead for rebuilding AM, with articles addressing the complex preemphasis issue and the new proposals for AM antenna design.

One of the most heavily discussed topics in the overall question of AM technical improvement is the very sticky issue of preemphasis. For the first time, receiver manufacturers and broadcasters have come together to try to work out a voluntary preemphasis curve for AM that will allow for the production of uniform AM receivers which give the high-fidelity response everyone connected with AM is seeking.

The manufacturers have expressed a strong interest in producing wideband AM radios for which broadcasters have been pleading the past few years.

New interest in wideband, high-fidelity AM has been spurred on, in part, by AM stereo. But in light of the systems war that still plagues the stereo question, the focus has shifted to wideband AM with the stereo question as a separate issue. In other words, it is possible to have high-fidelity AM, with or without stereo.

But there is general agreement that the manufacture of wideband receivers won't produce the high-fidelity AM sound that will put it on parity with FM as long as stations continue to boost high frequencies, and, in many cases, continue to overmodulate and cause adjacent channel interference.

With both broadcasters and receiver manufacturers finally working toward the same goal, the NAB and the EIA agreed at last summer's CES show to begin looking at the question of preemphasis, and the National Radio Systems Committee (NRSC) has met since then to begin working out a voluntary preemphasis standard. Their work represents a remarkable willingness to work out a compromise for broadcasters and especially manufacturers, who have stated that if a standard can be established, it will give AM radio designers guidelines for producing uniform, high-fidelity, wideband AM radios that can generate consumer interest and be competitive with FM.

Sorting out the preemphasis issue has at times been a "chicken

Preemphasis: Key to AM Improvement

By Judith Gross

Hopes for development of wideband, high-fidelity AM receivers hinge on broadcasters agreeing to limit the traditional boosting of high frequencies.

and egg" argument. Most recently-produced AM radios provide a signal flat to about 2.5 or 3 kHz—some are even narrower. After that point there is a sharp attenuation or rolloff of frequency response, and in some cases, it is not a gradual rolloff, with the highs hitting what has been called an abrupt "brick wall" that is characteristic of the IF filters currently in use in AM radios. Broadcasters say they need to boost high frequencies to compensate for the sharp rolloff of AM radios. Manu-

facturers claim that the radios have the sharp attenuation because stations use too much boost, or preemphasis, prior to transmitting.

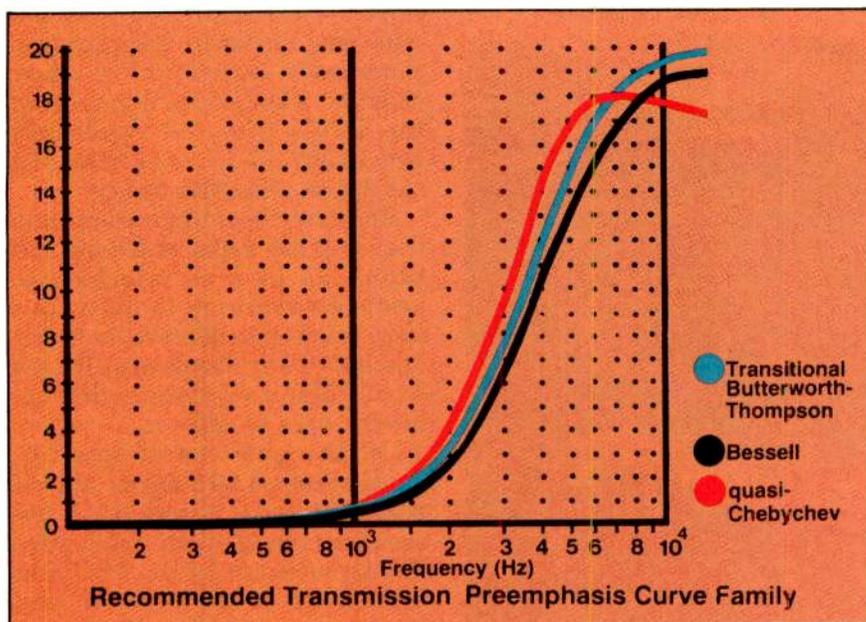
Historically, AM radios back in the early days were able to deliver highs, through the use of individually tuned components. But when AM radios began to be produced on a mass scale, such precision was not as cost-effective.

One important advantage of the built-in sharper rolloff was less adjacent channel interference of

the sidebands, which became a more vital consideration as the number of AM stations increased and as they became mobile, becoming standard in cars.

Then along came FM, and, ultimately, FM stereo, delivering a better response at high frequencies. AM broadcasters found they could get back some of the highs, or make their stations sound "brighter," by boosting high frequencies before transmission. As long as AM radios continue to have such a narrow bandwidth, the use of such preemphasis is not usually a problem. But with the advent of AM stereo, and the push for higher fidelity for AM, radios with a much wider response have been introduced, and the use of preemphasis can sound shrill or tinny at the high end. In addition, boosting the highs has been blamed for causing overmodulation and adjacent channel interference, both of which are greater problems with wider band radios.

Currently, preemphasis for FM radio is standard at 75 μ sec. (microseconds), and the boost is in the transmitter, with a virtually flat signal going into the transmitter and ultimately coming out of the radio. Unfortunately, no one really knows how much preemphasis is being used by AM broadcasters, only that frequently it is excessive, with some figures



Orban's Preemphasis Curves, allowing for processing (submitted to NRSC subgroup).

AM Preemphasis

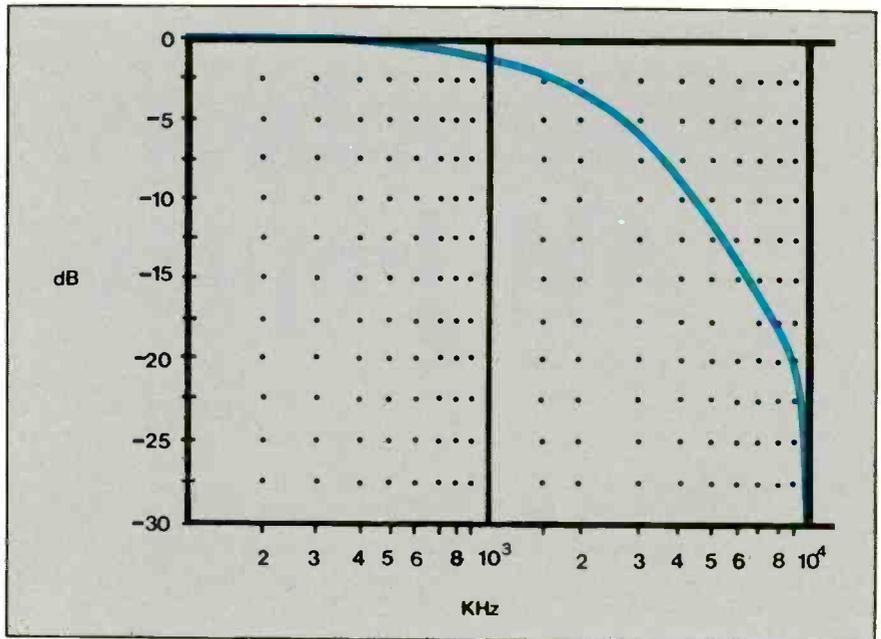
looming around 150 us. The only limiting consideration is the FCC occupied bandwidth requirement which says that stations must be 25 dB below the carrier at 15 kHz and beyond.

In addition, use of preemphasis is highly subjective, since stations are tuned on vastly different radios, with rolloff or deemphasis varying greatly. Often it is the program manager, and not an engineer, who decides just how bright the station should sound.

Committee's objectives

One of the first discoveries made by the NRSC, which consists of broadcasters, receiver manufacturers, EIA, and NAB representatives, plus Robert Orban of Orban Associates, is that there is no easy way to evaluate the current preemphasis situation and test new proposals. The committee's first formal action was to appoint a subgroup on methods and procedures, at the suggestion of Eb Tingley, of the Consumer Electronics Group of the EIA.

The subgroup outlined four objectives to be considered in setting a voluntary preemphasis curve. The first is that it should give AM a sound quality as close as possible to FM, with a system response flat to about 12 kHz and 25 dB down at 15 kHz in accordance with FCC re-



Orban's Deemphasis Curve (submitted to NRSC subgroup).

quirements. Secondly, processing must yield a predictable sound, with no apparent artifacts. Thirdly, it must be simple to implement. And finally, an agreed upon standard must be compatible with current transmission systems, including antennas; both narrow and wideband AM radios; the reception environment including such factors as electrical interference; program material, especially music with a great deal of highs; and listeners' expectations.

Splatter and monkey chatter

In trying to decide how much preemphasis is appropriate for AM, the subgroup, and eventually the entire committee, has been forced to look at some questions that have no clear answers and about which there is a wide disparity of opinion. One of these concerns "splatter": the result of a station either overmodulating or distorting. A discussion of splatter is part of an overall look at second adjacent channel interference, sometimes heard as "monkey chatter," which takes into account the FCC's occupied bandwidth rule (down 25 dB at 15 kHz) and the entire allocation policy.

Receiver manufacturers say they will not make wideband AM radios as long as interference problems continue to exist. But how much interference is there, and how many people are affected by it? These are questions the subgroup hopes to address.

On the question of splatter, most broadcasters agree that it wouldn't be a problem if the occupied bandwidth rule were strictly enforced by the FCC. But awareness of the problem and finding a way to measure its impact are two difficulties. The NAB's AM Improvement Commit-



Delco's Dick Kennedy discusses the preemphasis work of the subgroup on methods and practices.



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AM Preemphasis

tee recently suggested two solutions. One is a publication, which the NAB will undertake, to educate broadcasters about splatter and the problem it will create in a wideband listening environment. The other is to find some way to persuade the broadcast equipment industry to manufacture a "splatter monitor"—a device that will measure peak modulation and second channel adjacent interference, not at the transmitter, but in the coverage area.

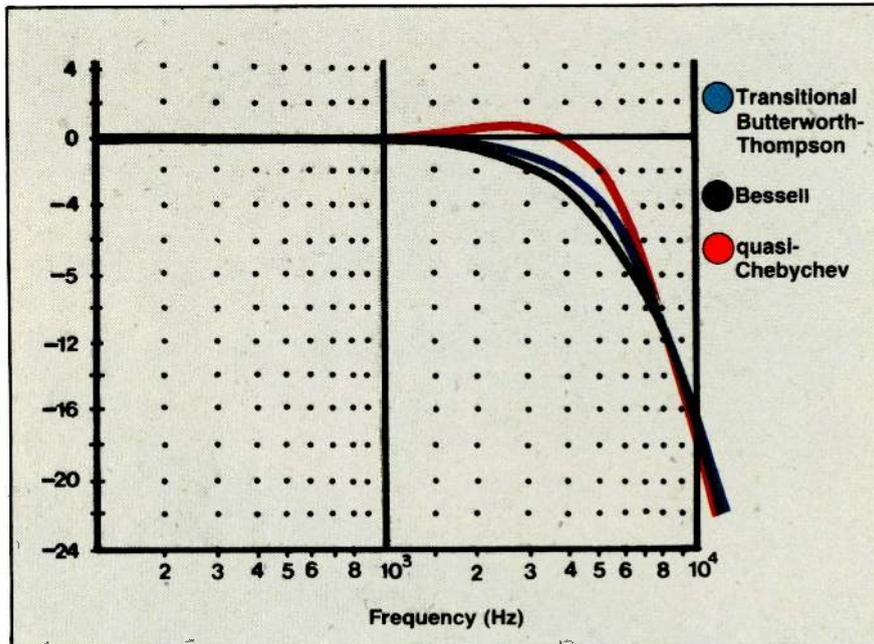
Interference from first adjacent channels is not considered to be a severe problem, because of the way they are allocated to avoid overlapping contours and because of the use of notch filters. But second adjacencies have been cited as being a potential problem as wideband AM listening increases, in areas where contours overlap. A suggestion has been put before the committee to look at the possibility of reducing the occupied bandwidth cutoff point from 15 kHz to 10 kHz, which would involve a ruling by the FCC and mean a compromise from broadcasters. In actuality, conforming to a reduced cutoff point would mean that a station's signal would roll off at 9 kHz instead of the 12.5 kHz now in use to conform to the 15 kHz cutoff point.

There is some disagreement among subgroup members about how much second channel interference actually exists. The problem was originally brought up by Dick Kennedy of Delco Electronics, who believes it is a problem. Bill Gilbert, also of Delco, agrees that it may be.

"Stations can be allocated to create interference conditions that aren't recognized by allocation guidelines; adding preemphasis could increase the area of interference," says Gilbert.

But Group W's Glynn Walden and Pioneer's Bart Locanthi report listening to AM in the wideband mode with no apparent interference problems.

"I listen in the wideband position all the time," explains Locanthi. "Interference isn't a problem. The FCC has never as-



Orban's Preemphasis Curves, allowing for processing (submitted to NRSC subgroup).

signed stations closer than 30 or 40 kHz, and even at night I haven't had interference."

John Marino, VP of engineering for Katz Broadcasting, points out that the compromise to a reduced cutoff point might not be that hard for broadcasters to swallow.

"If we could get a full 10 kHz from transmitter to receiver, we'd be in better shape than the allowed 15 kHz through radios with only 3 kHz response," Marino says.

Orban called the 10 kHz cutoff proposal "refreshing."

"The reason it looks so attractive," he says, "is because of the necessity for a notch filter at 10 kHz. Broadcasters are broadcasting energy from 10 kHz to 15 kHz that is not being picked up by radios, or is affecting the second adjacency." He adds that most listeners probably can't tell the difference between 10 and 15 kHz.

But Ken Brown, a senior engineer for ABC, questions the premise that second adjacent channel interference affects enough listeners to be a problem. He doesn't think broadcasters would be so willing to give up the extra 5 kHz, and he suggests a study of the top metro listening areas to see if a problem exists before asking

broadcasters to agree to a narrowing of their bandwidths.

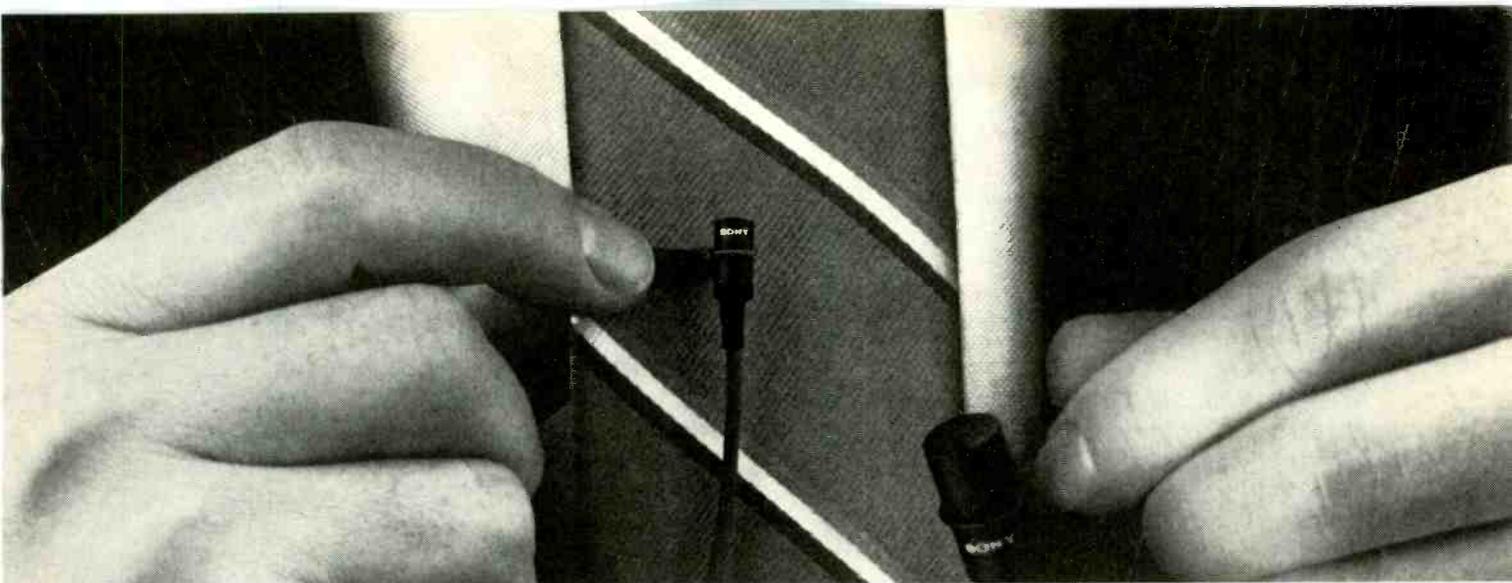
Almon Clegg, general manager for Matsushita technology, says the interference question can be considered separately from preemphasis, and he would like to see the committee's work stay with preemphasis first.

But it may be important for the committee to come to terms with the possibility of second channel adjacent interference before turning the focus to the final question of establishing a preemphasis curve for two reasons. The main one is that boosting highs can increase the possibility of adjacent channel interference as the highs throughout the sidebands are boosted. The second is that a rolloff curve for receiver design is impossible without first deciding a station's ultimate bandwidth limitation.

Preemphasis proposals

In reality, what the committee is really considering is not so much a preemphasis as a deemphasis curve for receiver makers to use in their designs.

Preemphasis will remain a matter of individual broadcasters' discretion, but receiver manufac-



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AM Preemphasis

turers want to know how much rolloff to build into receivers. The decision will take into account several key issues, including the present and future reception environment, the need to boost highs, and processing.

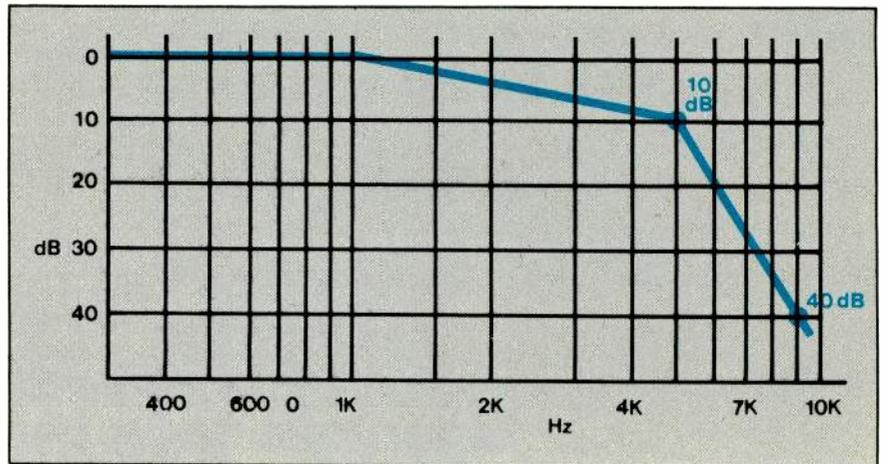
When looking at the reception environment, committee members must again return to the question of how wide is wide. For the high fidelity desired to give AM parity with FM, broadcasters desire the widest possible bandwidth. But there is still the unanswered questions about interference, which will need to be resolved first.

Another question is not only how soon to roll off, but how sharp the rolloff curve should be in radios, since a gentler curve could conceivably result in a better frequency range than a sharp cut-off. A sharper cutoff may, however, be necessary to protect adjacent channels.

The receiver manufacturers' starting point is that it is impossible, from a practical standpoint, to make a receiver that is completely flat to the required cutoff point. There will be some rolloff or attenuation of high frequencies. The question is how much, and how much boost should broadcasters use to compensate for it and to deliver a bright sounding station?

Orban was the first to suggest a preemphasis curve. At last year's Society of Automotive Engineers convention, Orban and Greg Ogonowski of Gregg Laboratories presented a paper called "AM Broadcast and Receiver Standards—Towards Opening a Dialog." This paper was a complete discussion of the issues involved, including processing, and Orban calls it a "compromise between narrow and wideband camps."

It is Orban's contention that in the reality of the reception environment, there are now, and will be for at least the foreseeable future, still many narrowband AM radios that need at least some boosting of highs to compensate for their sharp built-in attenuation. His recommendations have tried to compromise between such radios and still deliver the high-fi-



EIAJ 100 us Deemphasis Curve (submitted by Matsushita Technology to NRSC subgroup).

delity sound desired for wideband AM radios. The Orban proposal also looks at the reality of processing, which he says stations will not be inclined to abandon because of programming and promotional considerations.

Orban's proposal is for a pair of cascaded 51.2 us deemphasis networks, or "double 50" as it has been called. It consists of a pair of single-pole 51.2 us curves, cascaded with a 10 or 9 kHz symmetrical two-pole notch filter.

With that as a guideline, Orban has also recommended a set of preemphasis curves, which take into account the realities of processing and existing narrowband radios. The three curves are quasi-Chebyshev, Bessel, and Transitional Butterworth-Thompson, all of which can be generated through processors using plug-in modules, according to Orban. The preemphasis curves are up 18 dB at 5 kHz and begin to shelve off after that, because according to Orban boosting beyond that makes manually-tuned radios difficult to tune, and might cause problems with processing and loss of loudness. The proposal allows for a high-frequency equalizer in the processor that will permit broadcasters to choose where the boost begins to shelve off.

Orban says the deemphasis curve, when used with one of the three preemphasis curves, represents the best compromise, taking into account the broadcast environment today. Because pro-

cessing is taken into account, the preemphasis curves are not exact complements of the deemphasis curve, and some committee members feel that the boost is too high, and the curve rolloff too sharp, for wideband AM listening.

Orban has also suggested a complementary preemphasis curve that involves less of a boost and a more gradual rolloff. This double 50 us boost would be up 3 dB at 2 kHz, up 10 dB at 5 kHz, and would drop off at 10 kHz.

But Orban still believes the processing issue is vital, especially with the use of multiband processing, which handles each frequency band separately and could alter any preemphasis applied by reducing the gain of a high-frequency sound such as cymbals in music.

Other deemphasis curves have come under consideration by the committee. One, brought to light by Matsushita, is the standard accepted by the EIAJ. It's a 100 us curve that is down 5 dB at 2 kHz, down 10 dB at 5 kHz, and rolls off at 10 kHz. A corresponding preemphasis curve would be boosted by the same amounts.

Brown of ABC and Al Resnick of WLS (ABC O&O in Chicago) proposed a 50 us curve, which would mean an attenuation of 1.45 dB at 2 kHz, 5.4 dB at 5 kHz and drop off after 12.5 kHz, with a corresponding preemphasis curve suggested for transmission. The EIAJ and ABC curves only involve time constants, and do not make special

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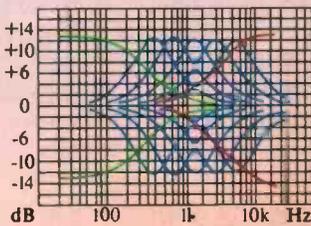
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AM Preemphasis

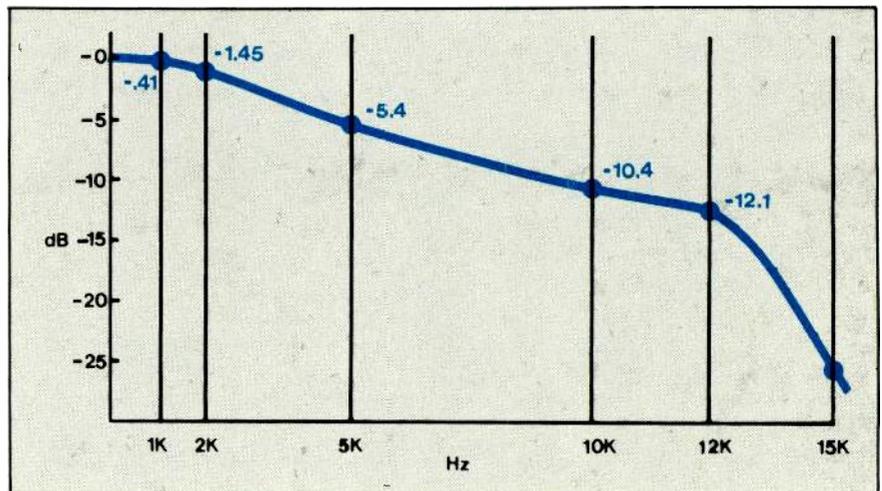
considerations for processing as Orban's recommendations do. Orban contends that there are problems with both. He says 100 us of preemphasis tends to result in lower midrange peaking in narrowband radios, giving the sound a "honking" quality. With only 50 us, he says, there is not enough boost to benefit narrowband receivers at all.

Committee members stress that the proposals are put forth merely to generate further discussion, and are not etched in stone. All of the proponents say they are open to changes. Once the peripheral questions of second adjacencies get resolved, then, it seems, the scope of the committee's work will be twofold. First, there will have to be some general agreement on which realities the deemphasis curves will address. Will they consider old narrowband radios, or future widebands? Will they compensate for use of processing, or not? Then, the committee will have to find ways of evaluating the curves themselves, which will involve trying out different preemphasis transmissions with various receiver designs.

Establishing methodology

ABC's Brown points out the need to determine if Orban's sketch of the AM listening environment is accurate.

Specifically, are there enough narrowband AMs already in the marketplace to necessitate greater boosts in highs than the time constant-only curves allow for? Brown says that there have been two kinds of AM filters used in the past. The "IF cans"—or individually tuned component filters that respond to preemphasis to deliver highs—and the ceramic filters that have come on the scene more recently and have what he calls a "brick wall" attenuation and do not respond to added boosts. If there are more of the former, he says, the Orban proposals make more sense. But if the "brick wall" or sharp rolloff is the norm in existing narrowband AM receivers, then Brown believes the extra boosts would not improve the AM



ABC 50 us Deemphasis Curve (plotted from figures submitted to NRSC subgroup).

sound and receiver manufacturers and broadcasters could agree on a lower amount of preemphasis as the voluntary standard. The problem is that no one knows for sure how many of each type of AM radio has been sold to consumers, but the EIA and receiver manufacturers can probably supply some statistics to help clarify the picture.

