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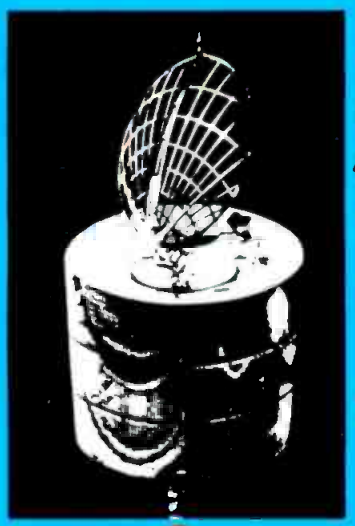
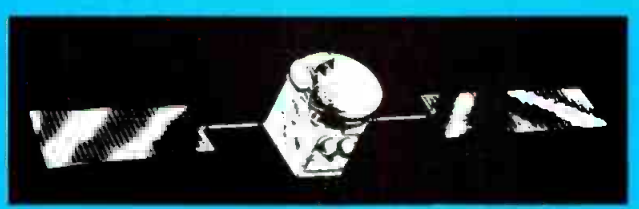


SPECIAL REPORT: SATELLITES

- How broadcasters use the birds
- New equipment review
- Planning for an earth station



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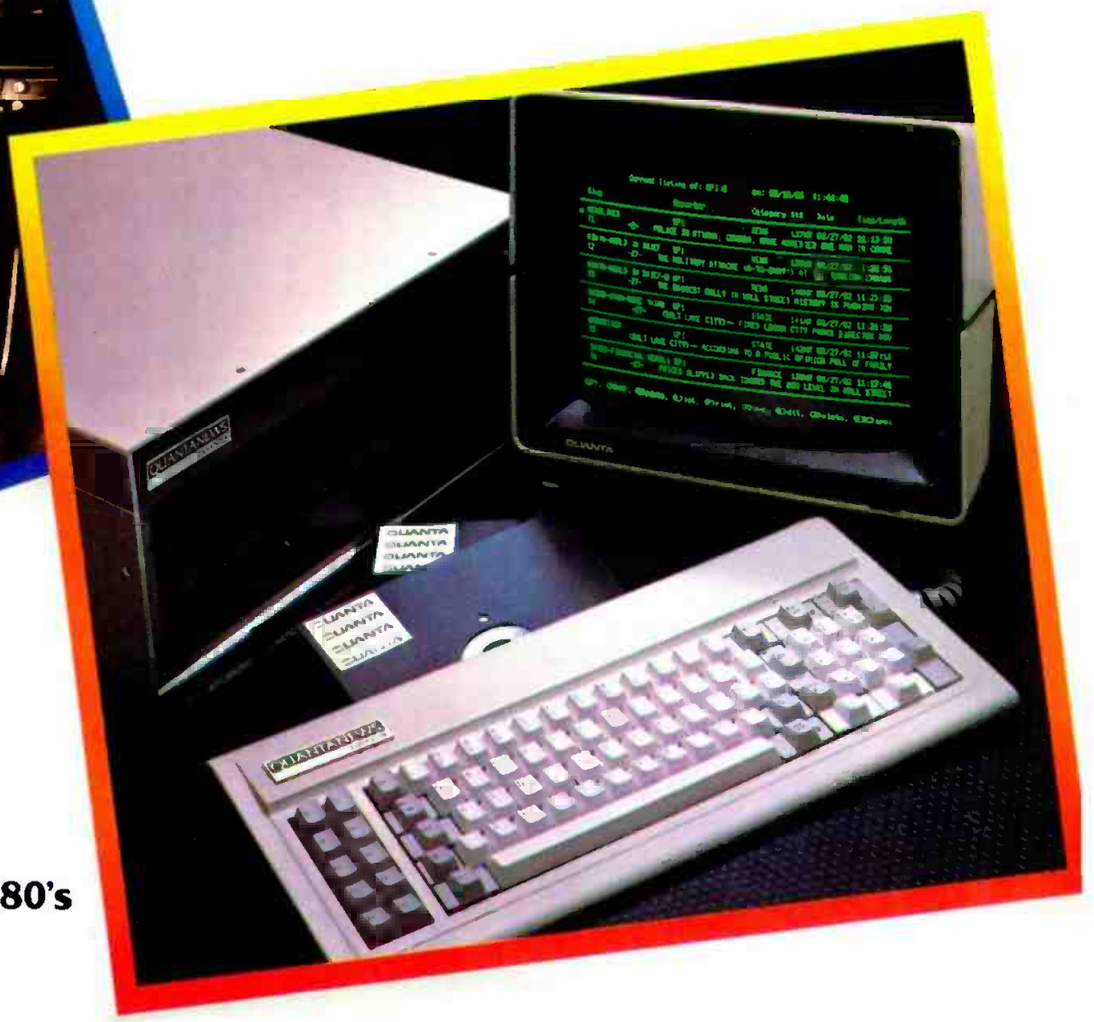