The final step will be to actually test the curves, and the committee intends to use both controlled transmissions and actual radio stations to evaluate the proposals.

"We may use closed circuit tests, switch selectable filters, as well as actual broadcast stations," explains Katz Broadcasting's Marino. "But it's going to take a lot of subjective listening, too."

Potomac Instruments, for one, has agreed to help the committee with spectrum analysis and other testing when the time comes.

Long road ahead

In looking at all the subjective questions involved in preemphasis, both manufacturers and broadcasters have learned a lot about each other's concerns. Broadcasters have looked at the realities and problems of receiver design, and the manufacturers have looked at the broadcast environment, including issues such as processing.

Some committee members have suggested that there may be no absolute answer, but that the final standard will be a range of an-

swers to fit differing needs. For example, receiver manufacturers may decide to market several types of AM receivers, with less expensive ones compromising on questions of bandwidth and sharpness of rolloff, and more expensive models allowing for choice of bandwidth and fine-tuning. Orban has suggested the possibility of splitting the "double 50" curve by using 50 us of preemphasis built into the receiver, and making another 50 us available to the listener in a tone control.

The committee may decide to begin with an interim preemphasis curve allowing for existing narrowband radios with higher boosts and sharper rolloffs, which will be "grandfathered" out as wideband receivers are perfected and gain acceptance.

Motivation to find an expedient solution is high, and there has been a great deal of good feeling and cooperation among broadcasters and manufacturers, in an apparent departure from past dealings with preemphasis.

"What's new is that now we're talking to each other instead of criticizing each other," notes Brown.

The reason all parties are so eager to find a solution may be the recognition of the state of AM radio, as expressed by Delco's Gilbert.

"It may be that AM is in so much trouble that everybody sees the need to come to an agreement." **BM/E**

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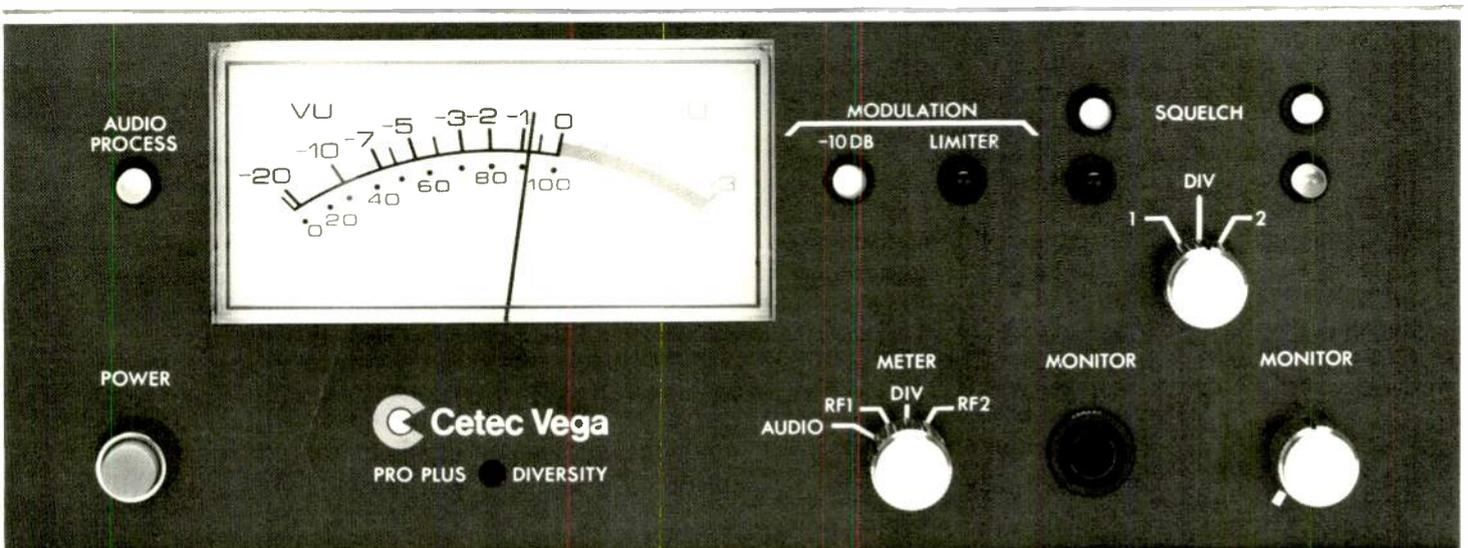
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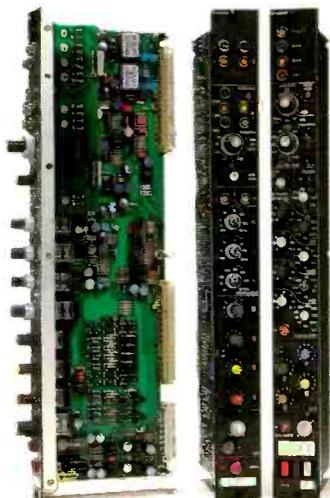
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MTS and the Stereo Synthesizer

The stereo synthesizer has become a required part of the cost for getting into the new television sound.

By Robin Lanier

Riding into television stereo sound alongside the techniques that have created MTS is an audio processing technique nearly three decades old. It is the stereo synthesizer, the system that turns a mono signal into approximate stereo. The stereo synthesizer has become a required part of the fee for getting into the new television sound.

This is evident from sales figures suggesting that 80 percent, or more, of the 250-plus stations now actively in stereo are using stereo synthesizers. A check of a small sample of the stations further suggests that they are synthesizing just about all the mono programming they send out.

When we remember that the output of a stereo synthesizer has for years been called "pseudo-stereo," even by designers and makers of the units, we know that something new is at work. What exactly does a television broadcaster get from a stereo synthesizer? What should he/she tell listeners about it? How should it be integrated into the plant?

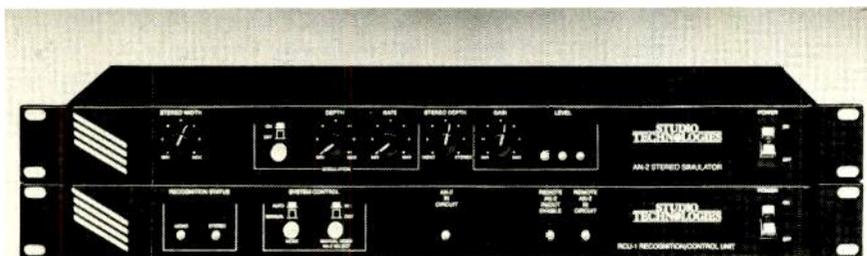
The basic push comes, as might be expected, from a well-known psychoacoustic phenomenon: once a listener is accustomed to stereo, mono will sound drab, leaden, and pinched. Increasing numbers of TV viewers have crossed this line.

Commercial pressures

It is true that the number of viewers with stereo sets, though growing rapidly, is still small. But there is the overriding commercial dynamic, which is familiar from



Orban's 275A synthesizer has switching that adapts to automation control.



The RCU-1 from Studio Technologies treats a single-channel signal as mono.

earlier technical advances, especially color. A station in a competitive market must have a new promotable "hook" if others in the market have it.

However, the available stereo programming the broadcaster can use is still quite scarce. One network, NBC, with a strong commitment to stereo, is putting out about 20 hours a week of live stereo; the other networks have yet to follow suit. The supply is certain to increase, from many sources, but it may not really be ample for two years or more.

There were attempts to make stereo out of mono back in the 1940s, but apparently the first reasonably successful scheme came from H. Lauridsen of Danish Radio in 1954. He developed from a mono signal two versions of the

same program, differing from each other in phase, by using complementary comb filter effects. He added the original signal to a delayed version (50 to 150 ms) for the left channel and subtracted the original signal from the delayed version for the right channel.

How it works

This original "synthesizer" supplied two different accounts of the mono material with phase differences between them, and also produced band-splitting that divided each channel into frequency bands of approximately constant

About the Author:

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

Important Synthesizers on the Market

The descriptions given here are sharply abbreviated; any prospective buyer should obtain from the manufacturer of a unit the full technical description. The respective units must be compared with others in a careful ear check.

- Orban's Model 275A is a major revision and update, to be released in March, of Orban's Model 245F. The main change is that the 275A incorporates automatic mode switching and elaborate controls to adapt the system to broadcast use. It also has a choice between the use of five frequency bands, as in the 245F, for a "wide," effect, and 15 frequency bands for a more "ambient" effect. Beyond that, the Model 275A has very complete manual switching controls, and can be set for either one-channel or two-channel distribution of mono in the plant. It is also computer-ready, and has automatic correction of polarity reversals and a noise-reduction system built in.

- Studio Technologies' Model AN-2 Stereo Simulator is another system with a great multiplicity of frequency bands in each of

the synthesized channels. The bands are random in the frequency spectrum (as they are in the other units) to avoid having them in a harmonic relation, which can be very destructive of quality. Controls for stereo "width" and "depth" give adjustment to the program material.

A companion unit is the RCU-1, which "recognizes" the difference between stereo and mono programming (within the limits discussed for all such circuits), to supply automatic mode switching. A recent modification, which is easily retrofitted, makes up the RCU-1 Mod 1, which operates with one-channel distribution of mono signals (the original RCU-1 is designed for two-channel mono and stereo).

- Kintek's Model KT-903 Stereo Converter introduces "high density phase and amplitude cues from 16 Hz to 20 kHz into the right and left channels from a mono input." The system has an "auto centering dialog control"—overall stereo width can be adjusted but dialog can be kept in the center, consid-

ered desirable for proper psychoacoustics. There is also a mono-stereo sense switch; see discussion in the story of the problems in all the circuits used in automatic mode switching.

Kintek claims that using a large number of frequency bands, close together and randomly distributed, contributes to an excellent acoustic quality. An associated unit is the KT-960 "Monogard" which automatically guards the system from a polarity reversal in one channel, which could have disastrous effects on the performance. The "Monogard" corrects the polarity quickly.

- Ursa Major's MSP-126 Stereo Processor is a multipurpose system, with stereo synthesis as one of its capabilities. It has a 360 mS delay line with 12 separate taps. Stereo synthesis can be accomplished with time delay patterns, or with comb filter effects (as in most other units). Ursa Major claims a full 20 kHz bandwidth digital delay line, image positioning in the stereo field through time delay, reverb enhancement, and special effects generation.

bandwidth, different from the bands of the other channel. Heard together, the two channels gave the sound a wide spaciousness very much like the ambience in "true" stereo.

This spaciousness, as well as the signal characteristics that create it, are too complex for exact mathematical treatment—the technology is basically empirical. But the creation of two channels with phase and split-band differences can be depended on, within wide limits, to produce a very pleasing space effect.

However, these channel differences created synthetically cannot put the apparent sources at "locations" in the stereo image that correspond to the original locations, or that are simply spread across the stereo space. This localizing, a familiar and attractive aspect of

stereo, depends on having phase and amplitude differences that are directly related to the actual positions, produced by differences in path lengths and directions from instruments or voices to the recording microphones. Or, as in much popular music, the localizing may be produced by panning.

One of the big steps toward today's refined synthesizers came from Robert Orban of Orban Associates and was reported by him in the *Journal of the Audio Engineering Society* in April, 1970. Under the title "A Rational Technique for Synthesizing Pseudo-Stereo from Monophonic Sources," Orban described his use of all-pass filters, rather than delay lines, to develop the comb filter effects. Some of the advantages he reported were much lower cost than that

of delay lines available at that time, and a transparency to the fidelity of the original signal.

The synthesizers prominent on the market today use advanced delay lines, far more effective than those available in 1970, or all-pass filters of similar sophistication, to produce the two channels with phase difference and split frequency bands.

What broadcasters get

If today's synthesizers are successful, it's because they must be. In the most basic sense, they meet the demands of stereo-equipped stations. To the community at large, the TV broadcaster can represent that he is consistently using a form of stereo, and there is a case for accepting this as totally correct. As Eric Small of Modulation Sciences notes, "stereo" is not

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The Stereo Synthesizer

just one sharply defined entity but has a range of meanings. There is stereo produced with coincident microphones, stereo with mics 12 feet apart, stereo produced by panning in the mixdown from a 24-track recording (each track being mono), etc. The results of the various techniques differ substantially, and the "stereo" in which spaciousness is the main aspect of the sound may be considered within the range.

The experience of a number of stations putting out synthesized sound indicates that it may, indeed, have this positive effect. A typical report is that of Stephen Vigneaud, chief engineer at WFSB in Hartford, CT. "We hear from many listeners with stereo-capable receivers that they like the synthesized sound tremendously and are most unhappy when for any reason we don't put it out."

This popularity of the synthe-

sized sound is reported by just about every station using it. Most of them do not distinguish, for their listeners, between real and synthetic stereo.

What is missing?

But we cannot deny that some of the attractive aspects of stereo are missing in using synthesizers: the sounds of instruments or voices coming from different, firmly placed "locations," and the excitement of an array of instruments spread out across the space.

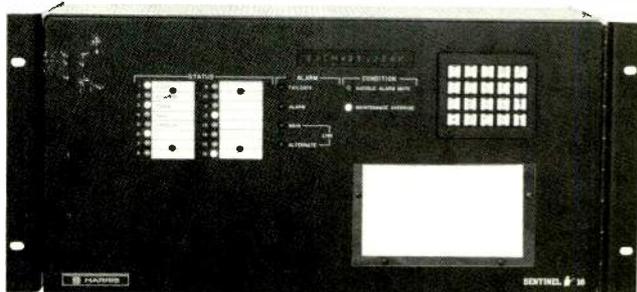
There are varied opinions as to whether stations should label their synthesized programs so listeners know what kind of stereo they are getting. A closely analogous situation developed when the stereo disc arrived in 1958. Then, as now, the commercial pressure for stereo was heavy, and a number of recording companies issued mono material that had been put through processing of some kind to

get a stereo "effect." The processing was far less refined than it is now, and the results were often distasteful, miles off from real stereo. The consumer press concerned with recorded music was highly critical of the "misrepresentation" when such material was labeled simply "stereo," as some of it was.

After a while, a number of companies began to put on "synthesized" stereo a jacket phrase such as "Reprocessed Electronically for Stereo" or "Electronically Rechanneled for Stereo," and the record buyer quickly understood the meaning. Apparently the record companies did it individually and voluntarily, or perhaps there was often a double motive: to avoid bad press and also simply to be honest with the record buyer.

What is going on in television stereo today has some parallels to that recording industry history but also some important differ-

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The Stereo Synthesizer

ences from it. The decision on what to call synthesized sound is being made on a station-to-station basis. NBC, for example, has been carefully avoiding putting a stereo label on synthesized sound, according to Randy Hoffner, network executive concerned with stereo programming. When the stereo program is put out by the network, an NBC logo at the head of the program identifies it as stereo.

NBC affiliates around the country have been following the same practice. For example, Bob Good, chief engineer at WGAL in Lancaster, PA, where both stereo and synthesized material is being used, said that the stereo label is reserved for "real" stereo.

Probably a majority of stations in stereo sound, on the other hand, are not making that distinction; the practice of WFSB, noted above, is typical. Those stations have a firmer position than the re-

corded companies did in 1958, in one sense, because today the synthetic sound is much closer to the real sound and is highly pleasing to the public.

Choosing a synthesizer

It's a good bet that virtually every television broadcaster going into stereo in the near future will want a stereo synthesizer. Aside from the obvious basics like harmonic distortion and frequency response (all the available units do very well in these areas), the sonic quality is not easily related to the technical characteristics. The real check is, of course, an ear check.

Some early guidelines on operation have come from the experience of users. Several advised strongly that the synthesizers should not be pushed hard, that is, the setting for "width" should not be advanced toward a maximum "wideness." Chuck Johnson at KTZZ in Seattle, WA, and Charles

Allen at WTXX in Waterbury, CT, were among those who said a very high width setting is likely to produce an unnatural, unpleasing sound, with a large hole in the middle. Johnson said further that the operators should be instructed not to twist the knobs on the synthesizer at all.

All those interviewed were aware of the necessity of monitoring the station's mono output while the synthesizer was brought on line. All the makers say their units are completely mono-compatible, and this is apparently true in normal operation. However, a faulty or very poorly adjusted synthesizer may have an adverse effect on the BTSC signal; mono monitoring (a necessity in MTS, in any case) will alert the operator to this. Switching the synthesizer in and out while listening to the mono gives a positive check.

There is some difference in opin-

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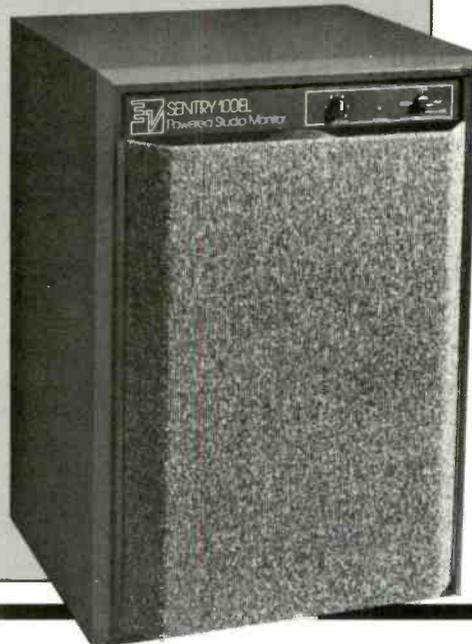
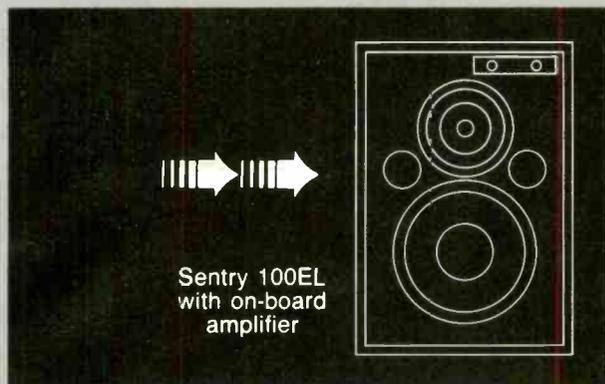
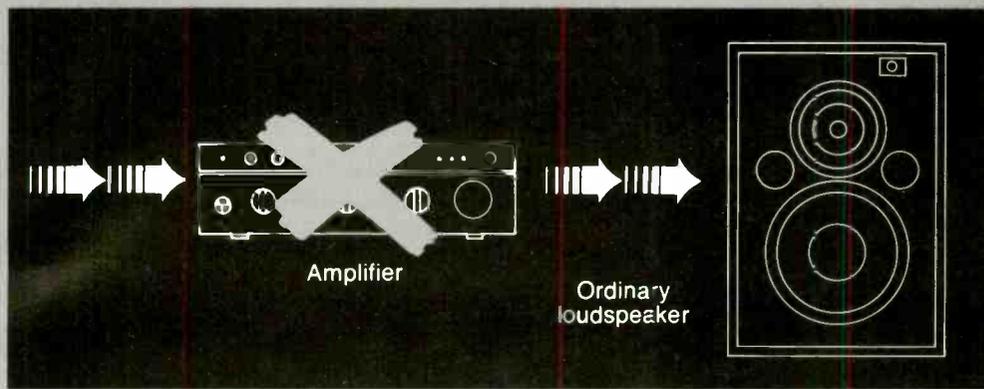


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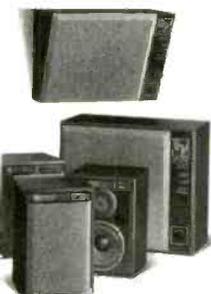
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The Stereo Synthesizer

ion on where the synthesizer should go in the audio line, but one caution is urged: It should not be after the audio processing, especially if hard clippers are used, with their strong effects on phase response. It must also, of course, be ahead of the stereo generator. Aside from that, the position will be determined in large part by the particular routing and switching arrangements in the studio plant, and these arrangements also have a major influence on the handling of a "false triggering" problem.

"False triggering" is the one important difficulty that now afflicts the operation of a stereo synthesizer. When a stereo program comes along, all the synthesizers, in normal operation, simply pass it through. When a mono signal comes along, the unit must synthesize. The necessary change of mode can be accomplished automatically, by the synthesizer itself or by the operator manually. If the

synthesizer is to do it automatically, it must be able to "recognize" which signals are mono and which are stereo.

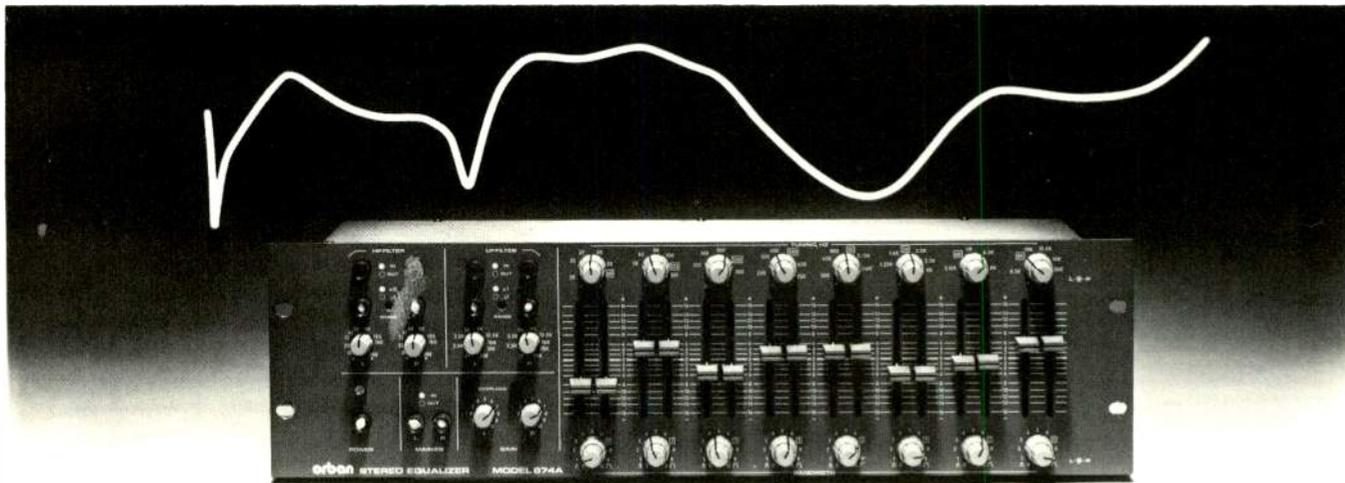
All the available units have recognition circuits for this purpose, but the circuits have not been 100 percent effective. One main slip-page occurs when a centered signal—for example, extended dialog—comes along on a stereo program. A great deal of the stereo program, especially movies, has centered dialog. The recognition circuit may decide that a mono signal has come along and switch the unit into synthesis. A stereo signal put through the synthesis is, as might be expected, a very unnatural signal.

Some stations get stereo in large, preidentified blocks, and the operator can set the synthesizer by hand without any problem. WGAL, mentioned earlier, is one of these. But if commercials are coming from a network in dense

clusters, there is likely to be a random variability between mono and stereo, on very short time intervals. It would be expensive, or perhaps impossible, to set up switching so the operator could do the job. That is why many prospective buyers of synthesizers at a recent convention, according to Howard Mullinack of Orban, said that they must have automatic recognition; even if it is not 100 percent accurate, it would be much better than trying to deal with the operating problem.

Recognition circuits

The handling of the problem depends to some extent on how the signals are routed around the plant and the setup of the recognition circuit. The practice in several of the available units will illustrate the general situation. Orban, admitting that "no electronic circuit can perform this task perfectly," says that the



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The Stereo Synthesizer

Orban 275 circuit has been painstakingly fine-tuned to "make the fewest errors" in its synthesizer. Two forms of recognition are supplied. Single-channel recognition sets the bypass mode if the signal is present on both channels, but for synthesis if it is on one channel only. This is adapted to plant routing in which the mono signal travels on one channel only, and two-channel distribution is always stereo. The second form is two-channel recognition, and this must discriminate between mono and stereo when two channels are used. A majority of correct performances is the best the technology can provide at this point.

The Studio Technologies RCU-1 (recognition unit) was originally designed for two-channel studio routing and makes the decision on mono vs. stereo by measuring the correlation between the two channels. If they are alike, it is mono; if different, stereo. As already noted,

there is an inescapable element of uncertainty in this. Centered dialog in stereo programming, for example, may well be interpreted as mono, but careful design, again, can keep the errors infrequent. A further complication is the lack of standardization in studio routing practice, which has led Studio Technologies to issue a modification of the RCU-1, adapting it to single-channel mono. With the RCU-Mod 1, a single-channel signal is treated as mono.

Kintek, a two-in-two-out system, monitors, again, the correlation between the two channels, with, again, considerable sophistication to avoid as much false triggering as possible. The "void" in stereo with centered dialog is handled with a delayed, gentle switch to synthesis, followed by a fast switch back to bypass when the "void" disappears.

The relative effectiveness of any of these circuits clearly depends on

specifics in design, and again ear checking is necessary to give the broadcaster a line on the performance.

Orban has suggested an industry practice that seems an excellent answer to the false-triggering problem. He says that each program segment—a commercial, an ID, a music program, or whatever—should have an industry-standardized label in the vertical interval that identifies the segment as mono or stereo. An automation system could then easily be programmed to switch the synthesizer in accordance with the label. The label could be at the head of the program or could be carried throughout in the vertical interval. The new Orban synthesizer, Model 275, has elaborate switching to make it easily subject to automation control. It is clear, moreover, that any synthesizer could do the job with proper interfacing to the computer. BM/E

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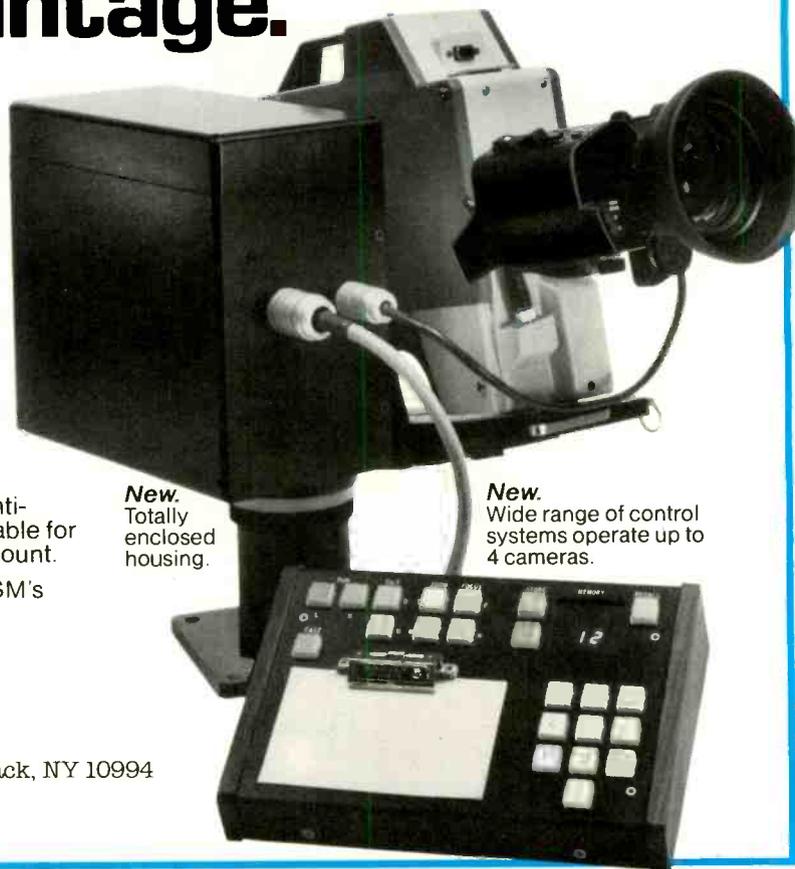
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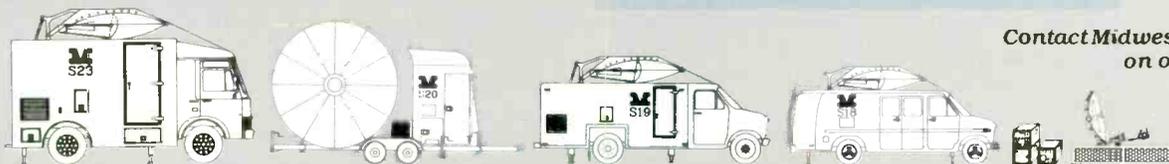
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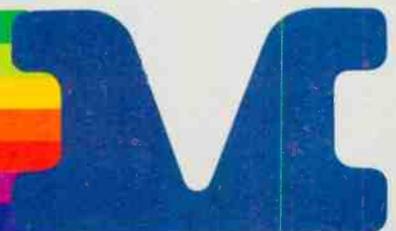


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Choreographer Michael Peters (left), writer/director Bob Giraldi (center), and Michael Jackson on location during the filming of the "Beat It" music video, which used video effects and dialog recorded in stereo.

Getting the Pictures to Match the Sound

Stereo techniques are on the rising tide as broadcasters and program producers learn how to use stereo in support of video.

By Mark DuPré

Matching sound to picture. Just when you thought the rules were set, along comes another technology to muddy the waters. In this case, stereo television is the culprit. While producers are frantically trying to get out product marked "stereo," or are simply trying to gear themselves up to transmitting a stereo signal, audio engineers are quietly using this time to exploit the possibilities of TV stereo sound in relation to the picture. There are traditions being tapped, of course—film sound and music video effects, to name two—but stereo in television is quickly finding its

own identity in creatively matching sound to image. How stereo is beginning to be utilized in television today—even with the vast majority of listeners still unable to discern it—is probably the way in which the first full stereo TV generation will hear it.

The stereo movie

The grand example most engineers have before them, and on which many have cut their professional teeth, is the stereo motion picture. What first pops into many a mind are the space operas and updated male versions of *The Perils of Pauline*, but a more subtle

example and one probably providing more of a working model for stereo engineers is a picture like *Under Fire*. A 1983 Lion's Gate Film done in conjunction with Orion Pictures, *Under Fire* had a goal the exact opposite of many of the current adventure fantasies, but which is more in tune with the aspirations of stereo TV. According to Steve Bremer, technical director of Lion's Gate and

About the Author:

DuPré is a freelance writer and copywriter living in the Rochester, NY, area.

TV Engineering & Production

Matching Picture to Sound

coproducer of the film, the aim of the audio was "to bring about a high degree of involvement by the audience, to allow them to aurally buy into the picture." Set in Nicaragua in the turbulent '70s, the film had to overcome both the film industry's recent operative use of stereo and the mono flatness of the nightly news that gave the viewer a daily helping of world warfare on video accompanied by catch-as-catch-can audio. Director Roger Spottiswood brought in Richard Anderson (supervisor of post-production sound effects) and Stephen Flick (line editor), who had both been involved in posting the sound for *Raiders of the Lost Ark* and *48 Hours*. Anderson remembers Spottiswood's concern about the audio. "He wanted a documentary feel," he says. "He didn't want to hear a Hollywood gun shot."

To keep as much control over the audio as possible, the team from the beginning designed and recorded many of the effects in stereo: gun shots, jungle backgrounds, explosions, and helicopter landings. Mono effects were still used the majority of the time because of the ease of panning the sound to match the appropriate "source" on the screen. But the sound engineers felt that much of the realism came from the stereo effects, which not only put the audience in the midst of war, but war in a very foreign environment.

Capturing that environment translated into a variety of different miking approaches. Most background (recorded in Mexico) was done with X-Y miking, using a pair of hypercardioid mics with a 90 degree angle. That gives a "fat center," according to Anderson. A "soft center," used primarily when placing effects behind dialog in a widescreen film, was obtained via the OTRS style, which uses a 110 degree angle between the mics. To yield what Anderson calls "a very discrete background," mics were placed 30 to 50 feet apart. The criteria, he says, was to "think of what kind of image you want this to represent. It really depends on intent." The intent apparently



Today Video's David Seeger uses audio-visual lock (AVL) as a key component in editing music videos.

furthest from his and the director's mind was to bewitch and bewilder. "Razzle-dazzle and technical trickery hasn't generally produced the best stereo sound tracks," Anderson notes. "Realism is the key word."

Music video influence

Ironically, it is in the very unreal world of music video—if not a parent of stereo TV at least its older brother—that the realism of stereo effects has been used in a way now being emulated in stereo TV. Antony Payne, president of New York and Los Angeles' GASP! Productions, Bob Giraldi's company, claims that "GASP! pioneered sound effects and dialog in rock videos." Those effects and dialog were recorded in stereo. But contrary to being used as "razzle-dazzle," the effects were used mostly "to increase drama," according to Payne. For example, Giraldi's ground-breaking "Beat It" video contained a fight sequence with gang A on screen left and gang B on screen right. Knives were drawn, and accompanying clicks were added, panned to the left and right to match the screen placement of the knives. To Payne, "the director is basically a storyteller. Color is a great tool to the storyteller, as is stereo."

Another man bound by a similar philosophy is Today Video's David

Seeger. AVL, or audio-visual lock, is a key component in editor Seeger's efforts to "try to bring audio into the foreground." "Body" by The Jacksons, for instance, contained a helicopter landing that had Seeger trying to "shoot the sound around the room." Hoots and hollers were added to the aerobic-feeling "Perfect" (Carly Simon), and Stevie Wonder's "Don't Drive Drunk" had nine levels of sound effects that, according to Seeger, were used in part to give proper spatial dimension and the sense of human presence and activity to the parking lot set.

Seeger goes so far as to say that "you're really utilizing the medium when you can turn off the picture and the audio can tell the story." But he still remains cautious about intruding on the performer's terrain. "Effects are a fine area," he says, "because you're playing with the artist's music. And the music's the thing. You have to be true to that. Video sound effects should be invisible in the sense that you should not feel them as an effect."

With such traditions to draw on, what is stereo TV doing? In spite of a great deal of experimentation and creativity in a few corners, the overall answer is very little. NBC, of course, is the network pioneer, but the general application of stereo is a conservative one.

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Shows such as *The Golden Girls*, *The Bill Cosby Show*, *Family Ties*, *227*, *Cheers*, *Night Court*, and *Remington Steele* are "stereo" because they have stereo music tracks. A few, like *Family Ties* and *Cheers*, go a step further and do a mild pan on the studio audience. *Cheers* in fact even pans the background noise, called walla, in its bar set. But dialog, as in most other sitcoms, is strictly center track. The guiding mentality behind these decisions is less creative than economic. Most of these shows are gold mines of future syndication, and will be ready for sale at appropriate top-of-the-line prices when stereo sets will be either more commonplace or even in the majority.

One show that is stretching the boundaries, even if ever so slightly, is NBC's *The Tonight Show*. Audio engineer Ron Estes doesn't touch Carson's interviews; the table mic and an overhead boom mic pick up all the sound in mono, and it stays that way in post. But Estes does exploit the stereo with the audience, the bands and singers, and Carson's monologue. He spreads six mics across the audience to catch both laughter and comments, and pans sufficiently left and right so that comments from a particular side of the audience will be heard in that channel; Carson, should he turn his head, will move in the "correct" direction for the home viewer. The band is miked in sections and panned to match the audience view—brass on the left, rhythm in the middle, reeds and percussion on the right. Drums are spread out from the center and panned right and left. Guest bands are miked and panned similarly, and Estes will even pan a trio of backup singers. But if his video/audio match for the singers produces a questionable sound mix, Estes admits to "cheating" a little on the panning.

The most dramatic panning is done during one of the most visually static portions, the monologue. While Carson is of course placed center track, Estes pans Doc Severinon hard right and Ed MacMahon, hard left, so that all



Audio engineer Ron Estes mixes NBC's *The Tonight Show*.

comments on Carson's jokes come from one side or another.

One of the more forward-looking of stereo shows, *The Tonight Show* has been broadcast in stereo since July of last year, but has been produced in stereo for about four years—600 shows' worth. All reruns about a year or so old are now broadcast in stereo. The others, according to Estes, are for "archival purposes."

Affiliate creativity

Creating new stereo sound and image complements is scarcely the sole domain of the networks, however. NBC affiliate KING-TV in Seattle, for example, jumped headlong into a full-blown stereo documentary over a year ago for the express purpose of learning by educated trial and error. "Our goal," says station production manager Craig Johnston, "was a stereo show—with no time constraints and few financial ones. We wanted to learn what it would take to do it." A documentary on the Seattle Symphony, the program was simulcast over the company's FM station in September 1984. Part of the show was performance, and part was interview, and both received their own miking approach.

For the music recording, two mics were hung near-coincidentally. Audio engineer Gary

Harper (also chief photographer at the station) synced two Sony BVU-100s to a Sony F1 digital processor, recording on half-inch VHS. Two performances were recorded, and video was edited to the conductor's choice of the better of the tracks. Off-lining was done on 3/4-inch, and audio was transferred to an M&M 1200 multitrack unit.

Interviews were done mono, but ambient sound was recorded on a pair of AKG 451 mics mounted on the cameras and splayed out at 100 degrees. To keep a proper visual/aural perspective, Harper employed a wide-angle lens to be able to move in tighter with the shots.

Most of the effort for the program, however, was in post. "It was a very post-production-intensive project," says Harper. Johnston remembers that posting "took forever. Trying to move all those tracks around took time." Part of that time was in making creative decisions for sound placement. An opening gate on screen left was assigned an appropriately panned sound. The sound of a baby carriage moving from left to right was panned across the screen. Though interviews were in mono, Harper and Johnston were inclined to pan the interviewer's questions a little to the right of center if the viewers knew that the interviewer was sitting there

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offscreen. No hard pans were done at all, as any suggestion of the ping-pong effect was avoided.

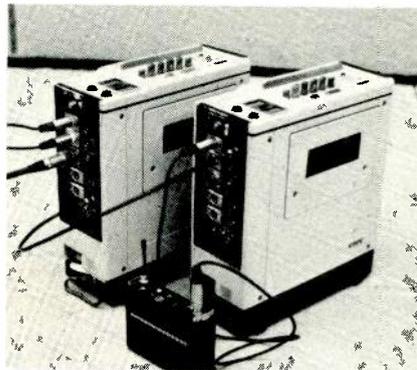
One of the more challenging decisions forced upon the crew was how to handle ambient sound amid changing camera angles. In this case, the track carried a beach scene with waves on one side and birds on the other. Camera angles varied throughout the sequence, even up to 180 degrees. Discovering quickly that "abrupt cuts in audio didn't work," Harper chose to cross-fade the audio every time a camera angle changed.

With the experience behind him, Harper has opinions about what he would do differently if he were to do it again. He would replace the AKG 451s with a single-point M-S mic, and would use a stereo mixer to mix the audio in the field. The F1 digital processor would be replaced by a dbx 700, which Harper judges better for professional applications. If he used the F1 again, "it would be modified to accept genlock from the station," he says. "I also should have encoded audio on one-inch and tried to genlock everything." In terms of separation, Harper would have recorded his audio "a little wider," and would be "more daring" in panning harder left and right. He also believes that background stereo can be a lot louder than its mono equivalent, and that it can be made to accommodate a wider geographic range of effects. Harkening back to early film sound days, Harper even joked about the need to get enough general ambient background. "Remember room tone?" he asks.

Since the documentary, KING has completed a special on AIDS. Produced in mono, the program was transformed into stereo by returning to the original scenes (or similar environment) and recording stereo ambient sound. Other stereo endeavors have included a comedy weekly series *Almost Live*, "Seahawk's 10th Anniversary Celebration," "Concert in Black Lightning," and "Puss in Boots."

In spite of the association with network use or high-priced specials, stereo TV is also making its

way into the smaller stations and into more everyday applications. Case in point is the work of audio engineer Bob Good of WGAL-TV in Lancaster, PA. Good's attitude is in striking contrast to that of the more cautious networks. "This is the time to experiment. As long as it translates into a good mono signal, who cares?" he asks. Not all his experiments have been successes, but as with the KING documentary, there are lessons to be learned. Good once put a pair of mics on either end of a small foot-bridge and had the announcer move across. The desired separation was there, he says, but the end result "sounded weird. I



Seattle's KING-TV lashes up two BVU 110s in order to record stereo ambient tracks, plus a center-channel effects track.

should have recorded it and panned it in the studio." Another time he put a mic in the hands of the interviewer, and another in the hands of the subject. He did some slight panning as the two walked across the screen, but didn't find it "effective." He ran into a technical problem when he set up another announcer between two mics, discovering that the mics, though identical, weren't matched.

One setup Good is satisfied with in his stereo news show. Three people are on the set, and Good assigns them to left (about 33 percent, he estimates), center, and right. Some of his audio operators regularly follow the announcers' movements, panning audio to center when the announcer hits center screen, for example. (Other operators don't bother.) Good feels

that this kind of technique is something that might be noticed initially, but would eventually be taken as routine.

Good's ideal setup is to have three audio channels. Two would be assigned to stereo ambience and one to mono dialog or narration. He would pan the stereo hard right and left, and would save the creative decisions for post.

One of the great ironies of current stereo TV is that some of the most extensive and creative work is being done where no one can hear it. The soundtrack of CBS's *The Twilight Zone* is easily as complex as that of any movie road show. But because CBS still hasn't completed work on its stereo transmitter, not even those few with stereo TVs are hearing anything but mono. As post-production sound coordinator Stephen Zansberg says, "We're banking on a future payoff for our efforts right now."

If the abused term *state of the art* retains any meaning at all, the audio on *Twilight Zone* represents that with ease. According to rerecording mixer Phil Seretti, the show is the only one being mixed to THX standards, and the dubbing stage is "the first to use full-blown video mechanics," with nary a single piece of film equipment in sight. Mixed at THX Sound Stage (THX is a division of Lucasfilm), the show utilizes an Amek console and the Otari MTR Series tape recorders.

Posting decisions are based, says Seretti, on "what the picture is doing. We're trying to create a real-life situation." But the visual/aural relationship is much more elastic than in most network television. Dialog, for example, is often panned when the opportunity arrives. A simple two-shot might create a limited sound spread, for instance, with a wide separation between the people meaning a slightly bigger spread. Off-camera dialog, such as a mother shouting from a kitchen, will be panned hard to whatever side it is supposed to be coming from. For noises above or below screen, the audio level is simply reduced, to

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TV Engineering & Production

Matching Picture to Sound

indicate distance. When rapid camera changes begin to play against the dialog, it goes dead center. For example, Seretti once mixed a verbal fight scene that started out slow, and panned slightly left and right. As the argument picked up pace and the cuts back and forth began to increase, Seretti slowly brought the dialog to center. He's not hesitant to throw speech into a hard right or left position if it's justified, however. During a monologue with cutaways, the monologue was put into a relative hard-panned position when the show cut to someone watching the speaker.

Music is premixed in standard two-channel stereo for the show, but even here Seretti may play it differently if warranted by the scene. A jukebox source may call for a tightening of the separation to simulate the appropriate sound.

Or Seretti may make it mono and pan it to match the visuals, which may mean panning completely right or left if the jukebox is offscreen. If the background music has a lot of separation to begin with, Seretti would tend to mono it to keep it from being distracting. On the other hand, some stereo source music heard on a car radio in the show was kept stereo since the story was then being presented from the point of view of the passenger listening.

Effects are generally panned to their position on the screen, and separation will be played to extremes if necessary. A fire engine, for example, might first "appear" in the left speaker, move to left center, will show up on screen while the sound follows, and then leave, visually first, then aurally on the right.

A glimpse of the credits would

reveal another element not standard on most stereo shows: sound design. Seretti is careful to point out that the meaning is different from a film environment, and here he refers to the services of Mickey Hart, better known as the drummer for The Grateful Dead. His job is to develop custom sounds for special objects or occurrences. A sequence with a multicolored reflective orb, for instance, needed Hart's services. According to Seretti, the sounds range from simple to multilayered and complex, from almost musical to atonal.

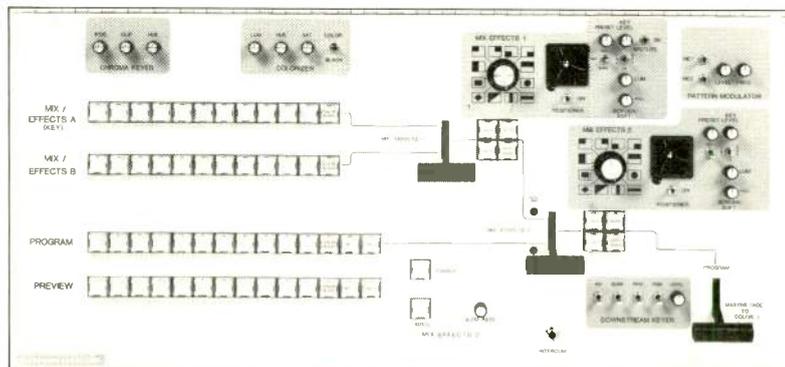
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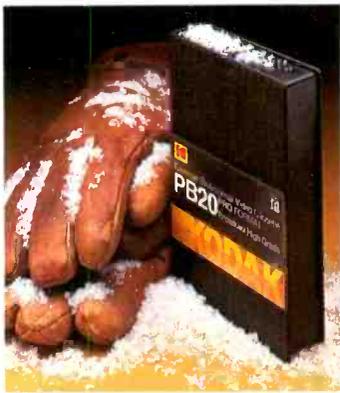
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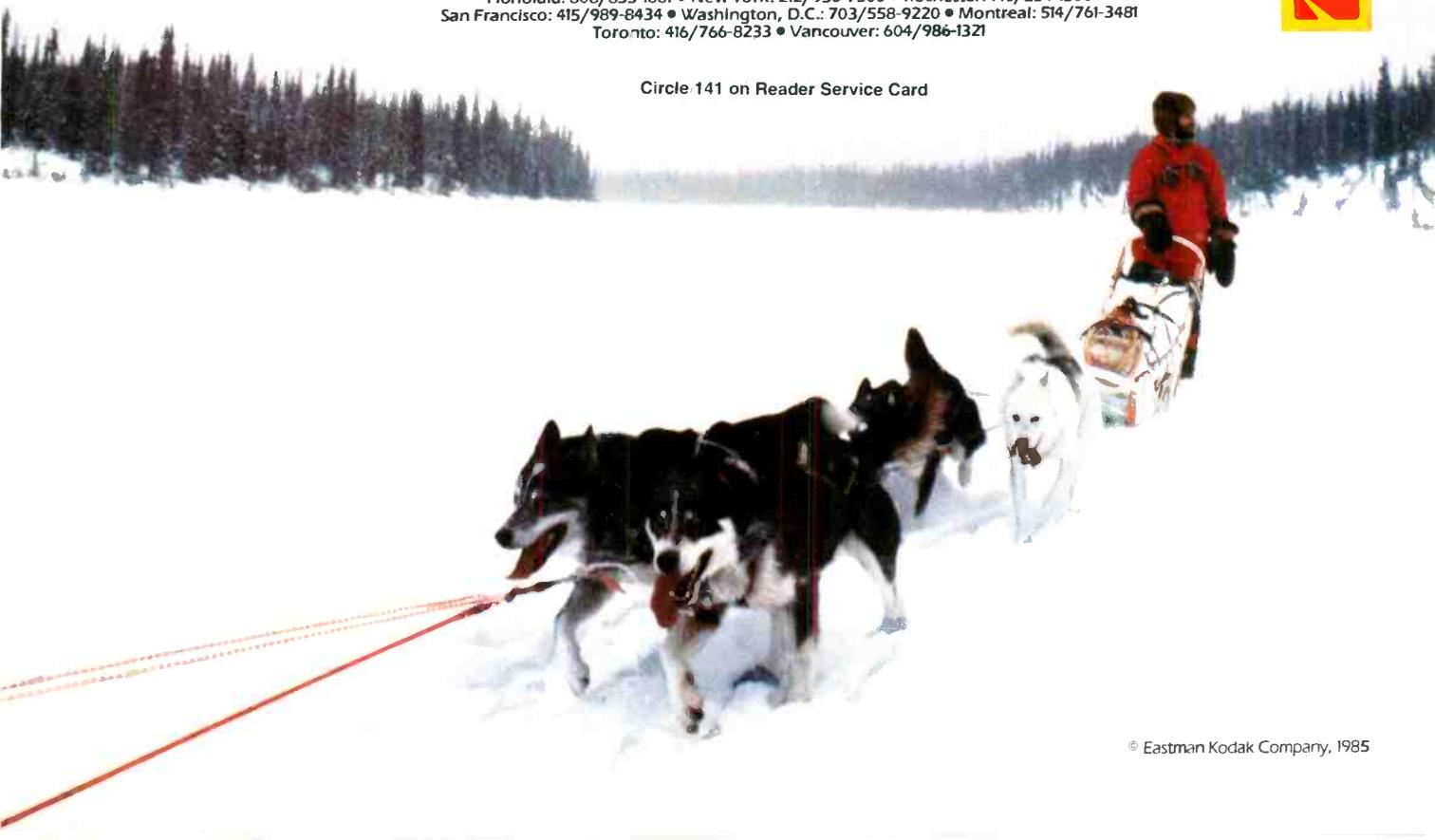
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Matching Picture to Sound

Those who see a feature film in a THX theater are more than likely visiting the theater of the future. In the same way, the audio-acoustical standards developed by THX and utilized by *The Twilight Zone* might be the direction for stereo television as well. One consideration that enters into panning decisions, for instance, is the judgment that the ideal home listening environment places stereo speakers six to 12 feet apart.

Not part of the THX philosophy but obviously part of the same concern for proper sound placement is the show's use of spatial reverberation, done in conjunction with Northwestern University's Center for Computer Music. Out of a study of psychoacoustics has come a computer program that localizes sound, reportedly replicating the experience of the human ear. Once certain sounds are chosen as espe-

cially important in an episode (e.g., "Cupid's Arrows"), the effects are copied digitally and sent to Northwestern, where certain "pinna cues" are added. The process, which precludes a judgment on criteria from the home environment to the shape of the ridges of the ear, adds time delays, some reverberation, and with the added reverb, some equalization as well. The jury is still out on whether this will make any difference to the home viewer.

The fact remains, however, that the vast majority of listeners are listening in mono. To keep standards separate and mono audiences happy, a "mono-compatible stereo," as Zansberg terms it, is created. Mono dialog is pulled down 3 dB to compensate for center-channel buildup. Hard-panned effects are generally left alone, as they will decrease in

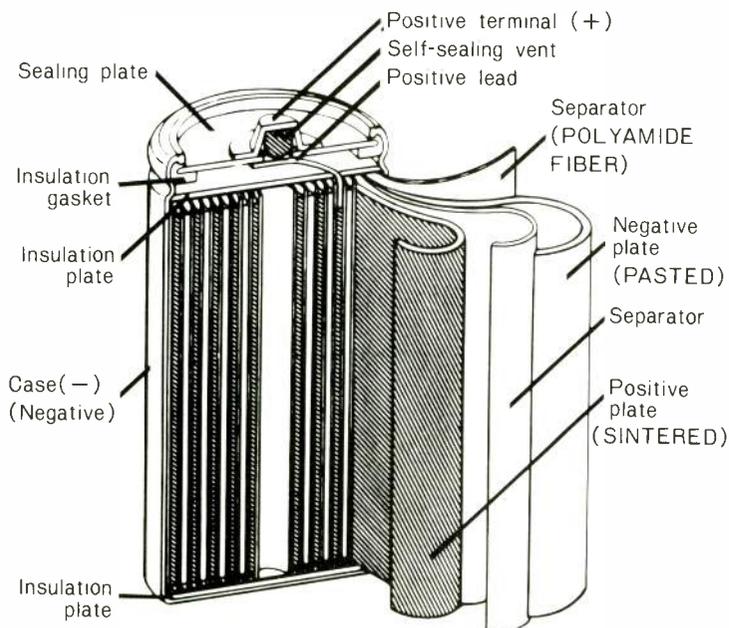
volume in mono, but will still indicate distance because of that decrease.

The great experiments aren't limited to CBS, of course. NBC's *Amazing Stories*, for example, just used the *Under Fire* team of partners Anderson, Flick, and Mark Mangini on "The Mission," one of the few episodes directed by executive producer Steven Spielberg. That show used stereo sound effects of a B-17, and positioned the sounds of doors, machine guns, and airplanes.

There are a great many advances around the corner in stereo TV. One will be the complete transformation of networks into stereo and the growth of stereo sets, which will finally instigate the public feedback now missing. The development of digital technology will cut down on steps and bring up the quality. **BM/E**

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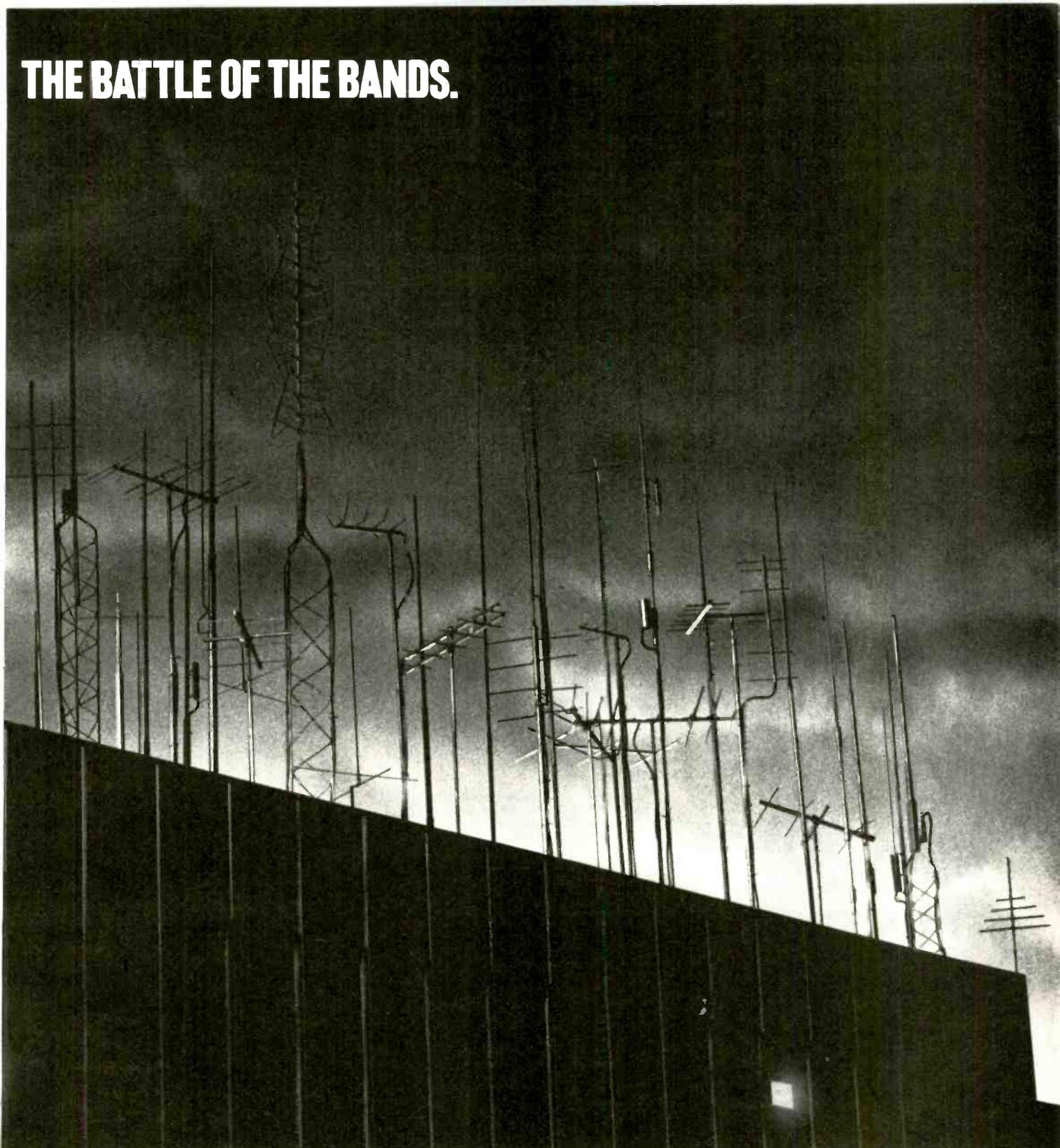
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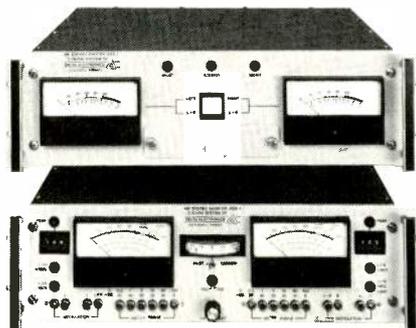
For more information about the Sony Wireless System, call the Sony Professional Audio office nearest you. In the East, call (201) 368-5185; in the

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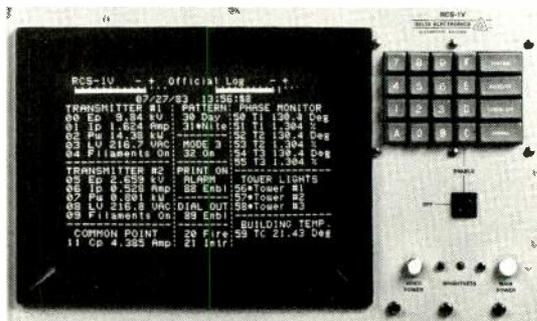
DELTA BROADCAST PRODUCTS



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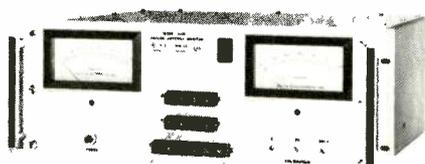
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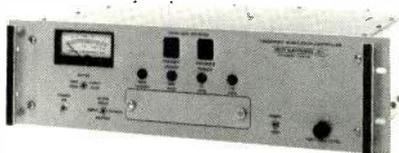
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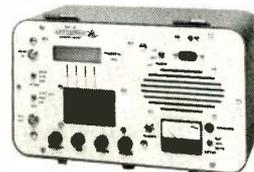
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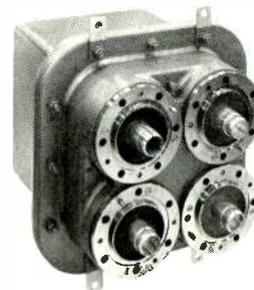
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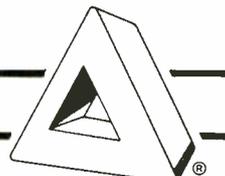
6730E/6740B

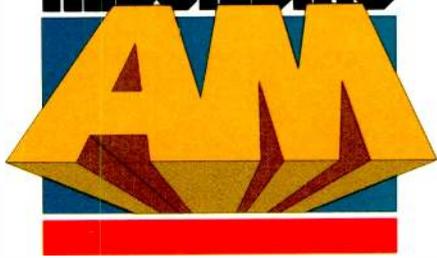
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AM Antenna Design: The New Wave?

Relaxed regulations and improved technologies are beginning to make AM's future sound better.

By Hugh Aldersey-Williams

The AM industry has been thrown into turmoil by recent moves both in technology and in regulatory areas.

For its part, the FCC has outlined regulatory changes it would like to see in AM broadcasting. The changes would improve AM's competitive position with regard to FM transmission, which has been received rather more favorably in recent years.

Night and day

While the FCC has been relaxing its regulations, the NAB has been seeking to improve AM antenna technology. The principal problem that hampers the success of AM transmissions is signal interference arising from the antenna signal strength profile (Figure 1a). Existing antenna designs generate signals having two components.

The groundwave is directed from the antenna to the horizon. The stronger it is, the wider the coverage of that broadcasting station. The skywave, on the other hand, is directed more vertically, and would not matter but for the fact that its signal is reflected by the earth's ionosphere back towards the surface. This can cause "selective fading"—severe ampli-

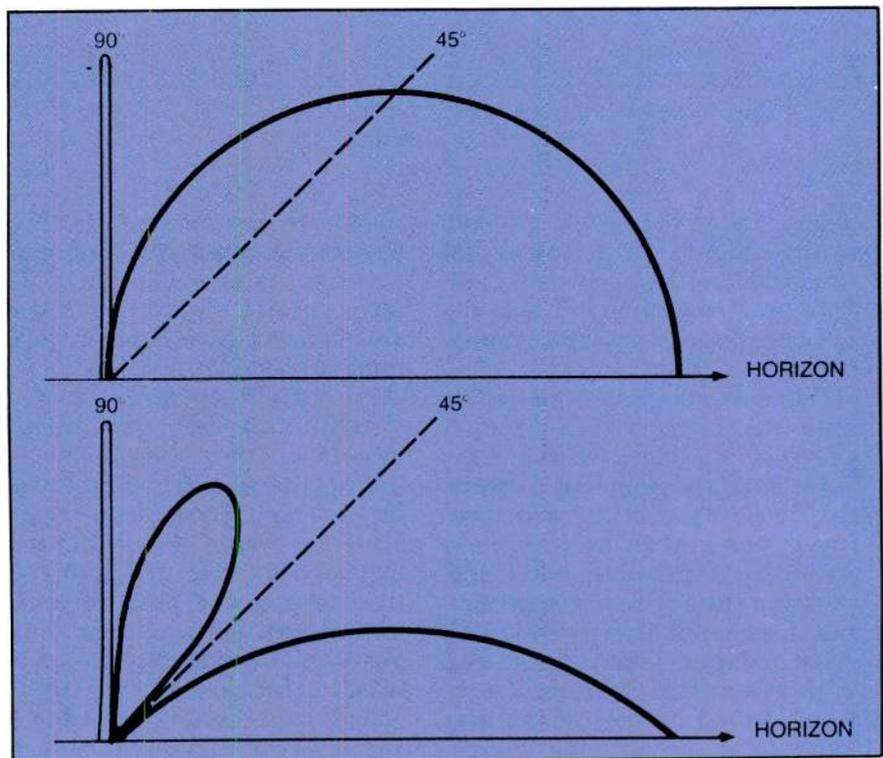


Figure 1. Signal strength versus departure angle for a) typical AM antenna; b) new design antenna. Note the relative increase in signal strength at the horizon (groundwave) and the decrease at 45 degrees (skywave).

tude and phase distortion or even disappearance into noise—of one broadcast signal, as well as interference between stations with signals that are close in frequencies even though they may be hundreds of miles apart. At night, the

ionosphere reflects radio waves even more strongly than it does during the day, making many AM services unusable after dark. Efforts to increase the groundwave signal strength produce a concomitant increase in the skywave,

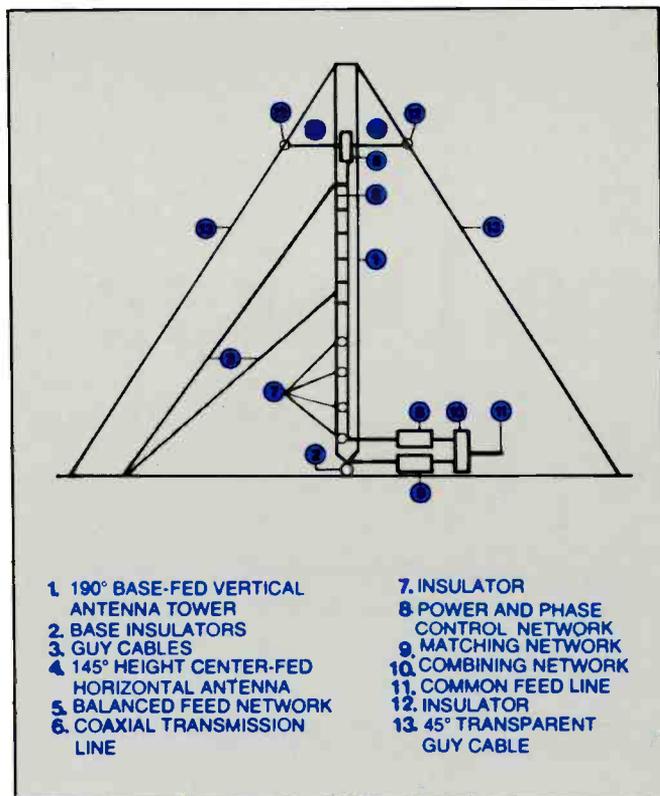


Figure 2. Design of Prestholdt's AM antenna comprising horizontal, vertical, and diagonal antenna elements.

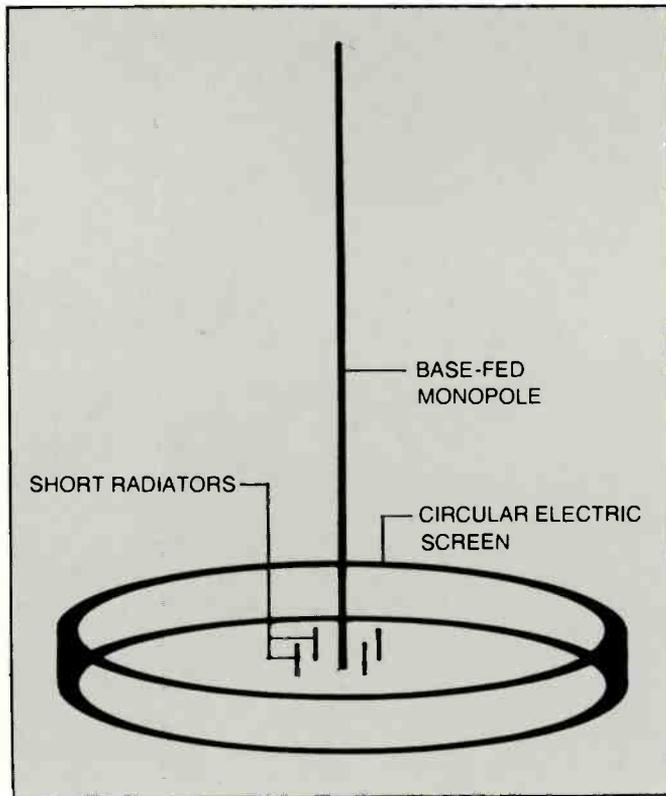


Figure 3. Design of Biby's AM antenna showing the central monopole, four short radiators, and the circular electric screen.

merely exacerbating the problem of interference. In a typical AM broadcast antenna system, perhaps only 10 percent of the radiated energy goes into the groundwave.

Previous attempts to devise an antenna design with a stronger groundwave but a weaker skywave have not been very successful. Larger radiating structures have been able to generate stronger groundwaves while suppressing the skywave component, but this has not been possible with short radiators (shorter than half a wavelength). Successes have been limited by the comparative expense of the antenna designs and the fact that they did not suppress the skywave signal over the full range of vertical angles necessary to cut interference to an acceptable level.

Now, the NAB has authorized the construction and testing of two new antenna designs, which represent the most promising move in the technology of the field for years. "This is a major undertak-

ing for the association," says NAB president Eddie Fritts, "one which we expect to have a significant impact on AM radio. The result should be a clearer, louder, better quality sound for AM."

In a field 40 miles west of Washington, DC, next month, ground will be broken for the prototypes, developed independently by two engineering consultancies. Construction of the antennas is expected to take one year, and field testing and proof of performance will take another year. Tests will be conducted on the unused 100 kHz available on AM.

The engineers responsible for the projects stress that both designs currently only exist on paper and have not yet been proven in any way. Nonetheless, theoretical predictions have been sufficiently optimistic for the NAB to give its backing. "A significant increase in AM service would result if these antennas are successful and implemented by AM broadcasters," says the NAB.

The new designs work essential-

ly by combining a number of antennas at one location. The overall signal obtained by adding the individual signals from each antenna in the array is expected to provide more independent control over the skywave and groundwave component signals. Suitable adjustment of the component antennas could then minimize the skywave signal and simultaneously increase the horizon signal strength of the groundwave (Figure 1b).

Antenna segments

The first public announcement of a design, one of those now being investigated by the NAB, was announced at the September 1985 IEEE Annual Broadcast Symposium by Ogden Prestholdt, a retired partner of A.D. Ring and Associates. It comprises vertical, horizontal, and diagonal antenna segments. These segments are designed to be excited with carefully chosen current amplitudes and phases to obtain an overall radiation distribution with a sup-

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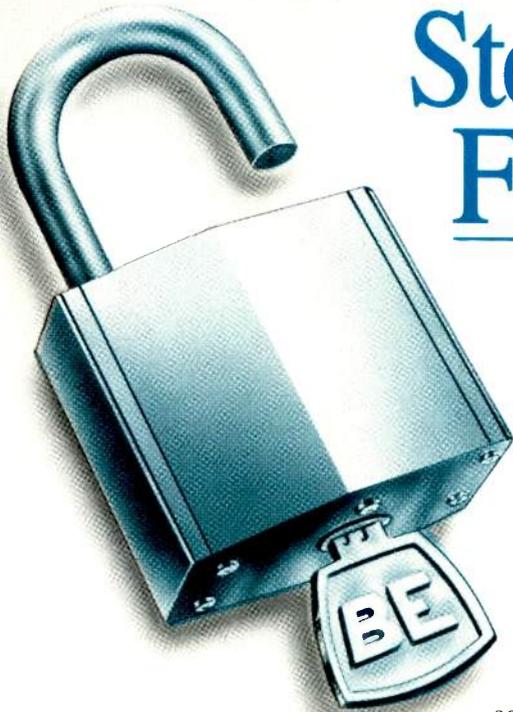
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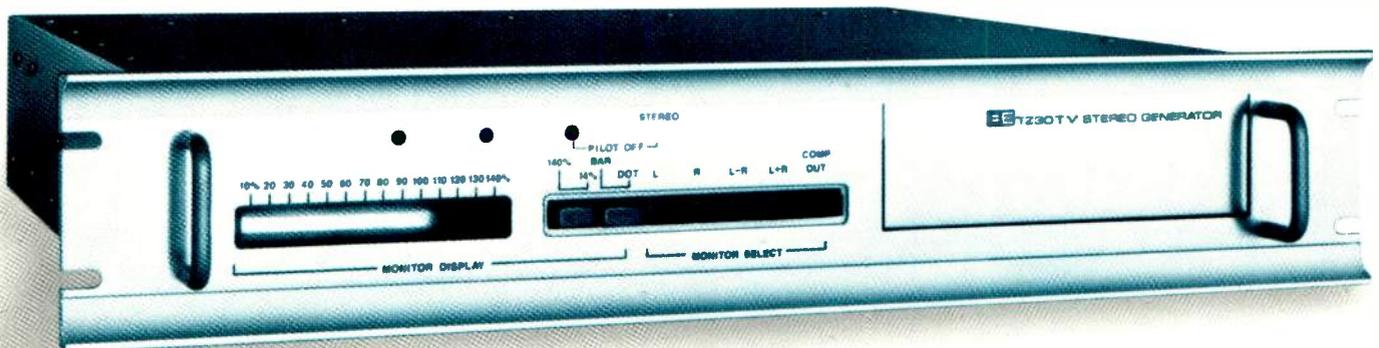
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RF Engineering

AM Antenna Design

pressed skywave. Using separately driven diagonal as well as vertical and horizontal segments provides a selection of amplitudes and phases than has been possible with the "T" and "L" antennas tried in the past, says Prestholdt.

The design was conceived when it was realized that "vertical polarization isn't necessarily generated only by a vertical wire," says Prestholdt. A possible configuration of Prestholdt's design is shown in Figure 2. It comprises a typical 190 degree base-fed vertical tower with a base insulator and guy cables. At the 145 degree height, there is a center-fed horizontal antenna oriented parallel to the y-axis and supported at its ends by insulators and an auxiliary set of transparent guy cables at a 45 degree angle. Thus, each half of the antenna is 45 degrees in length. The horizontal element would be fed from a balanced feed network supported in the tower which is in turn fed by a coaxial transmission line supported inside the tower and insulated, for isolation, from it for the lower 90 degrees.

Prestholdt calculates the radiation distribution—described in a series of conic sections—from the prototype antenna by first developing a mathematical description of the total radiation from a short current element using a computer. Then, the far-field—both skywave and groundwave—is calculated by integrating the antenna current elements and their images for each antenna segment. The component due to the vertical antenna only varies with the angle of elevation and is in that direction, while the horizontal signal is a function of both elevation and bearing from the antenna and has components in both of these directions. The elevation components are found to be in time quadrature—i.e., these signals from the horizontal and vertical antennas are 90 degrees out of phase when the antenna currents are in phase. By selecting appropriate signal amplitudes the skywave component can then be minimized.

A typical configuration of two

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distant antennas of the new design might reduce the RMS of the groundwave significantly from its value for conventional vertical antennas. But, Prestholdt reports, the AM transmission service radius can be approximately doubled because of the reduced level of interference between the two antennas. "It is not yet known how versatile the system will eventually be," says Prestholdt, "but it is anticipated that it will permit new stations to be added to the spectrum, for existing stations to improve their local service and to result in reduced interference to many stations."

Short radiators

The second proposed antenna comes from Richard Biby of Communications Engineering Services. It will be described in detail in a paper at the NAB conference in April. The design centers on a base-fed monopole of about a quarter of a wavelength in height. This operates over a conventional ground system comprising approximately 120 buried copper radial ground wires of the same length as the monopole. Around the base of the monopole are distributed a number of shorter ($1/30$ wavelength) base-fed radiating elements. These short radiators and the central monopole are enclosed by a circular electric screen also about $1/30$ wavelength high and roughly a quarter of a wavelength from the monopole (Figure 3). Biby says that "this is not a super-gain scheme—the performance of the antenna is critically dependent on the imperfect conducting characteristic of the earth."

The screen in the layout serves to cancel the creation of a strong groundwave by the short radiators, but does not prevent them from radiating a strong skywave at angles above the horizon. Judicious positioning of the screen and the short radiators allows the skywaves from the central monopole and from the short radiators to be closely matched in phase and amplitude. Then, adjustment of the short radiator currents can

cancel the two skywaves over a range of vertical angles. The circular electric screen only has a small effect on the groundwave component from the monopole.

"This antenna design," says Biby, "should result in greatly increased groundwave signal strengths per unit of input power as compared with that obtained with conventional antenna systems." Biby's computer model of the new antenna concept allows for variation of a number of details that affect the radiation strength at vertical and horizontal angles from the antenna. These variables on the computer model include frequency, the number and dimensions of radiating elements, conductivity, and dielectric constant of the screen and the earth. Biby is able to compare results for well-established designs for verification of the model before using it to predict an optimum new antenna configuration.

For the future

Both Biby and Prestholdt are confident that their computer modeling of their antennas' performance will be verified when the antennas are up and running in early 1987. For the moment, however, they emphasize that they have only these theoretical predictions.

Nonetheless, their experiments are being followed with interest by the parties that stand to benefit. Biby and Prestholdt have been receiving attention from a number of companies, which do not wish to be named. Michael Rau, the NAB's engineer coordinating the field study, also says a lot of interest is being shown by the broadcast community—engineers, consultants, and managers.

Such interest, while encouraging, is a little premature with first tests not due to start for at least a year. The NAB is, however, maintaining a mailing list for those who wish to be updated on progress and for volunteer AM engineers interested in performing the necessary skywave field measurements over the period of the test.

BM/E

You could
WIN!
\$1000

by answering three simple questions about a new product we've introduced in an ad which appears on a previous page in this issue.

We're anxious for you to see what makes this new boom mic headset different from the rest. So, we're willing to put your name into a \$1000 drawing if you'll answer three simple questions about the PH-24. (Here's a hint. The answers are contained in the ad.)

Question 1—What TYPE of boom mic is used to produce the full studio quality sound discussed in the ad?

Question 2—How LIGHT (in ounces) is this lightweight headset?

Question 3—What HALFTIME PROBLEM has network sports announcer Charlie Jones eliminated since he began using the PH-24?

Hurry! Only those correctly answered entries post-marked before Feb. 28, 1986 will be used in a random drawing held on March 14, 1986. The drawing will be performed by a neutral party. Employees and families of Telex or this publication will not be eligible. Winner will be notified by mail, and the winner's name and address will be available to anyone upon request.

Void where prohibited by law.

"No more halftime headaches..."

Charlie Jones



Send answers to:

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Headset Drawing
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Minneapolis, MN 55420

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Answer 2: _____

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CITY _____

STATE _____ ZIP _____ BM/E 2-86

Outlook '86: Matching Tools and Tasks

Broadcasters have been saving up. But their list of objectives for '86 is extensive and expensive.

By David Hawthorne

This year's crowd of broadcasters at NAB may be reminiscent of Saturday morning shoppers at a chainstore discount basement sale. One major difference, however, is that at NAB the items for purchase will not be marked down. Why then, will there be all this enthusiastic buying? Have there been major technological breakthroughs that cause broadcasters to rush forward, cash in hand, to acquire a gadget edge over their competition? Has business been so good that broadcasters have money to burn? Or are they like sailors on shore leave anxious to expend pent-up buying urges after a long boring tour of duty?

To some degree, all of these factors play a role. All through the first half of the 1980s, according to New York investment bankers Veronis, Suhler & Associates, "Accelerating growth, not just consistent growth, was the name of the game for U.S. and Canadian broadcasting companies."

Cash flow (for broadcasting companies) grew at a compound rate of 15.6 percent for the five-year period, while 1984 operating cash flow return on assets stood at 26.3 percent. Pretax operating income margins in 1984 reached 18.5 percent—up from 18 percent in 1980, according to the investment bankers' data.

This growth, by and large, appears solid. Despite the fact that 1985 was a relatively slow year in broadcast equipment sales, this

can largely be attributed to a determined effort on the part of broadcasters to build cash flow, which reached a record of 25.3 percent in 1984.

Another factor, of course, was the first decline in network revenues since cigarette advertising was killed in 1971. This decline, according to Robert J. Coen, senior vice president, director of forecasting at McCann-Erickson, was due to a number of influences: First, marketers rebelled against double digit increases in network prices over the past few years at a time when inflation was generally in the low single digits; further, there was a normal post-Olympic fallback, a slight increase in inventory due to increased use by

the networks of split 30-second spots (15s) and competitive pressures from local spots and cable TV. Said Coen, at the annual Paine Webber Media Outlook Conference in New York City, "When final 1985 results are in, the networks should be down at least 2.5 percent."

Nevertheless, broadcasters in general did very well in 1985—especially local broadcasters and independents. Local television revenues are expected to be up 12 percent over 1984, and local radio revenues are expected to be up 11.5 percent. The strength here comes largely from auto dealers and fast food franchises.

The high cash flow achieved by broadcasters was desirable pre-

National Advertising 1985 vs. 1984

(in millions of dollars)	1984	1985	Change
Network TV	\$8526	\$8310	- 2.5 %
Spot TV	5773	6264	+ 8.5
Cable TV	466	569	+ 22.0
Radio	1513	1680	+ 11.0
Total	16,278	16,823	3.3

Changes in Network TV Revenues

(Percent Change vs. Year Ago Quarter)	1984	1985
First Quarter	+ 19%	+ 1%
Second Quarter	+ 19	+ 6
Third Quarter	+ 44	- 18
Fourth Quarter	+ 10	+ 2

Source: McCann-Erickson

Total Advertising 1985 vs. 1984

(in millions of dollars)

	1984	1985	% Change
Local Newspaper	\$20,441	\$22,180	+ 8.5%
Local Television	5055	5661	+ 12.0
Local Radio	4300	4795	+ 11.5
Other Local Media	8335	9149	+ 9.8
Total Local	\$38,130	\$41,785	+ 9.6
Total National	\$49,690	\$53,285	+ 7.2
Grand Total	\$87,820	\$95,070	+ 8.3%

Source: McCann-Erickson

Political Advertising on Television

	Network	Non-network
1978	\$1,100,000	\$56,000,000
1980	20,700,000	69,900,000
1982	900,000	116,200,000
1984	43,700,000	104,500,000
1986 (Est.)	1,000,000	150-200,000,000

Source: BAR, McCann-Erickson

ceding and following the adoption of the 12-12-12 rule as the flurry of acquisitions in broadcasting in 1984-85 set records for station prices computed on the highest multiples of cash flow ever.

With acquisitions in broadcasting beginning to temper, much

of this cash will leave the bank and be applied to new expansion and acquisition of equipment in 1986. While some broadcast property buyers may find themselves with heavy debt burdens as a result of a major acquisition, those who did not buy new properties or

did not sell their existing ones have built up substantial cash assets. Said one industry analyst who asked not to be identified, "I think we'll still see some major acquisitions this year but nothing like the recent past. Station buying and selling should settle out by the end of the third quarter."

Business/technology interests

Many broadcasters have plenty of money and plenty of plans. While there is no shortage of things for them to spend their money on, they will not be spending like the proverbial sailor on shore leave. Television broadcasters particularly have distinct business objectives in 1986. They want to continue to build their news operations; they want to expand their production capacity to handle anticipated increases in production of commercials for both their own air, outside air, and local programming; and some are even interested in extending the use of their production and post-production.

1986 Industry Needs Survey: Brisk Buying Predicted

Amidst scattered reports that broadcasters did not place as many equipment orders in 1985 as expected, *BM/E's* just-completed Survey of Broadcast Industry Needs for 1986 reveals very strong market activity for the coming year from all sectors: AM radio, FM radio, TV, and teleproduction.

Some new technologies will be scrutinized closely. Compact Disc players (CDs) and alternatives to cart players show up as of keen interest to radio broadcasters. Ku-band satellite reception is high on the TV broadcaster's list along with two schemes to get around NTSC shortcomings: analog components (S-MAC) and enhanced NTSC.

The survey results show that not only will broadcasters be looking, but they will be buying. Over 600 respondents to this year's survey did not hold back in divulging budgets. Figures reported were upbeat, with increases in budgets outnumbering decreases better than three to one. The typical increase was over 20 percent.

While the median figure for a radio station budget is not a high number—\$10,000 in small markets and \$25,000 in major markets—by definition half of the fig-

ures reported are higher. In 1986 they are much higher. In metro markets 1-50, the average is \$106,000; in markets 51-100 the average is \$48,170; and in 200+ ranked markets it is \$30,000. A typical group broadcaster may easily spend over \$300,000. The highest budget reported for a single radio station was \$800,000. Several group broadcasters reported budgets of over \$1 million.

The highest TV budget reported for a single station was \$10 million. The average for 100+ stations supplying budget figures was \$880,000.

FM radio appears very strong

The heavy interest in radio broadcast equipment is fueled by the fact that on average 35 percent of all radio broadcasters who responded to our survey will either undergo a major expansion or move into a new facility in 1986. The percentages for FM stations run even higher than this. Group broadcasters in particular are bullish in their plans. The only lackluster area seems to be AM stations in the smaller markets—particularly those with a metro rank of over 200.

New technology is not quite the force in radio as it is in

Broadcast Management

Outlook '86

Media Unit Price Increases—1986		Change Over 1985
Network TV		+6.0%
Spot TV		+5.5
Magazines		+5.5
Newspapers		+7.0
Radio		+5.5

Source: McCann-Erickson

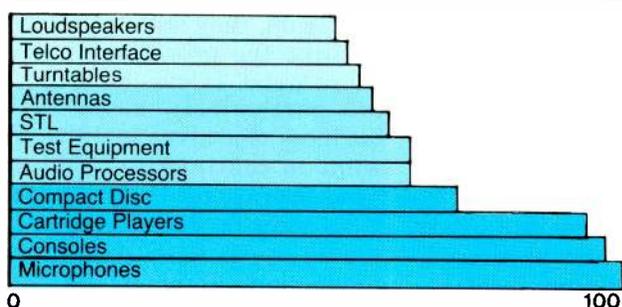
Add to this their distinct interest in new technologies—particularly Ku-band satellites, satellite newsgathering (SNG), component video, and computer interface of equipment and systems—and you

have a pretty extensive wish list requiring deep pockets. Other technologies in which broadcasters showed distinct levels of interest this year in our 1986 Survey of Broadcast Industry Needs were

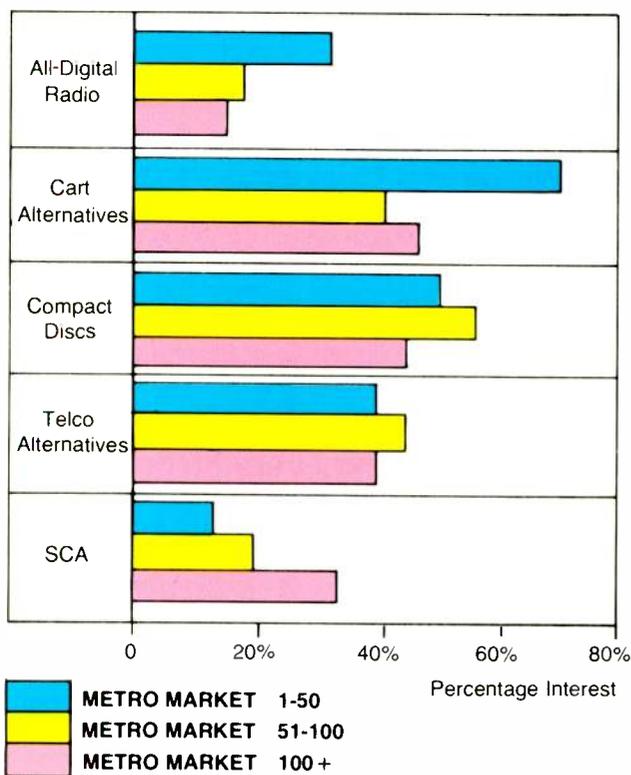
MERPS (Multiple Event Recording and Playback Systems) and enhanced NTSC systems.

The analysis of our own survey results, combined with what we have been told by broadcasters informally, leads us to believe that two major concerns will drive television broadcasters' equipment buying in the 1986-1987 period. First, resistance to half-inch component video systems seems to have collapsed as stations have become true believers in the efficiencies and quality improvements

10 HOTTEST RADIO PRODUCTS



INTEREST IN NEW RADIO TECHNOLOGY BY MARKET SIZE



TV. Among the 32 different product areas surveyed, most are everyday bread-and-butter items—microphones, consoles, monitor speakers, and audio processor black boxes. In all of the 11 years that *BM/E* has conducted the industry needs survey, the items on the top of the shopping list remain the same. Last year the top 10 products most in demand were cart decks, consoles, mics, test equipment, turntables, audio processors, monitoring equipment, monitoring speakers, antennas, and FM transmitters.

In 1986, those products moving into the top 10 products of "highest priority interest" are compact disc players (ranked fourth), STLs (seventh), and telco interface equipment (tenth), edging down monitoring equipment, loudspeakers, and FM transmitters.

This is not to say these latter items have slipped in demand. In terms of "expect to buy" rankings they remain in the top dozen.

Actually, telco interface equipment, while getting a lot of "high priority" checks, slips from seventh to sixteenth in terms of actual buying intentions.

The percentage of respondents who indicate they actually intend to buy any given product tends to vary widely depending on whether the broadcaster hails from a major metro or from a small rural market. Consoles and loudspeakers will be purchased by half of all broadcasters in the top 50 markets but only about one out of 15 sees the need to purchase these when the station is selling spots for only \$5 and \$6.

Several products are more in demand in the major markets compared to the smaller markets. Test equipment is purchased more frequently by major ranked stations than by the smaller stations. Even AM transmitters are replaced less frequently. In the top 50 markets, about 20 percent will buy a transmitter this year, compared to about five percent in the very smallest markets.

While AM stereo equipment will be bought by maybe one station out of every seven in the larger markets, the average will more likely be one out of 10 in the smaller markets. SCA, on the other hand, will be stronger in the smaller markets. Remote pickup equipment is mentioned more often by stations in the smaller 100+ markets. This is no doubt due to the increase in remotes

When the Hitachi HR-230's real-time diagnostic system spots a potential problem during operation, it tells you what happened, and exactly where it happened. And it tells you in plain English.

The HR-230's computer controlled self-diagnostics continually monitors 49 different operational, maintenance, and troubleshooting parameters during both playback and recording. And it gives you the whole story up front on a console display and on the monitor.

Plus, you don't have to keep your eyes glued to the machine. Because the HR-230 stores it all in memory—along with the exact location—so you can go back and check later on.

But the HR-230 has a lot more going for it than just a great memory. Our retracting tape guides and tension arms—along with a non-contact



air scanner system dramatically reduce head and tape wear. It's compatible with all major editing systems. And such features as master/slave operation of up to 43 VTRs through its built-in editor, complete autoseup, pre-aligned replacement scanner, and a built-in TBC save you a lot of time and trouble.

And the HR-250 will save you money. Because nobody offers you so complete a machine for so modest a price.

For a demonstration in your studio, contact Hitachi Denshi America Ltd., Broadcast and Professional Division, 175 Crossways Park West, Woodbury, NY 11797. Or phone (516) 921-7200 or (800) 645-7510. In Canada, contact Hitachi Denshi Ltd. (Canada), 6E Melford Drive, Scarborough, Ontario M1B 2G6; (416) 299-5900.



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THE FIRST 1-INCH VTR THAT TELLS YOU WHERE TO GO.



Radio & Television Broadcasting 1980-1984 Growth and Performance Measures				
Segment Rank in Communications Industry in Parenthesis				
Growth/Performance Measure	Revenue	Pretax Operating Income	Pro Forma Operating Cash Flow	Assets
1980-1984 Compound Annual Growth	14.2% (4)	15.0% (5)	15.6% (5)	20.9% (3)
1984 Growth	18.8% (2)	25.1% (5)	25.3% (5)	33.3% (2)
1984 Operating Margin		18.5% (2)	21.1% (4)	
1980 vs. 1984 Margin Change (Points)		0.5% (6)	1.0% (6)	
1984 Return on Average Assets		23.1% (5)	26.3% (5)	
1984 Asset Turnover				1.2% (6)

Source: VS&A Communications Industry Report

promised by the new systems. While the qualitative improvements for ENG offered by component seem not to have played a decisive role, the realization that quality was important to other production missions (particularly commercial and program production) does seem to have worked on news directors. Also, the sense that the smaller half-inch cassettes would take up less room for storage seemed to give some news directors the vision of another ENG editing suite in a space formerly designated for 3/4-inch cassette storage.

Commercial production, particularly production of retail commercials on-location, has been another pull for component. While

3/4-inch was cheap, its quality just didn't excite the commercial client.

Another pull for component came from the use of half-inch in program production and post-production. NBC's *Golden Girls*, shot and posted on Sony Betacam with only the final network master copy on one-inch, demonstrates the suitability of the smaller format product for fairly demanding production values. While no one is predicting half-inch will replace one-inch Type-C as the industry's program production and post-production standard in 1986, more and more post-production suites are being built around the new format. Should Panasonic be successful this year

with demonstrating a dramatic improvement over Betacam and their own M format with their new M-II system—using metal particle tape and offering a one-hour play time—the adoption of component technology could be accelerated. Of course, as has happened in the past with the introduction of other new formats, M-II using metal particle tape could slow progress in the adoption of component if it raises significant questions of compatibility in the minds of the user. Matsushita's Panasonic promises to show M-II at this year's NAB, and the industry will then get an opportunity to satisfy the questions raised by the technology. Metal tape technology has progressed, but there are still concerns about its performance in humid conditions (earlier formulations have had problems with rust).

Replacing MERPS

Related to the whole issue of half-inch component recording is MERPS. The installed base of two-inch quad cart machines continues to age—and some say age gracefully. Concern is high over how to replace the ACR-25s and TCR-100s. Solutions are required for this complex issue. Numerous approaches have been proffered: automated spot reel systems on one-inch, such as AF Associates'

PRODUCT INTEREST AS A FUNCTION OF RADIO MARKET SIZE



being done by "local" stations. (One respondent indicated that he does over 400 remotes a year. Another re-

spondent stated that his remote activity increased 100 percent in the five-year period covering 1980-1985.)

Remote-control equipment definitely appears to be of higher interest across the board compared to previous years.

Business automation systems will get a closer look this year by a number of stations. Program automation evokes only small interest. Newsroom computers will be looked at closely by only a few.

Intercom equipment, as usual, is of no particular interest amongst smaller stations. Noise reduction equipment is not of great interest this year. Neither is reverb or special effects with only about five percent indicating buying intentions. Time compression systems are of small interest to large market stations and of practically no interest elsewhere.

Minimal interest was shown in mobile vans for radio. Traditionally, digital ATRs are near the bottom of the list. They are there again this year, though maybe three or



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

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

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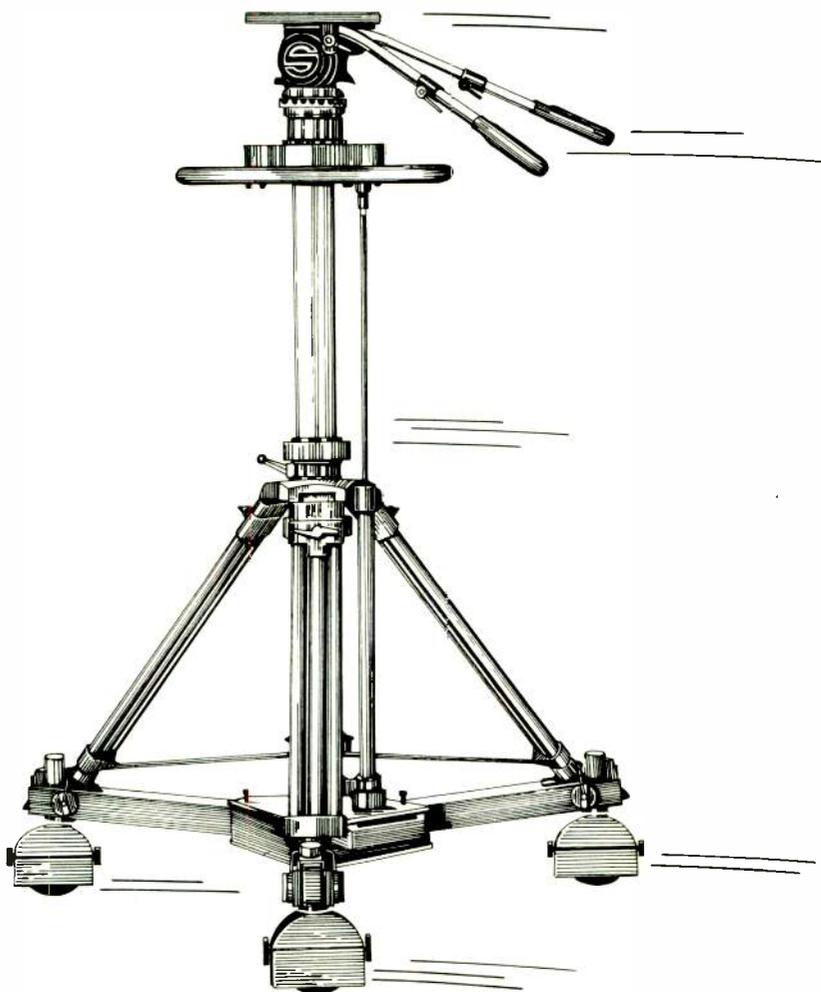


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Broadcast Management

Outlook '86

Pegasus system, Sony's Betacart approach, Panasonic's multicart player in M format, automatic control systems for banks of players like La-Kart from Lake Systems, and many more.

The complexity of the problem, however, is not just technical. Business and operations concerns also play a major part. The 20-minute play time of the Betacart system seems to detract from the enthusiasm of those who want the system to handle program playback as well as commercial playback. News story playback capability seems ample at the 20-minute duration, and may be overgenerous for commercials. Ad agencies and commercial spot distributors, accustomed to distributing in two-inch carts, need to determine if their interests—particularly concerns of image quality—are well served by the narrow bandwidth of the current small format cart players. Moreover, station on-air automation systems need to be rethought. Most current automation systems are predicated on the assumption that separate cart systems carry commercials and that other sources carry program material. What, if any, software changes are needed? Until it is determined as to whether or not these cart sys-

tems will carry commercials exclusively (act as one-for-one replacements for two-inch cart systems) or carry news stories, and program material too, a clear development path for MERPS is unlikely.

Nevertheless, interests recorded in our 1986 Survey of Broadcast Industry Needs shows MERPS high on the agenda. Time, tide, and the political calendar wait for no man. The biennial elections this year are likely to generate \$150-\$200 million in revenues for political commercials run on nonnetwork television, according to the projections of Coen. With hot political races in several states, pressure will be put on stations to acquire newsgathering gear and election reporting systems. Moreover, the next national election is just two years off, putting enormous pressure on news organizations to prepare for the campaign season.

Supporting these intentions are the high marks broadcasters give such systems as half-inch recorder/players, character generating systems, electronic still stores, digital effects systems, multisource editing systems, and even extravagant systems like art/paint systems. While most of the strength is from stations in ADIs 1-50, even

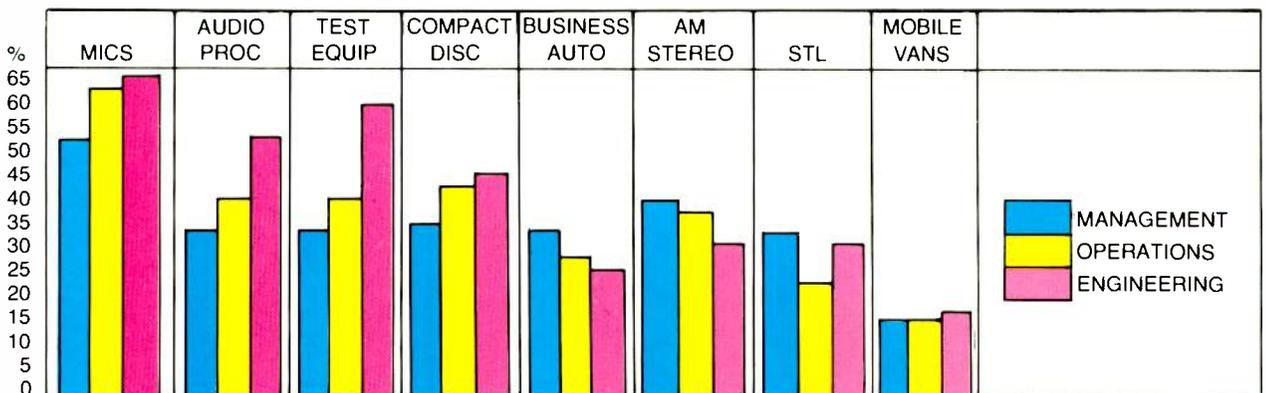
smaller-market stations are hot for things like digital video effects—responding, we suppose, to the introduction of lower cost systems like those from Micro-time, Digital Services Corp., NEC, and others.

Repeal of must-carry

The need to expand local program production capacity also seems strong. Program costs, according to a report by Frazier, Gross & Kadlec, Inc., a Washington, DC-based financial services and marketing company serving the communications industry, have escalated during the 1980s by an average annual rate of 15 to 20 percent. For independent stations, the rate of increase is even higher, hitting 25 percent. Programming costs are the largest single operating expense for broadcasters generally and compose more than half of the independent TV stations' costs. Said the report, "The resultant profit squeeze on stations, however, will encourage development of new sources of programming which may, over the next few years, provide sufficient alternatives to stabilize (program) prices."

Foremost on the minds of independent TV broadcasters is the repeal of the "must-carry" rules over

HIGHEST PRIORITY RADIO PRODUCTS BY TITLE



four stations (from major markets) out of the sample of 300+ will be making such purchases.

Products of highest priority depend somewhat on the title of the person replying. Engineers tend to show both more breadth of interest and intensity of interest than

do managers or station operating personnel, even for such peripheral equipment as newsroom computers, belying the often made criticism that engineers are not always "hip" to the latest products. Managers are the major force in calling the shots in a few areas—business

How can you increase your number of cameras without buying more?



LDK 6, most popular U.S. news production camera.

By making them do double duty. The advanced design of the LDK 6 (1") and LDK 26 (2/3") automatic cameras with Philips unique triax system and *total* computer control make this possible . . . *with no compromise in performance*

Your camera can move between studios, locations, and applications with ease.

Users from networks, stations, production facilities and institutions prove this daily. Here's how.

Triax cable is a Philips innovation and we continue to lead the world in its use. It is many times cheaper to buy, pre-cable and service. In the studio simple triax patch panels allow cameras to be quickly and reliably relocated - while maintaining the camera's quality performance.

LDK 6 triax cameras have complete intercom, teleprompter and full bandwidth RGB for chromakeying - essential in news presentations. In the field, you can locate your camera head up to 2 miles away from the camera processing unit - without loss of picture quality, and lightweight triax is very easy to handle.

LDK 6 and LDK 26 are a new generation of cameras - with total computer control over 1000 different settings to ensure excellent pictures with ease-of-use. Because they

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Some of the other advantages of total computer control are:

- On line 24 hour surveillance of the total camera system warns of any potential problems before faults occur.
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- *Total* computer control technology is available from Philips in all tube formats . . . the 2/3" (18mm) LDK 26 and the choice of 1" (25mm) or 1 1/4" (30mm) LDK 6.

These and many other features are why the LDK 6 and LDK 26 family are the fastest selling news and production cameras in their class, with over 400 sold worldwide.

Prove the total computer difference for yourself. A demonstration will prove why they are years ahead in design, performance and cost effectiveness. Call or write for demonstration or request the descriptive LDK 6 or LDK 26 technical brochure.

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LDK 6 - the total computer control camera.



Broadcast Equipment

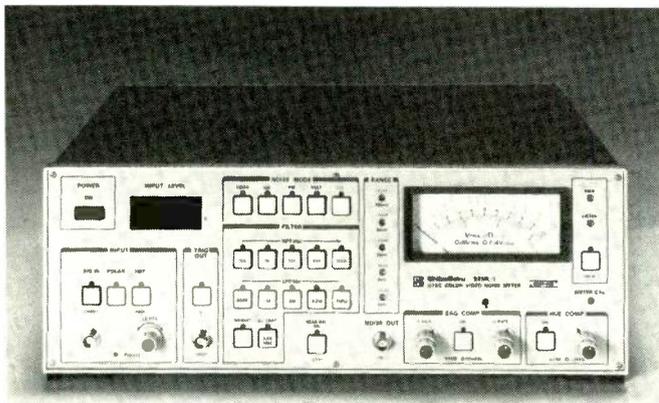
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ASACA/SHIBASOKU 925R Color Video Noise Meter

The versatile 925R accurately measures both luminance and chrominance noise generated from TV transmission equipment, TV cameras, VTR's, videotape and videodisks. Connected to a general purpose interface bus (IEEE-488), it gives you complete receive/transmit capabilities. You can receive measurement start, mode and filter selection commands and transmit measurement data through the bus. You can expand the 925R into a fully automated system by using a desk-top computer with the SHIBASOKU TG-7 TV Test Signal Generator, U705 Noise Test Unit and 531 Interface Unit.

- Tests equipment under actual operating conditions.
- Separates AM/PM chrominance noise and measures each.
- Features HP/LP filters and weighting network for frequency analysis.
- Provides V/H sag compensation, hue compensation, and VTR head balance.
- Logs digital data; may be used as a digital video level meter.
- Available in NTSC; PAL B, M, N; and SECAM systems.

Measure your performance with the best. **ASACA/SHIBASOKU 925R.** The world standard in color video noise measurement.

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Broadcast Management

Outlook '86

automation is one example. Managers showed more overall interest in AM stereo than others.

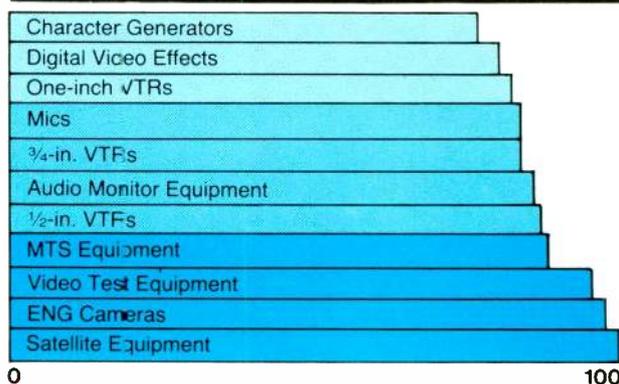
Smaller markets look to DVE

Products heading the list of highest priority interest to television broadcasters taken as a whole are pretty much the same as those identified in previous years. In the video area these include ENG cameras, half-inch, 3/4-inch, and one-inch VTRs, recorder-camera combinations, digital video effects devices, character generators, and test equipment. Not far behind are electronic still stores, digital paint systems, either a TBC or frame synchronizer, and routing switchers.

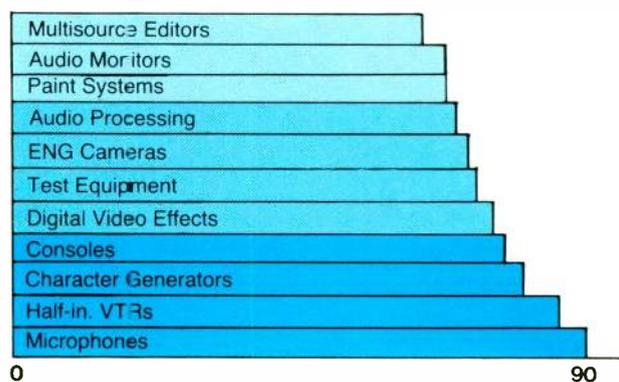
The most popular item depends upon the market size in which a station is located. Half-inch recorders head most video "expect to buy lists" except for the smaller markets (ADI over 50). Here, 3/4-inch machines still reign supreme. Half-inch VTRs come in number one in ADI markets 1-10, and second in ADI markets 11-50. ENG cameras are among the top three products on anybody's list, but are first only in the ADI over-50 markets. First in the ADI 11-50 markets are digital effects devices.

Just how many will be buying? In ADI markets 1-10, 45 percent said they would be buying half-inch recorders. In ADI markets 50+, that same percentage will buy ENG

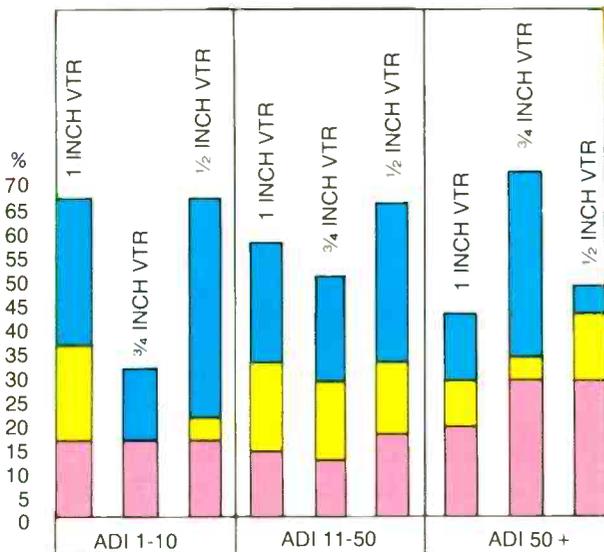
10 HOTTEST TV PRODUCTS



10 HOTTEST TELEPRODUCTION PRODUCTS



VTR INTEREST BY MARKET SIZE



- EXPECT TO BUY
- HIGH
- MODERATE

cameras. Overall, 35 percent will be buying ENG cameras.

Taking into account not only "expect to buy" intentions but broad interest in a product, perhaps for future purchase, video test equipment is of high interest, out-ranking VTRs. Following VTRs come digital video effects and character generators.

More or less in the third quartile of priority interest rankings are production switchers, master control switchers, switching automation, editors, and studio cameras.

Big ticket items—weather graphics, multisource editors, video animation, and slow-motion recorders—tend to appeal to a smaller group and don't show up well on "high priority" lists.

What video products are of least interest in 1986? At the very bottom of the list are quad VTRs, with only two percent saying they expect to buy quads. Also down at the bottom are tape synchronizers. Noise reduction systems don't excite very many broadcasters these days, with about four percent saying they will buy.

Amongst teleproduction buyers, half-inch VTRs are the number-one product on both "expect to buy" lists and "high priority" lists, being of interest to more than half of all teleproduction specialists. In terms of actual buying, 3/4-inch VTRs are second (because of the smaller-market teleproduction houses outnumbering those from the larger markets), and ENG cameras are third. High priority items for evaluation amongst teleproduction houses also include digital effects devices and character generators.

No particular audio equipment stands out as of unusual interest to either broadcasters or teleproduction houses. Ranked in the top four, with interest shown by

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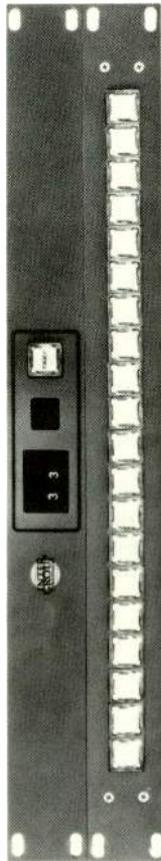
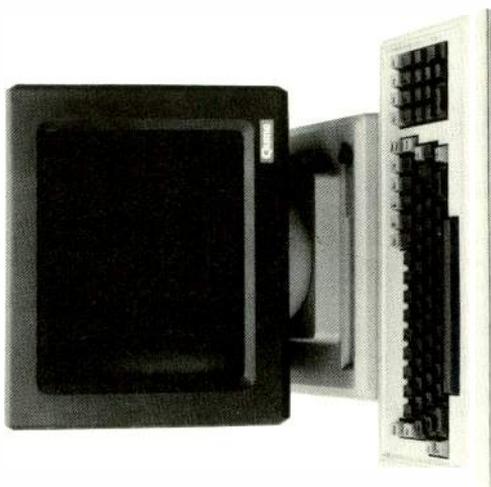
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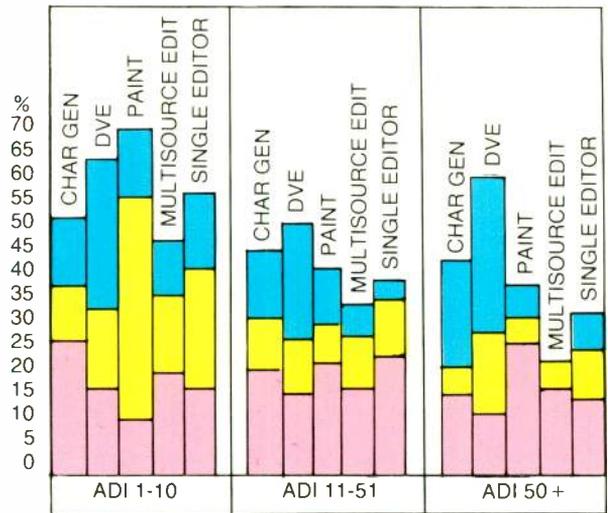
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INTEREST IN MAJOR PRODUCTION TOOLS BY MARKET SIZE



- EXPECT TO BUY
- HIGH
- MODERATE

about one out of four broadcasters, are monitoring equipment, mixing consoles, audio processors, and microphones.

In the RF area, two product areas stand out: satellite earth stations and STLs. The high interest in satellite earth stations—the highest since 1981 when nearly everyone was converting to satellite reception—stems, no doubt, from the keen interest now being given to Ku-band reception. Gathering more information on Ku-band technology appears to be greater priority this year than evaluating analog component technology, enhanced NTSC technology, or MERPS equipment. STLs are of high interest presumably because of the high interest in multichannel sound transmission.

Satellite newsgathering activity was identified by survey respondents as stepping up in 1986 with a median increase in the top 50 markets being about 30 percent.

ENG/EFP vehicles continue to be in demand by buyers with over 20 percent indicating they will buy such vehicles. Local newsgathering will grow in all markets by 20 to 30 percent, according to survey respondents.

Equipment budgets seem to be strong enough to sustain a lot of buying activity. As indicated earlier, TV stations, on the average, have budgets just a shade under \$1 million.

Throughout this article we refer to "expect to buy" lists and "highest priority" lists. The difference is that "expect to buy" lists are just that. The survey respondent said he/she intended to buy this product in 1986. The "highest priority" list includes those that intend to buy, but also factors in those who said they had a moderate interest and a high interest in that product.

cable television. It is largely attributed to cable that independents have increased their audience share to 21 percent. Clearly, placing the UHF independents and VHF independents (to a lesser degree) on the cable channel selector has helped enormously. Repeal of "must-carry" will lead to either a decline in independent station viewing as some stations "fall off" the cable box, or will lead to a frantic effort by successful independents to retain their audience through even more glittering (and more expensive) program purchases.

A repeal of "must-carry," on the other hand, might provide respite to the network affiliate who has been challenged with increasing success by the independent. Another regulatory change that has independents worried is the possible repeal of the "network financial interests and syndication

rules." This regulatory change, say some observers, would put independents in a double bind: reduced access to audience through repeal of "must-carry" and access or inventory of high-profile off-network program product.

While the regulatory picture for independents is murky, Frazier, Gross & Kadlec, Inc. testify to an even more ominous fact for equipment sellers: "Since some startup operations are thinly capitalized, the loss of the "must-carry" rule, a lower-than-anticipated rate of increase in advertising expenditures, and/or a continued escalating cost of programming will erode startup cash flow." In this climate, financing for startups will become increasingly hard to find.

The shape of appropriate technology

This year, therefore, will be typified by stations seeking to ful-

fill their short-term expansion goals and improvements in their overall efficiencies. With most stations getting increases for commercial airtime just ahead of the inflation rate, the emphasis will be on positioning for their individual markets (not withstanding a change in the investment tax credit picture).

Half-inch component videotape recording equipment will undoubtedly come into its own; demand for graphics equipment and systems will also garner attention, and more and more stations will seek to get a piece of the production dollar pie from commercials and teleproduction. As *BM/E's* survey of broadcast industry needs indicates, there is an enormous interest in "computer interface."

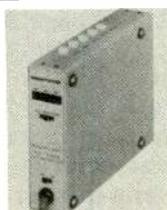
Computer interface is a nebulous area dealing largely with perceived needs for greater efficien-

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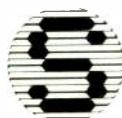


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Broadcast Management

Outlook '86

cies. Of the product areas most sensitive to this issue, multiworkstation systems and routing switchers are probably the most notable.

In the multistation area, television equipment users simply want to be able to offset the enormous cost of large-scale computerized systems such as graphics systems, digital effects systems, and still stores, by being able to have multiple users (more than one edit suite, for instance) have simultaneous access to the principle functions of these systems. Bosch, for instance, will show new multiuser workstation units this year for its FGS-4000 graphics system.

On the other hand, much of what users mean by computer interface impacts on their attitudes toward what routing switchers can do. In addition to switching video and audio signals, many users are adamant about good command and control features. With the work on machine control interface done by the SMPTE in the past year, users believe that they must soon be permitted to network production systems throughout their plants without rigid regard to the physical location of the hardware.

The gadget edge

While no major technological breakthroughs are in the offing this year, broadcasters are still trying for a gadget edge. This is reflected in their interest in satellite newsgathering (SNG) and the market creep of interest in high production value equipment. But, a shaky overall economic outlook could kick the picture into a cocked hat. Broadcasters are not spending like sailors on shore leave. They are looking for concrete improvements in efficiencies and some are, indeed, witnessing the benefit of higher cash flows. Overall, however, the outlook is for solid gains against delayed expansions and replacements and for adoptions in force of a few of the latest and most promising technologies.

BM/E

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NAB '86

Tunes In New Technology

While NAB is busy "Tuning in America" at its 1986 Dallas convention, radio and TV broadcasters will find exciting equipment across the dial.

It's only two months off—the annual orgy of new and improved equipment that is the National Association of Broadcasters Convention. The 1986 NAB show shows signs of bursting the seams of the Dallas Convention Center, with a record number of exhibitors and a stunning array of new technology that is eloquent testimony to the continuing vigor of the broadcasting industry.

While many exhibitors had not revealed their full plans at press time, *BM/E* editors were able to glean an array of tantalizing tidbits to whet appetites at television and radio facilities alike. New video and audio recording technologies, including proposed replacements for audio and video cart decks, will be in ample evidence, as will equipment to support the news department's latest need—satellite newsgathering.

The three sections that follow spotlight the most exciting products NAB '86 will offer—as of press time. Next month's issue will offer a complete booth-by-booth rundown of all exhibitors with complete details.

VIDEO

TV Wish Lists Find Fulfillment in Dallas

Once again, a wealth of new and improved equipment on the NAB exhibit floor in Dallas will illustrate the close communication between broadcast equipment manufacturers and the industry they serve. The top items on broadcasters' 1986 shopping lists will be in ample supply at NAB '86, reflecting—among other trends—the increasing maturity and acceptance of half-inch video and the rising demand for replacements for aging quad cart decks.

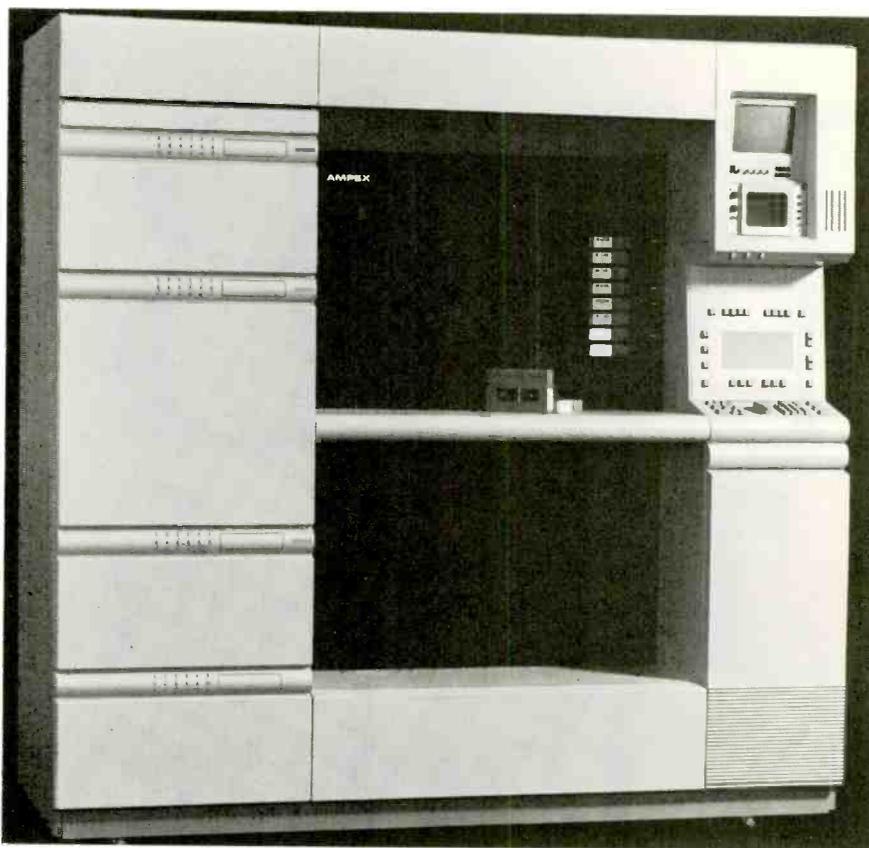
One of the most exciting an-

Broadcast Management

NAB Preview Video

nouncements at NAB will concern the latter issue, although the entry will be neither a half-inch MERPS system nor a spot reel compiler and won't even be on the exhibit floor. In a hotel suite, Ampex will demonstrate its revolutionary ACR-225, billed as a direct replacement for the company's ACR-25 quad cart system. What sets the 225 apart from other ACR/TCR replacements is its use of the internationally accepted 19 mm digital videocassette, which offers four channels of digital audio in addition to digital video. The video is composite, not the much-discussed 4:2:2 digital component system, and output is NTSC or PAL. The ACR-225 holds up to 256 cassettes and is designed for quick, simple playlist entry and last-minute modification. Ampex says pricing will be "similar" to the ACR-25. Development is still in progress, and Ampex is actively seeking broadcasters' input.

Other state of the art systems will be on display with all their latest wrinkles. Sony's Betacart is a great success, with about 140 systems installed so far. The new barcode printer introduced at SMPTE will be featured; Sony Magnetic Products also has a new 30-minute Betacam cassette. Odetics will show its TCS-2000, developed as Silverlake for now-departed RCA Broadcast. Also



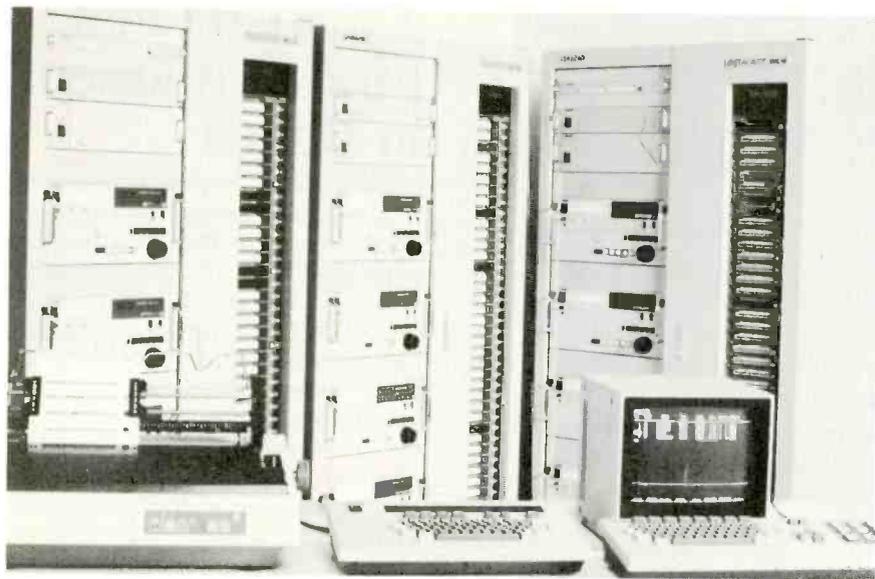
Ampex's all-new ACR-225 digital cart spot player

look for MERPS systems from Panasonic and Asaca. Lake System's LaKart automation system, which uses any tape format, will be shown in its new multichannel version, and A.F. Associates will feature the Pegasus commercial compilation system, seen at SMPTE.

Video recording

In the related—and equally hot—area of video recording formats, NAB '86 will bring plenty of news. Sony, of course, is jubilant over the success of Betacam and is the primary systems manufacturer in the half-inch field. It will show a full line of Betacam recorders, players, and accessories, including the new field deck introduced at SMPTE.

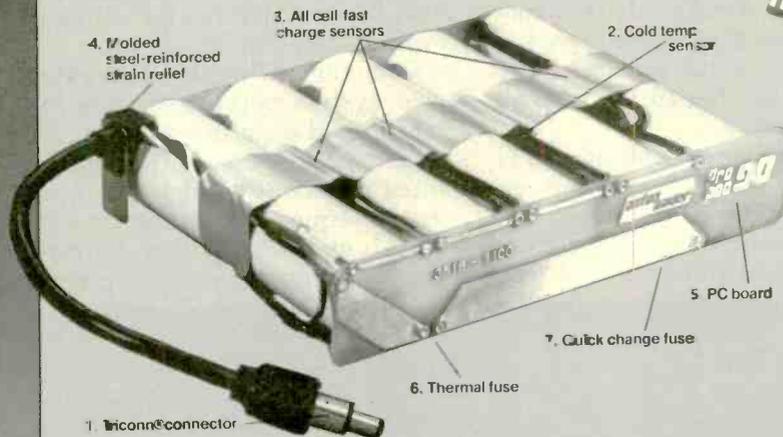
Panasonic/Matsushita can be expected to display a range of equipment in the new M-II metal particle tape format, although it is too early to predict whether M-II will be able seriously to challenge Beta's dominance in the half-inch field. The signal quality benefits of metal particle tape must be balanced against potential problems with consistency and oxidation, although Matsushita certainly is aware of the risks and is taking steps to correct them. Sony is monitoring the development of M-II and is said to be ready to upgrade Betacam if needed. Meanwhile,



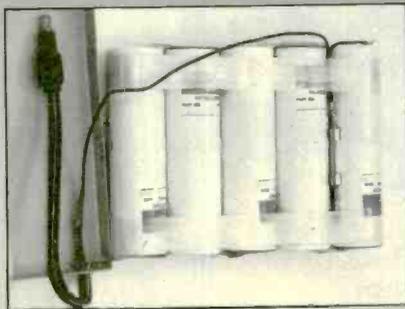
Sony's BVC-10 Betacart MERPS player.

SURVIVOR

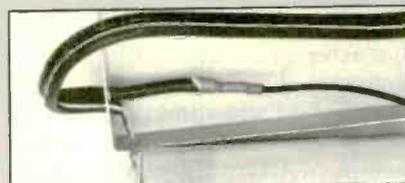
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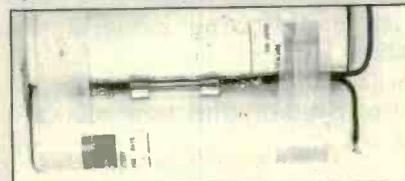
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Broadcast Management

NAB Preview Video

Matsushita continues to promote its M-format line.

While a number of manufacturers have expressed interest in the future of 8 mm video, all are in a wait-and-see mode pending further development. Hitachi and Bosch continue on opposite sides of the 1/4-inch camp and both should bring equipment to Dallas.

The newer formats are far from spelling death to established videotape systems, however. Despite its success with Betacam, Sony is continuing strong with U-matic, still heavily favored by broadcasters—especially in markets 50 and below. Sony will introduce a new U-matic line, the SP Series, including three models: the BVU-850 and BVU-870 studio recorder/players and the BVU-150 portable recorder/player. The 870 boasts improved DT picture quality; all feature improved audio/video characteristics and operational functions. A new SP tape from Sony Magnetic Products Co., used in conjunction with the SP decks, is said to give third-generation picture quality comparable to first-generation pictures on conventional U-matics.

Sony will also introduce a pair of new lower-cost Type-C one-inch recorders, the BVH-2000/10 and BVH-2000/12. These are designed for less demanding duplication and production applications, along with post-production and on-air use. The new SU-L200 compact console unit for the BVH-2000/2180 VTR series will also be introduced.

Another leader in one-inch video recording, Ampex, will introduce a stereo upgrade kit for its VPR-2 one-inch recorders. The VPR-3 and VPR-6 one-inch VTRs will be featured in Ampex's Creative Command Center. Broadcasters shopping for one-inch should also make sure to visit the Hitachi booth.

Graphics

Interest will be running high in digital paint systems and associated electronic arts equipment once again at this year's NAB. For

some stations, falling hardware costs will bring such exotic technology into their budgetary range for the first time; others, who already possess first-generation systems, will be looking for improvements in resolution and speed of image manipulation as well as greater creative freedom.

ColorGraphics Systems will introduce its ArtStar III-D, a combined three-dimensional graphics and digital paint system. Its 24 bits per pixel offer 16.7 million colors for display.

A 3D Animation Automation facility features VTR machine control for automatic animation of solid geometric objects, such as letters, directly onto tape in digi-

Iris still store units.

Computer Graphics Laboratories and Inovion will both announce real-time video image capture systems. Inovion's PGS II image processor allows a digitized image to be "flash grabbed" and then manipulated by changing its color, size, shape, or shading. It includes a varied paint package and disk drive functions for collage, overlay, and similar effects.

Computer Graphics Laboratories' system permits similar re-touching of a captured image. Its Instamation software then facilitates real-time animation. Animated sequences may be created quickly and painlessly by software interpolation between different



Cubicomp's PictureMaker 3D modeling system.

tal component format. ArtStar III-D also incorporates a "vector type" character generation capability for 9 ns/pixel antialiased two- and three-dimensional fonts in full color, including multicolor metallics.

Bosch will announce a remote workstation for its FGS-4000 graphics system which will allow images to be created on-line, as well as a new three-dimensional illustrator. Aurora Systems—now part of Harris Video Systems—will also introduce three-dimensional modeling capability as an option to its new Aurora/220 videographics system, based on the IBM PC. The RGB graphics system also interfaces with Harris

still frames.

3M will introduce several new character generator and graphics products: the D3600 CG with 96 built-in font sizes and three modes of operation; the Panther graphics system, a CG plus paint system with variable fonts and the ability to grab artwork, logos, and fonts with a digitizing camera; the D2200 low-cost character generator; and new models of the 3M Paint System, plus new software for old and new models including animation, font, and special effects packages.

Although nothing will be "new," strictly speaking, a visit to the Quantel booth will be well worthwhile to see the Harry digi-

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tal cel recorder, Paintbox art system, Mirage 3D graphics system, Encore 2D graphics system, Cypher 3D caption generator and manipulator, and DLS-6000 still store.

Super-high-quality text generation will be featured by Chyron (Scribe) and Aston Electronics (Aston 4); Chyron will also show the Chameleon paint system. Don't forget to visit the Ampex and Dubner booths to see established art and graphics systems. Cubicomp promises enhancements to its PictureMaker 3D modeling system.

Special effects

The dazzle on the screen will be matched by that on the floor as several hot efx systems make their first NAB appearances. Expect the Grass Valley Group Kaleidoscope DPM-1 component effects processor—seen as an engineering model at SMPTE—to be shown as a fully functional production model incorporating broadcaster feedback from its initial showing.

Also new will be the Magic digital video manipulator from Vital, featuring a color touchscreen controller and three-axis trackball.

Ampex will show the ADO 2000 (for on-air applications) and the ADO 3000 (post-production) with optional Infinity 3D efx package.

Also hot will be the NEC DVE System 10 with 3D rotation and perspective, on-board memory for 100 effects, off-line storage on 3.5-inch micro floppy disk, and built-in key mask function.

Video processing

The burgeoning video processing field will provide plenty for NAB attendees to talk about. Expect two hot new entries from For-A, amid a range of new and previously shown processing gear. The FA-800 Autocore TBC was introduced last year, but its one-inch VTR capability—including velocity compensator and dropout compensator—is brand-new and brings For-A into the one-inch market for the first time. The up-

graded FA-800, with full frame memory synchronization and automatic video level control, will sell for under \$9000. For-A will also introduce the CCS-4400 color corrector for component video, based on its high-performance CCS-4300 composite color corrector. The 4400 will have component inputs and outputs plus a composite monitoring port and will be priced in the \$7000 range.

Ampex will feature its exciting Zeus 1 advanced video processor, introduced at SMPTE and interfaced for the first time with the VPR-6.

New from Harris Video Systems will be the Model 640 frame synchronizer, optimized for transmission link operations, featuring time base correction, smart noise reduction, remote control, and audio synchronizer control. Look also for a full line of former ADDA video processing and still store products, now manufactured by Harris.

Lenco will show its new TBC-450 digital time base corrector, introduced at SMPTE, with 16-line correction window and 50 dB S/N.

Also significant is ALTA Group's Pyxis processor, shown by Convergence and introduced at SMPTE. Pyxis combines two 16-line window TBCs, a sync generator, five-input (stereo) audio mixer, and the ability to take live camera inputs in one \$6500 package.

NEC will feature its FS-19 frame synchronizer with 10-bit quantization and modular design.

Post-Production

Never one to stand still for long, CMX will continue its intense activity of the past year with the NAB introduction of its 3100 large-scale editor. This replacement for the 340XL made its industry debut at SMPTE last fall. While you're at the booth, also check out the 330XL midrange editing system and the CASS 1 audio editor.

Convergence, long a leader in small and mid-sized editing systems, has been expanding the top

of its line recently and promises added capability—including multiple record and assignable record—in two of its multisource editor lines.

Other editing system manufacturers will show existing systems. The Ampex Creative Command Center will feature the ACE editor interfaced with an AVC switcher, ADO 3000, Zeus 1, and VPR-3 VTRs. GVG/ISC will feature the 41 and 51 editing systems. EECO promises additions and enhancements to its IVES II and EMME editing systems. And check out Videomedia, Control Video, United Media, and Sony for any last-minute editing product announcements.

Cameras

Although television stations indicate high interest in ENG cameras in *BM/E's* Survey of Broadcast Industry Needs, they will find few brand-new cameras at NAB '86. All indications are that short of a revolutionary breakthrough, the camera market has matured to the point where changes are of a gradual and evolutionary nature. With the loss of RCA, the only company actually showing a CCD camera for broadcasters remains NEC—at least as of press time.

Most of the other camera companies are at least looking into CCD technology and it has been rumored that the technology behind the RCA line-transfer device will be licensed to an unnamed manufacturer. On their own, at least Hitachi and Sony have the capability to build such devices, but when they will introduce CCD cameras is anybody's guess. Until then, a broad range of high-quality tube cameras awaits broadcast buyers from such vendors as Ikegami, Panasonic, Sharp, JVC, and Harris, as well as Sony and Hitachi.

Switchers

Among the most significant switcher introductions this year will be Vital's 3000 video produc-



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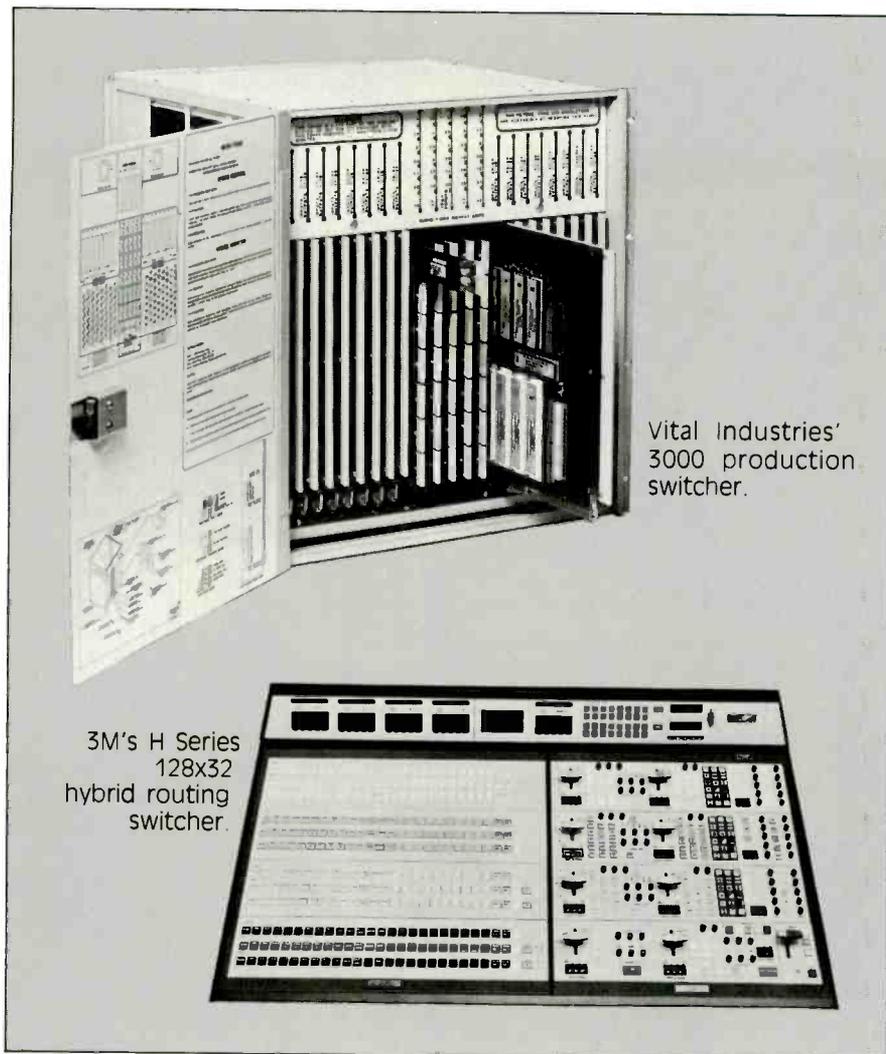
Is This the Year for Digital?

Having firmly entrenched itself in the music recording business, digital audio has still not found its rightful place in broadcast. Nonetheless, many radio engineers and station managers are ready to look at the possibilities. The area generating the most interest at the moment, which should become an even hotter topic of discussion at the NAB, is compact discs.

CDs are now commonplace in record stores, and are quickly becoming popular with consumers. One by one, music library syndicators are starting to offer their products on CD, and they will no doubt be highlighting CD libraries at the convention. By now, most classical or concert music stations have incorporated CDs into their regular playlists. The only missing link appears to be enough pro product offerings in the way of CD players.

Studer and Philips have broadcast model CD players, and several other companies at both the AES and SMPTE shows were "feeling out industry reaction" for possible future offerings, but so far, there hasn't been much progress in this field. Sony still has its "CD jukebox," popular in Japan but not yet in this country, and last year the company showed CD players in tandem, in a "cart deck"-type arrangement, but broadcasters may have to make their interest known more strongly before the manufacturers respond. One problem seems to be determining the specs of a pro product.

One company that has been talking with manufacturers about CD players for broadcast is Digital Programming Inc. DPI offers to record and supply music libraries on CD with encoding for automation, and the company was very aggres-



Vital Industries' 3000 production switcher.

3M's H Series 128x32 hybrid routing switcher.

sion switcher, shown first at SMPTE. The 3000 incorporates one, two, or three double-level M/Es that each can air up to five separate keys simultaneously. It has 16 or 24 inputs plus black and color background and a full range of standard & optional features.

New additions to 3M's H Series Hybrid routing systems will include a 32x32 matrix with one level of video and three of audio; a 64x64 one video/one audio switcher with companion 64x64 two audio frame; a SMPTE RS-422 machine control system that can handle any format VTR, ATR, or telecine; and a 16x16 and 20x26 component video switching system using H Series technology. Also new will be a 40 MHz high-frequency switching system for HDTV; a 128x32 one video/three audio H Series switching sys-

tem; and the 660 Control System with "new and versatile" control panels.

Dynair will intro 1600 Series ultra-wideband (100+ MHz) switcher for graphics and HDTV, plus a line of System 23 SMPTE/EBU "ESbus" controls and components for switching equipment.

GVG will display its previously introduced 300, 100, 1680 Series production switchers; the 1600-4S MC switcher & M200 Series automation systems; and the Horizon, TEN-XL, TEN-XT routing switcher systems.

Among the new routing products from Hedco are the HD-50, a 50x20 matrix unit expandable to 500x600; the HD-12 12x12 video and stereo audio routing switcher, and the GSC-101 microprocessor-based general switching controller.

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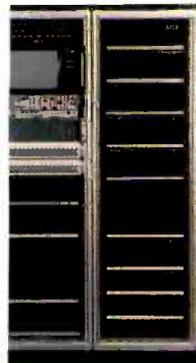
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sive and highly visible at last year's show. There will no doubt be even more interest this year.

Digital spot players

The other digital area attracting a great deal of interest and many inquiries from radio stations is that of digital spot players, or replacements for cart machines. Last year four companies showed prototypes of models, each displaying a different application of the technology.

Broadcast Electronics generated quite a bit of discussion with its Digitalk, a solid-state, RAM-chip-based digital record-player which resembles the standard cart machine. BE has since modified Digitalk by improving its fidelity and increasing its storage time, and it will be on display, again as a prototype, in Dallas.

Compusonics has moved the



MEI's Digisound digital spot player.

fastest in getting an actual production model of a digital spot player ready. At SMPTE, the company showed its DSP-1500 recorder and DSP-1200 player, floppy disk-based units that also resemble cart machines. They feature all the benefits of digital audio, with a frequency response of 15 kHz and four minutes of stereo (eight minutes mono) storage per floppy disk.

Compusonics, as of last year's NAB, had been about to enter into an agreement with BE to collaborate on a digital product, but as of this writing that agreement was still pending.

Microprobe Electronics Inc. will

also offer a production model of its Winchester nonremovable disk drive system, Digisound. The broadcast version features a fidelity out to 15 kHz, (the one for the recording industry has a fidelity to 20 kHz); and both have 38 minutes of stereo (76 min. mono) storage capacity. Digisound does not look like a typical cart machine; it has a membrane keypad and CRT screen.

The other company showing leadership in the area of digital audio for broadcast is Gotham Audio. The company's EMT 448 uses removable hard-disk technology that brings to mind the feel of audio cartridges. Two high-fidelity versions are offered: a 48 kHz model featuring 52 seconds of stereo recording per 10 mb disk, or a 32 kHz model. The EMT-448 will be demonstrated with the company's large, Winchester disk drive digital audio machine, Systex.

But it's unlikely that digital technology will ever completely replace cart machines, at least not for the immediate future. In fact, cart decks are high priority with radio engineers and managers who are coming to the NAB looking to buy this year, and will continue to be the staple of radio stations for some time to come. Expect high interest from broadcasters in this area, and offerings from BE, 3M/ITC, Pacific Recorders, and Fidelipac, who introduced a low-end, low-cost cart machine at Radio '85, the CTR 10 Series.

One other digital audio area is still a very low priority with broadcasters, however, and that's the digital ATR. Although the music industry has embraced them, broadcasters either view them as not yet cost-effective, or not yet easily incorporated into the average radio station. Confusing the digital issue even further is the fact that there are two main formats, with major companies lining up behind one camp or the other. Sony, of course, has the DASH format, supported by Matsushita and Studer. Mitsubishi, meanwhile, has gotten firmly behind its ProDigi format with support from Otari and AEG Tele-

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Broadcast Management

NAB Preview Audio

funken, and introduced a digital recorder in this format at the AES. Both formats should make a showing at the NAB show, but not as products high on the shopping list of broadcasters.

Audio editing

One other digital area where there is some interest is in audio editing. Droid Works' SoundDroid was a popular new attraction last year in the category of audio for video, and it should draw attention this year as well. Other offerings in this area will include Amtel's Soundmaster, although Amtel is planning to introduce a synchronizer of its own, and CMX's CASS-1, a computer-aided sound sweetener.

A company that has been moving along similar lines, but with applications clearly intended solely for audio editing, is Lexicon. At both AES and SMPTE, in private suites, the company showed its RD-1 project, a digital audio computer which edits, records, synchronizes, and mixes. Its unique feature is that it duplicates the "sound" of audio editing by offering slow cueing with an audible tape "roll," only there is no tape. Lexicon emphasizes that it is a concept, not yet a product, and was seeking feedback. Comments from broadcasters would no doubt be valuable, but Lexicon has reportedly moved ahead past the R & D phase of the concept and the RD-1 project may not be available for NAB.

A new area of interest in audio is the need for phase correction. Broadcasters in both TV—with the growth in MTS—and radio—with AM and FM stereo—have recently awakened to the need to check for phasing problems in everything from their cart machines through their satellite links and STLs. Last year Harris introduced the Phase Fixer, offering one type of phase correction by recording a pilot tone. Howe Audio had already been marketing its Phase Chaser, which offers detection of phasing problems through cross-correlation, then correction when

needed. The two systems represent slightly different applications and also a difference in philosophy as to how much and what kinds of phase correction is needed, but both should draw interest at the show.

In the long, troubled saga of AM stereo itself, there has been some renewed hope for more action on the part of broadcasters. There are still two competing systems: Motorola's C-Quam and the Kahn system, with the former Harris system now on the C-Quam pilot tone. Motorola appears to have the edge in both the number of stations using C-Quam and the number of receiver manufacturers making C-Quam-only radios. But Kahn supporters remain loyal, and there is hope among them for acceptance of multisystem receivers now that Sony has begun making multisystem chips.

The good news on AM stereo is that receiver manufacturers are very eager to begin making high-fidelity AM radios, and this has sparked a new emphasis on AM improvement. The NAB is now urging AM stations to "go stereo," no matter what system they choose, for the benefits of cleaner sound and higher fidelity alone. The NAB will again show a multimedia presentation on AM stereo that was introduced by WLAM/WKZS general manager Ron Frizzell at Radio '85. The presentation has been met with such enthusiasm, that the NAB feels it will encourage more AM stations to convert to stereo sound.

Stereo processing equipment

One of the most exciting topics in the world of audio today is still MTS. There are some 250 stations equipped for stereo at present, and the phenomenal growth in this area will no doubt spur many TV station engineers and GMs to go shopping for stereo equipment at this year's show. In addition to the many companies offering MTS exciters, stereo TV has given rise to a new generation of equipment for stereo processing and produc-

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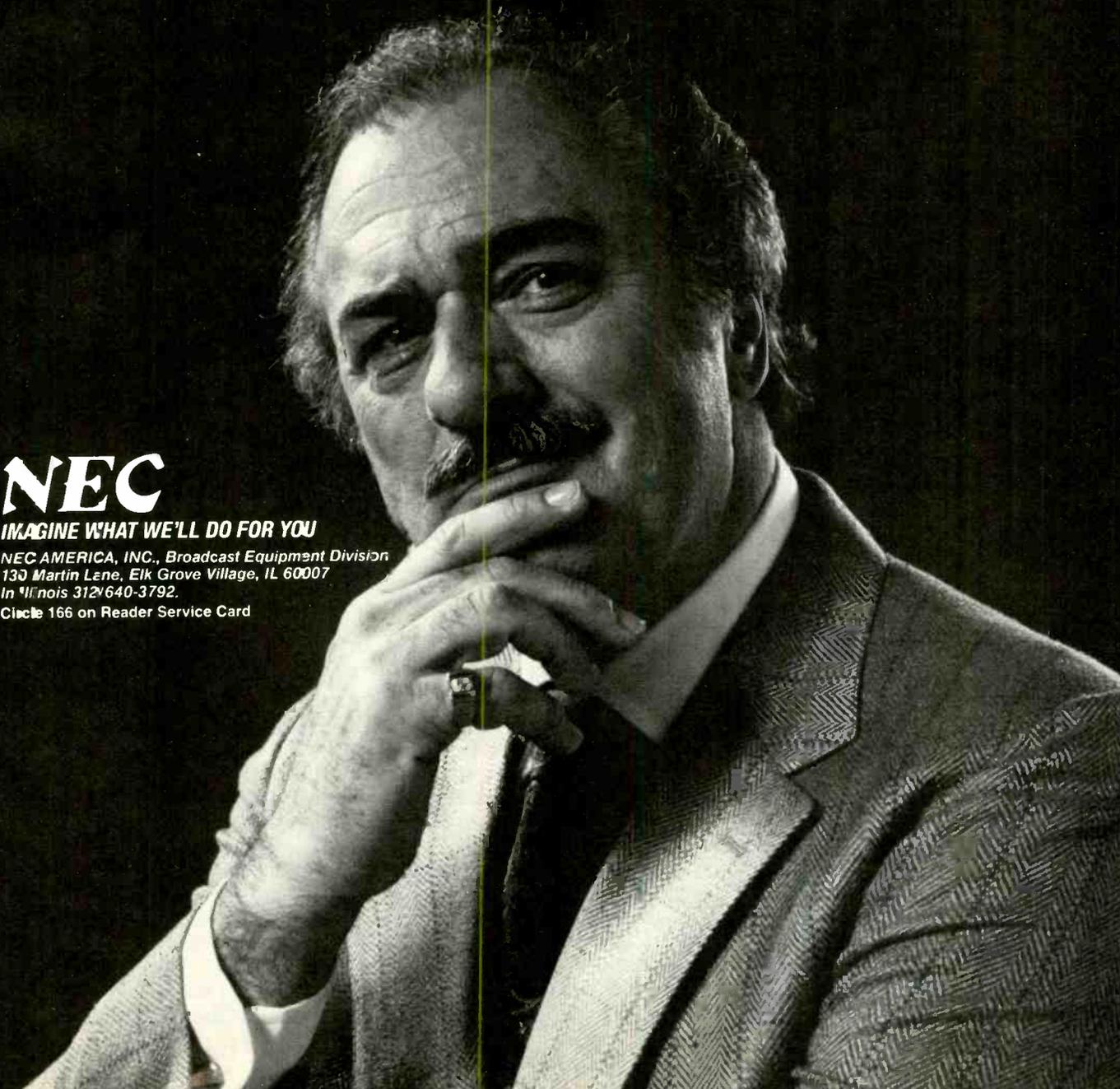
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Broadcast Management

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tion. Stereo synthesizers head the list, with several new offerings. Orban unveiled a new synthesizer at AES and showed it at SMPTE, and it will be ready for production by NAB. Other stereo synthesizers to watch for in Dallas are offerings from Kintek, Studio Technologies, and Ursa Major.

In addition to stereo synthesizers, the growing number of MTS stations has given rise to a demand for processing and production equipment to help stations produce their own stereo programming. This, too, should be in evidence at the show.

Consoles and mixers

Very high on the audio shopping list of many NAB attendees this year will be consoles, both for production and on-air, and mixers, especially those with "smart" functions, and the new variety of assignable mixers. Another trend is toward compact design, as witnessed by ATI's new, smaller mixing console which was unveiled at Radio '85.

In other production equipment, ATRs featuring time code will again be a dominant influence at this show, and the move toward more multitrack production, especially among FM stations, should spark interest in ATRs from such companies as Studer, Tascam, and Otari, including that latter's microprocessor-controlled analog recorder.

Mixers, mics, and wireless equipment all continue to move toward greater portability, as seen last year. There are portable mixers from Shure and Sennheiser, as well as mics from each, and portable mixers from Audiotronics. There should also be no shortage of wireless mics, transmitters, intercoms, and telephone interface equipment from which to choose, and it looks as if broadcasters will be choosing to buy in this area this year.

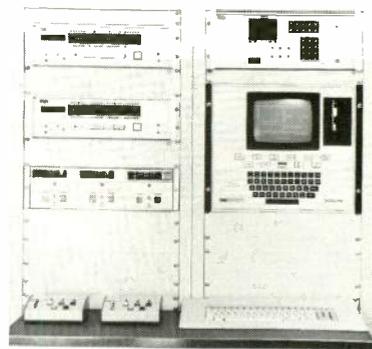
Finally, audio processing and special effects continue to improve. Look for Gotham Audio to move into this area, and dbx to emphasize its processing products for

MTS and for radio. Noise reduction will still be in great demand, with offerings from both Dolby and dbx for VTRs. And more special effects, reverb and room sizes will come from Lexicon and Eventide, with a new "surprise" product to be unveiled by Eventide.

RF

Solid-State Suits Some in Transmitters, Remotes

One volatile market for 1986 will be in TV transmitters, following the departure of RCA from the business. According to industry sources, the change leaves Harris and Larcan as the main players in VHF and Harris, Townsend, and Comark in UHF. There is the strong possibility that a purchaser for RCA's broadcast division will be announced at the NAB show.



Modulation Associates' suitcase portable uplink.

New VHF transmitters will be on display from NEC America, Larcan, and Acrodyne Industries up to respective power levels of 35, 50 and 60 kW. Larcan's 50 kW VHF unit incorporates two tubes with a 2 kW visual solid-state amplifier and a 225 W audio solid-state amplifier. The transmitter is contained in four racks with the exception of the visual plate trans-

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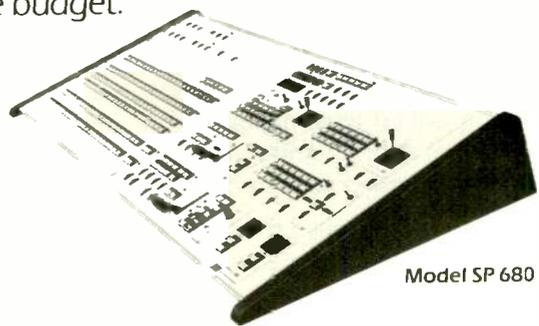
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Broadcast Management

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former. Larcen is also announcing a 1.2 kW VHF high-band/low-band solid-state transmitter. NEC and Larcen will also be showing new UHF transmitters at the 60 kW power level. Both the NEC transmitters—VHF and UHF—have a 30 percent reduction in their exciter parts, which gives a 50 percent MTBF improvement at 30,000 hours.

In UHF TV transmission, where one in five respondents to *BM/E*'s industry needs survey expects to buy equipment in 1986, the emphasis remains on reducing the power requirement in an effort to compete effectively with VHF stations. Improvements have been incorporated both into solid-state transmitter designs as well as into variations on the more traditional

transmitter tubes.

Klystrode design

Power savings of up to 50 percent may be attainable with a novel high-power transmitter design due to be announced by Comark at the NAB show. The 60 kW amplifier design, intended for both audio and video UHF TV signals, centers on a Klystrode tube unveiled at last year's NAB by Varian EIMAC (see *BM/E*, January 1986, p. 61).

Klystrode performance more closely resembles that of a VHF tetrode than a UHF device when it comes to degradation of the carrier S/N ratio. Precorrection technology in the Klystrode reduces its ICPM (incidental carrier phase modulation) from the 40 degrees of a typical klystron to around four-five degrees, according to Co-

president, Nat Ostroff.

This property will simplify the design of stereo transmitters in which EIA standards call for an ICPM as low as one-two degrees.

In capital cost and lifetime, the Klystrode is expected to be competitive with existing klystron technology. Ostroff anticipates life tests on the new transmitter design will have demonstrated 10,000 hours by the time of the NAB show. As *BM/E* went to press, the count stood at 6000 hours.

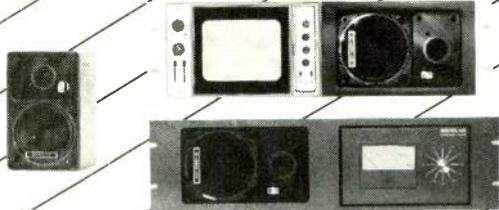
Microprocessor control

Many transmitters are installed in locations where they must be controlled remotely. In remote-control systems, one trend is toward increasingly sophisticated transmitter control by computer. As greater microprocessor memory and processing power become available at reduced costs, control systems will incorporate them to increase their functionality.

However, vendors also observe a strong countertrend with transmitter stations retaining a strong loyalty to nonmicroprocessor-based remote-control systems. This market will remain buoyant

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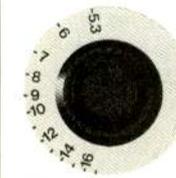
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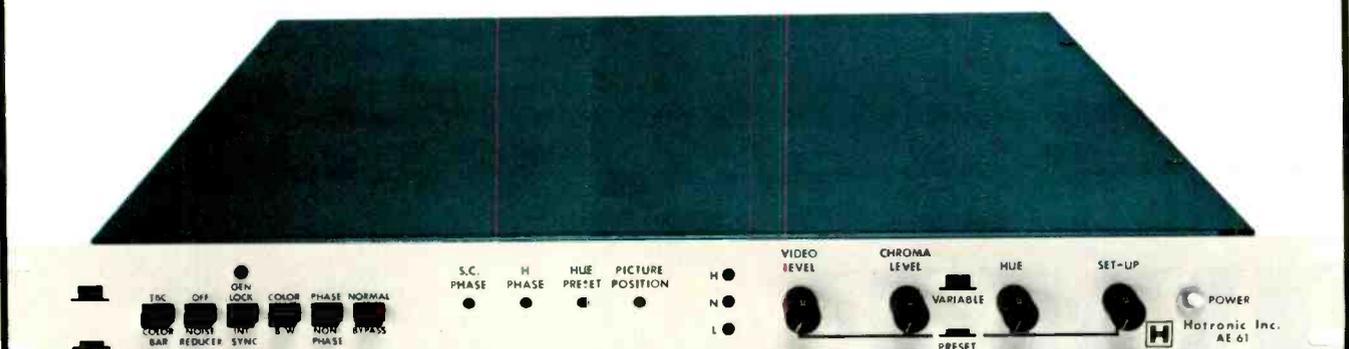
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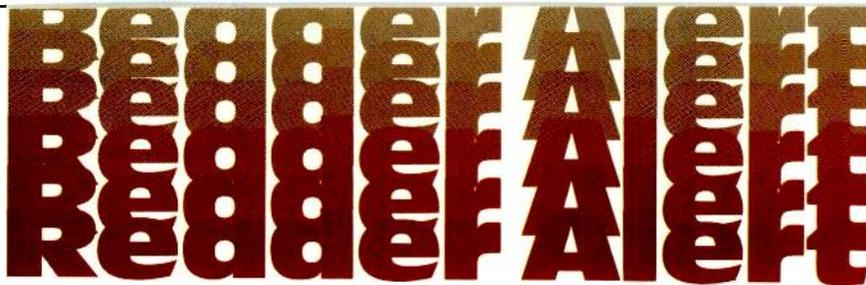
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There's no business like show business . . .

and there's no editorial like BM/E's March 1986 NAB show coverage.

Editorial is the cornerstone of publishing. The essence of editorial excellence is a satisfied, informed reader. At BM/E we are constantly striving to give *you*, the reader, the best quality editorial in the business.

For instance, BM/E knows that equipment and services buyers will read the March NAB Show Issue whether or not they are planning to attend the show in Dallas. So what is new and exciting at NAB is of special interest to *you* and deserves a special editorial report.

Non-attendees—You'll find BM/E's Show Issue just as valuable as those planning to attend the show. More so. In fact, you can plan on using it as your exhibit-in-print. BM/E's March issue is made to order. Here you'll benefit from the sense of excitement that NAB generates. Search the pages to find out what's new, what's "hot" and how to evaluate it.

Attendees—BM/E's March NAB Show Issue will reach you long before you leave for Dallas. This comprehensive guide will arrive just as you are making your important show plans. Research shows that the average attendee will have less than 15 hours to visit 31 booths. With only four days and over 600 exhibits to choose from, BM/E gives you the opportunity to plan your agenda well in advance of the show.

BM/E's March NAB Show Issue will tell you everything you need and want to know—from what's on the program—to what's hot in equipment and where to find it. Only BM/E has the editorial expertise and inside contacts to penetrate the industry and gather the exclusive information that the March issue will feature.

Here's the March Issue program:

What's Hot Product Sections—Complete category-by-category analysis of the hottest audio, video and RF equipment to be unveiled at NAB.

Complete Exhibitor Listing—Color-coded and cross-referenced to their advertisement.

Editorial Overview—Significant trends and developments to be anticipated at NAB.



BM/E's March 1986 NAB Show Issue
The best showplace for our readers

thanks to the needs of less technologically advanced stations, both in radio and in auxiliary TV broadcasting.

Indicative of the computerization trend is TFT. It will show its Model 8610 multichannel remote-control system at NAB. The 8610 is an updated version of the TFT 7610. It has 40 functions, and is expandable with 32 additional status displays in the basic studio unit and to 80 functions using an expansion unit in the transmitter.

Moseley Associates, on the other hand, builds its added functionality and flexibility into its software. The company will announce enhancements to its MRC-1600 software that extend its capability to control multiple transmitters. Mute, analog, or status alarms can be supplied on one channel while another channel is activated, Moseley says. Moseley is also expected to introduce a video analyzer option for its largest remote-control system, MRC-2.

ARC-34 is an automatic remote-control system that may be interfaced to any transmitter, according to its manufacturer, QEI Corp. The system contains a diagnostic package that monitors performance and stores information needed in troubleshooting and autologging.

Satellite earth stations

Engineer respondents to *BM/E*'s broadcast industry needs survey listed satellite earth stations topping their list of priorities for 1986. More than three quarters of the engineers in the top 10 ADIs answering the survey indicated that they were planning to purchase an earth station this year.

Satellite newsgathering is the predominant factor in this rapid growth. SNG activities in these ADIs are expected to increase by around 50 percent this year. In other ADIs, these trends, though less pronounced, are still strong. The three networks, with complete satellite systems, are now looking at enhancements like SNG and some data transmission applications.

SNG stimulates growth

With market interest running this high, many vendors will be taking the opportunity of the NAB show to launch new products. Riding on the wave of SNG interest, there will be introductions of mobile uplinks and the downlinks to accompany them. Industry observers predict that Ku-band activity will match that of C-band within two to five years, and that Ku-band uplinks will be predominant.

Harris will introduce a portable uplink package called Pups. A suitcase portable uplink, designated KU 02, from Modulation Associates, is configured to provide continuous two-way voice/telephone communications plus program controls between remote locations and a master control center. Options on the KU 02 include provision for stereo, an engineer's private line, IFB channel, digital data channels for news bulletins, and other channels.

Broadcast Microwave Systems is expected to unveil a new Ku-band SNG uplink truck. Scientific-Atlanta will announce a 4.5 m Ku- and C-band downlink, the 9630 receiver, designed to operate with the company's Model 8345 antenna system. Scientific-Atlanta will also feature a new version of its 7500 receiver equipped for Ku-band as well as C-band signals.

One other development this year has led to an unexpected surge in remote microwave and microwave STL equipment sales. Telephone companies were allowed to raise their rates, and many radio stations were especially hard hit, with some stations reporting increases in their telephone bills.

To remedy this problem, stations turned to microwave equipment, and sales have continued to soar. Marti Electronics responded to the increased interest in such equipment by coining the phrase "Telcobusters" at Radio '85. Interest in remote and microwave STLs will no doubt still be running high at NAB.

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Cleaning Up Old Business

By Harry Cole, FCC Counsel

As 1985 drew to a close the Commission took care of cleaning up some old business and took at least one forward-looking step toward correcting a problem which has increasingly become an unwanted result of deregulation. The following is a grab bag collection of generally unrelated items of which you should be aware.

The Simon Geller Case. Long-time readers of this column should be familiar with this old friend, which has been in various stages of trial and appeal for almost 10 years. As you will recall, Simon Geller is the licensee of station WVCA-FM, Gloucester, MA. Not only that, he is the sole employee of the station, which broadcasts a strict regimen of "symphonic music." During the 1972-1975 license term, Geller presented less than 1 percent nonentertainment programming and no programming at all in response to ascertained community needs. When his 1975 renewal application was filed, a competing applicant filed against him. A comparative renewal hearing was held, and in 1982, the full Commission denied his renewal application and granted the competing application. The case went up to the courts on appeal and, sure enough, Geller convinced the U.S. Court of Appeals in Washington that the Commission's decision was wrong. Accordingly, the court sent the case back to the Commission in 1984 for further consideration. In December the Commission decided that Geller's license should be renewed after all.

What is most noteworthy about the FCC's latest action is what it did not do. In its 1982 decision to deny Geller's renewal, the Commission had occasion to address the subject of "renewal expectancy." "Renewal expectancy," of course, is what each licensee claims when its renewal application is challenged by a competing applicant. The theory is that each licensee should have some assurance that, if it does a reasonably good job of serving the public, it will be entitled to renewal of its license. The trouble, of course, comes when the Commission tries to define the level of broadcast performance necessary to warrant such assurance.

In the 1982 Geller decision, the Commission was confronted with a licensee who had broadcast virtually no nonentertainment or issue-responsive programming. Yet Geller was providing pretty much of a unique program service; he was operating on a shoestring budget, and he still managed to get a number of community witnesses to come forward in support of his application. The bottom line as far as the

Commission was concerned, however, was that Geller was not entitled to *any* renewal expectancy, since such an expectancy is based only on the licensee's nonentertainment programming record.

In 1984 the court agreed with this analysis. However, it disagreed with another aspect of the FCC's decision relating to the effect of Geller's broadcast performance on his comparative qualifications. Since Geller is the sole operator of the station, he understandably claimed credit for 100 percent integration of ownership and management. Similarly, since he has no other broadcast interests, he claimed a diversification preference over his competitor, whose principals hold a number of other interests. The FCC, however, diluted any preferences to which he might have been entitled. According to the 1982 decision, Geller's poor performance undermined any value which would otherwise have been derived from his integration and diversification claims. This is where the court disagreed with the Commission. As the court saw it, this latter aspect of the FCC's ruling unfairly penalized Geller for his past performance: after all, he had lost his renewal expectancy, and beating on him further seemed unjustified. As a result, the court sent the case back for the FCC to reconsider that aspect of its decision.

In December, the Commission finally announced the results of its reconsideration: it reassessed the comparative aspect of the case and concluded that Geller is the preferred applicant. In so doing it did not attempt to address the question of renewal expectancy standards and, therefore, the FCC's earlier decision on that point stands.

The bottom line

The bottom line on this is that the concept of renewal expectancy has not changed, even though the result in the Geller case has now been reversed. Thus, you should still be concerned about your level of nonentertainment programming responsive to your community's needs and interests, since that continues to serve as the basis for any claim of renewal expectancy. As long as the Communications Act continues to compel the FCC to conduct comparative renewal proceedings, incumbent licensees will have to worry about the possibility of license challenges and, more directly, how they can protect themselves in the event of such a challenge.

Character Qualifications. For years the Commission has struggled with the question of how to factor an applicant's character qualifications into

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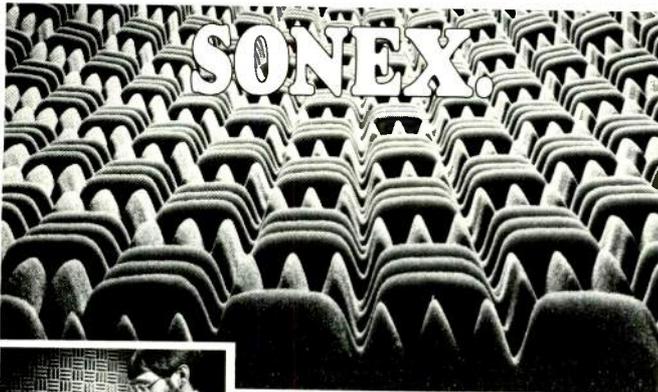


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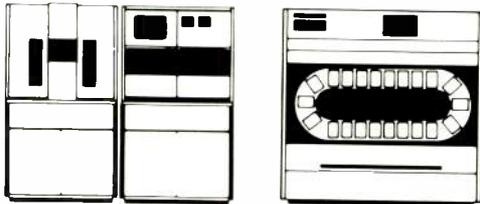
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FCC Rules & Regulations

the overall licensing decision of whether or not to grant the applicant's application. For a while the governing thought seemed to be that applicants who were demonstrated to have engaged in some relatively serious misconduct should be disqualified, or at least severely penalized. Gradually, however, that relatively draconian view has been softened in a variety of individual cases. Except for a 25-year-old policy statement, however, the Commission had not issued a comprehensive statement setting forth precisely what factors are important in this area. As a result, applicants and licensees alike were left to guess as to what consequences would befall them if they engaged in misconduct.

Recognizing the usefulness of a definitive explanation of its character qualifications policies, the Commission instituted a rulemaking proceeding some four years ago to investigate the whole matter. Finally, in December, it released the results of its deliberations. As might have been expected of this deregulation-minded Commission, the FCC has apparently sought to limit the scope of character qualifications inquiries. According to the FCC, inquiry into an applicant's character "should reflect (the Commission's) primary regulatory objectives—i.e., to ensure compliance with the Communications Act and the Commission's rules and policies." Thus, obviously flagrant violation of the Act or the rules will warrant serious consideration and could weigh heavily against an applicant. Misconduct not related to the Commission's specific regulatory system would generally only be considered if it involves one of four categories: (1) adjudicated cases of fraudulent conduct before another governmental agency; (2) criminal convictions involving fraud; (3) certain felony convictions; or (4) adjudicated case of broadcast-related antitrust or anticompetitive conduct.

FCC policy

The thrust of the FCC's policy is clear. The Commission relies to a substantial extent on the information supplied to it by applicants and licensees. If it cannot trust the applicant or licensee, the FCC's ability to regulate effectively is seriously compromised. Thus, to the extent that an applicant/licensee is shown to have engaged in fraudulent conduct, the Commission must be concerned that that applicant/licensee may be untrustworthy. Because of that, continued consideration of that relatively narrow aspect of "character qualifications" is warranted. While it is not clear precisely what "certain felony convictions" might be involved, it is likely that the Commission will restrict itself to consideration of only those criminal activities which suggest that the applicant is somehow not to be trusted. Of course, any demonstrated instances of misrepresentation or lack of candor before the Commission would have the same effect. In connection with that, the Commission also amended its rules to make clear that mis-

representations to the Commission are specifically prohibited. (Previously, the rules themselves technically did not contain such a prohibition, although misrepresentations were clearly prohibited as a matter of policy.)

Interestingly, the Commission decided that "character" will not be considered on a comparative basis, that is, it will be considered only as a disqualifying matter. This is important because frequently very few differences actually separate competing applicants on a comparative basis. If, for example, two applicants are virtually dead even, but one had been involved in criminal conduct while the other had not, some might say that the noncriminal should be entitled to the grant (all else being equal). This gut reaction most likely stems from a sense of morality, a sense that nice guys should be preferred over bad guys. The Commission, obviously, would rather not get involved in this kind of subjective comparative analysis. In the FCC's view, an applicant is either not qualified because of past misconduct, or qualified irrespective of that misconduct. If the applicant is qualified, that should be an end to the matter.

Construction Permit Extensions. Christmas came a little bit early for holders of, and applicants for, construction permits. The Commission announced that it is extending the time allowed for construction of stations. Previously full-service television station construction permits provided only 18 months for the construction of the facilities; permits for stations in the radio and most auxiliary services generally allowed 12 months for construction. As of early December, however, those limits have been extended to 24 months and 18 months, respectively. If you have a permit the initial term of which is about to expire, you will be entitled (upon appropriate application) to a six-month extension.

Raising the ante

The Commission is obviously concerned about the increasing number of broadcast permits that are issued but that, for whatever reason, go unbuilt. It is clearly a waste of the FCC's limited resources to spend time and effort processing applications for stations that will never be constructed. Further, the FCC also seems concerned about the possibility that some applicants may be intent upon trafficking in construction permits. The new rules appear to have been designed to discourage such conduct by raising the ante which both buyers and sellers of permits must put up. As we have previously indicated in this column, the Commission has in recent years become increasingly reluctant to extend *ad infinitum* construction permits. Its action last December clearly demonstrates that the Commission is not backing off that reluctance. Indeed, it appears to be ready and willing to go further in its efforts to cut back, if not eliminate, the possibility of speculation in construction permits. Caveat applicant. **BM/E**

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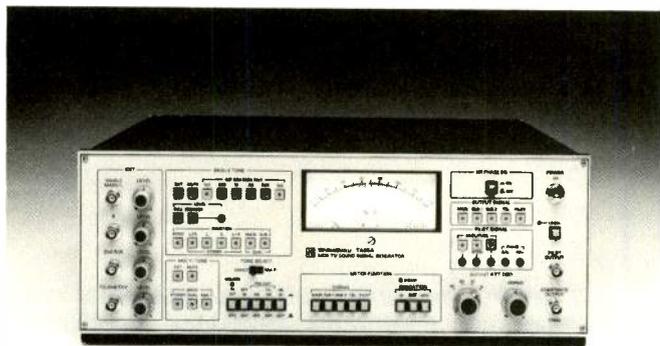
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New Equipment



Audio Console Automation System from CMX

CMX Corp. has introduced the CASS 1, an integrated time code-based audio editing and audio console automation system, which is the first of its kind.

The CASS 1 simultaneously controls up to six audio tape recorders and 15 additional sources, permitting precision mixing of an entire soundtrack. It is designed for use in video post-production facilities that offer audio sweetening as well as audio post-production houses that offer audio-for-video.

The unit is integrated and referenced to time coding so that a fader can be adjusted during the mix to be accurate to 1/1000 of a frame. The CASS 1 interfaces to most audio consoles with VCA-controlled faders and features the familiar CMX keyboard and Edit Decision List.

Mix lengths of up to a half-hour are achievable, and over 100 different mixes may be stored on the integral hard disk and archived to floppy disk. The unit is priced at \$40,000.

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MFJ Video Effects Titler

MFJ Enterprises has introduced the Video Effects Titler (VET), a computer-based, standalone titler for the professional broadcast market.

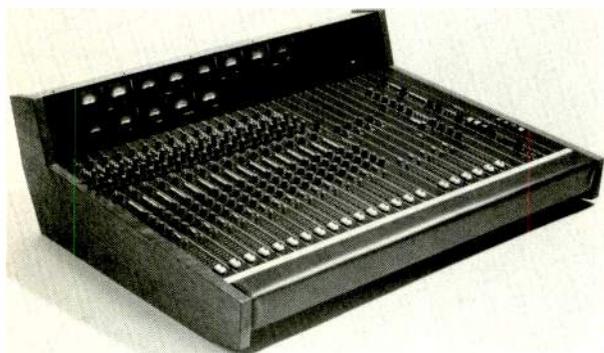
Priced at \$599.95, the VET allows superimposing 30 pages of color titles over a camera image or other external video. Titles may also be added over existing video footage during editing. These

titles can be composed and edited with the VET's professional typewriter-style keyboard.

Each of the 30 pages will display eight lines of 16 characters in upper and lower case.

The character cartridge will allow the use of different style fonts (two per page), while the program cartridge will allow a range of special effects including scrolling, flashing, special logos, and borders and page transitions. The interface connector will enable the user to connect the VET to an IBM PC, Commodore 64, Apple II+, Apple IIe, or TRS-80 color computer to create complex images or animation.

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Wheatstone has New Production Console

Wheatstone's newest production console, the SP-5, offers both mono and stereo inputs as well as stereo subgroups, multitrack routing, and matrix submixing.

In addition to these features, the SP-5 also has composite stereo and mono mixes, as well as four auxiliary send buses, which provide tape machine controls, clocks, timers, and user-specified frame widths.

The SP-5 can be custom configured to specific system requirements.

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TBC from Lenco

The TBC-450, a digital time base corrector, is the newest addition to Lenco's line of professional video/audio broadcast equipment.

Weighing less than 15 pounds, and measuring only one rack unit tall, the digital TBC-450 requires no external cooling. It features digital pixel-by-pixel dropout compensation, an S/N ratio of 58 dB, and heterodyne processor/feedback of 3.58 MHz.

Other features include advanced sync output signal, four-times subcarrier sampling with eight-bit resolution, constant H phase for matched frame edit, and high-speed search handling.

The unit is priced at \$5450.

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Transmitter Remote Control from Gentner

The VRC-1000 Voice Remote Control from Gentner, which takes advantage of the FCC's adoption of Docket 84-110, and which operates on a standard dialup telephone line, permits telephone remote control from anywhere—at home, at a pay phone, in a car with a cellular phone, or at the studio.

The VRC-1000 offers many features, including two modes of reporting—voice synthesis or optional digital (ASCII) data. (Video display terminal and printers are available as options.) Also included is fully automatic transmitter operation (ATS).

Priced at less than \$3000, the VRC-1000 can be used as a station's principal remote control or as a backup system, pending FCC part 15 and 68 certification.

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Note:

In the Broadcast Equipment section of the November issue, we inadvertently referred to a "New Grass Valley DVE." DVE is the registered trademark of NEC America, and should be used only in conjunction with NEC systems.

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Business Briefs

Eastman Kodak has placed a substantial order with Shintron for Andromeda 3000 Component RGB Digital Framestores. This agreement provides for co-ownership between the two companies of any software developed at Kodak labs for the Andromeda....Amek Consoles has appointed **Audio Engineering Associates** of Pasadena, CA as its exclusive dealer for all of its series consoles in southern California.

Orban Associates reached a milestone when its **one-hundredth stereo TV installation** went on-air in December....In Pittsburgh, **WTAE-TV** has begun operation with a microwave link from a Collins Doppler weather radar system located at Beaver County Airport, 35 miles away.... **Conus Communications** provided extensive coverage of last month's football Super Bowl by having three mobile uplinks with multiple crews.

Data Communications Corp. has installed its BIAS computerized newsroom system at WREG-TV, Memphis, TN and KOB-TV, Albuquerque, NM....Two Metro-media Television stations, KRLD-TV in Dallas and WFLD-TV in Chicago, have purchased a Sony Betacart multicassette system.... **Graham-Patten Systems** has installed its Model 612 Edit Suite Audio Mixers in KQED-TV, San Francisco, WCPX-TV, Orlando, and WTMJ-TV, Milwaukee.

3M has created **new units** within its Memory Technologies Group, merging its audio, video, and data recording products into a new Magnetic Media Division. This new division will be responsible for manufacturing and marketing magnetic media in various formats including open reel, cartridge, cassette, and diskettes....The Distributor & Special Markets Division of **Philips ECG, Inc.** has become part of Amperelex Electronic Corp....Tandberg of America, Inc. has been reorganized as **Tandberg Audio**. Although Tandberg will maintain its R&D and production facilities in Oslo, Norway, all operations



Emory Cohen, president of Pacific Video, in the telecine suite of the company's Electronic Laboratory which features electronic dailies transfer.

will be directed by its Armonk, NY office....In Berkely, CA, **DiaQuest** has contracted with Cubicomp Corp. to be a systems integrator providing total video solutions for the PictureMaker computer graphic animation system.

In New York City, Intercontinental Televideo recently added **NTSC standard conversion** to its VHS Stereo Hi-Fi capabilities....**MetroPost**, a full-service video post-production facility, has opened for business at 906 E. Fifth St., Austin, TX 78702 (512) 476-3876....In upstate New York, **OurTown Television Productions** is in new quarters at 78 Church Street, Saratoga Springs 12866 (518) 899-6989....C/M Studios, a new recording facility in New York City, has opened at 30 East 23rd St (212) 777-7755.

Ceavco Audio Visual Company of Denver is sponsoring the "**All Sony Only Show**" at the Denver Hilton Inn South February 5 and 6. The show will feature the latest in professional video products from three divisions of Sony....Cranston/Csuri Productions re-

cently created simulated refractions of a mechanical pencil through a pair of eyeglasses for *The Best Idea in the World*, a 30-second commercial spot done for TRW....Television Associates has used its Paint Box in projects involving Apple Computers, Lockheed, Hewlett Packard, and Convergent Technology....New York City's **Video Planning** has wrapped two shoots in that city, one on location for The Movie Channel (featuring Francis Ford Coppola and Kenny Loggins), and one at its 325 West 56th Street studio (for VIDA, a medical advertising agency)....*Golden Girls*, the top-rated NBC sitcom, is the first prime-time comedy series shot entirely with Sony Betacam half-inch camera/VTRs.

Among the personnel changes this month, Arnold Taylor is the new president and CEO of **Quanta Corp** **JVC** has named Dave Walton as its marketing manager, new products....James Woodworth is the new director of marketing and sales at **Circuit Research Labs**.

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