News Standard for the 80's

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We are willing to bet there is at least one person in every radio and television newsroom in America still using an old Underwood. For those people still living in the Underwood Age, Quanta™ has a message. QUANTANEWS™ makes it possible for you to keep that personal relationship with your typewriter and still move surely and confidently into the world of computer-assisted news writing and management. Relax, it's not going to be painful at all.

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QUANTANEWS will help you to be better organized, more effective, and able to produce more copy with greater accuracy in less time. All this and more starting for under $30,000.

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To help you shuttle more customers in and out of your facility than ever before.

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Thanks to the Sony editing system, this scenario is rarely, if ever, played out in leading production houses like Broadway Video, Videowork JSL and a host of others currently using it.

The reason?

"Sony belongs to a small group of manufacturers that still think of broadcast equipment as a product, not an experiment," says Frank Herold

hief editor of Videoworks in New York.

"When you take a piece of Sony equipment ut of the box and plug it in, an amazing thing appens. It works!"

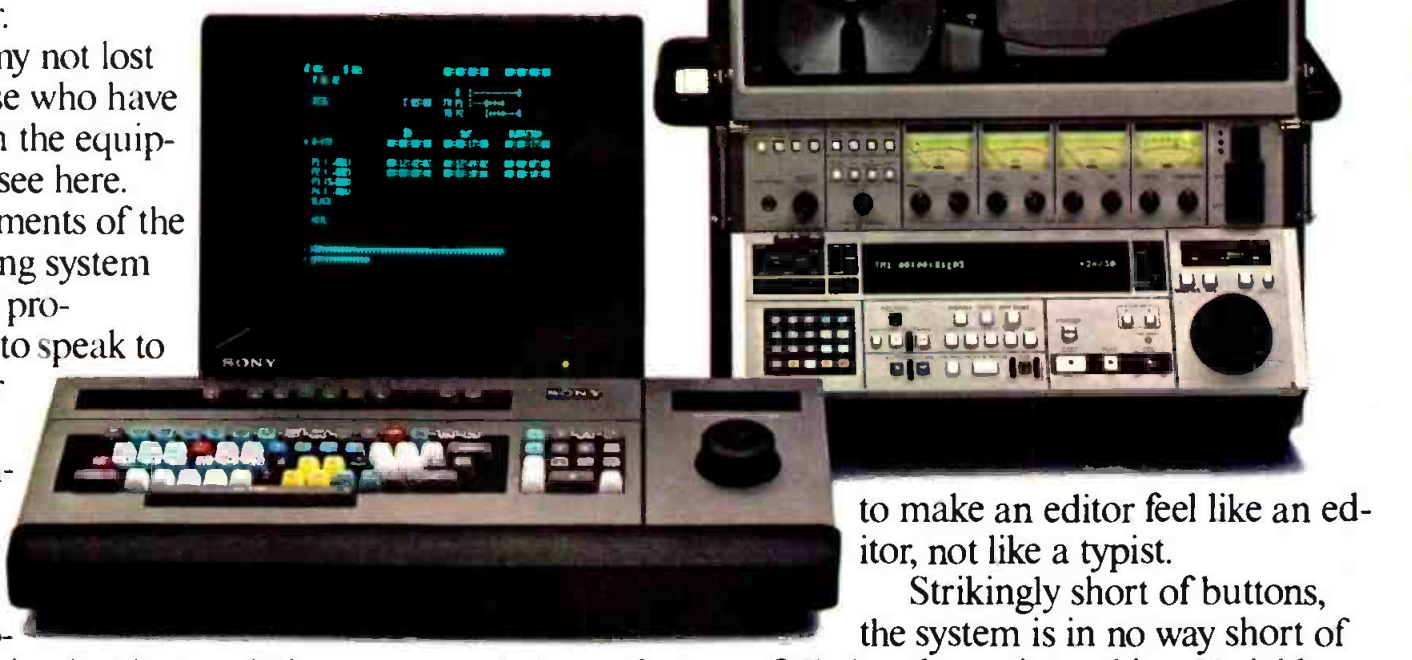
And keeps working. Faster. Easier. And more recisely than any other system.

THE MOST INTELLIGENT CONVERSATION YOU'LL EVER HAVE WITH A MACHINE.

Today, there are any number of people trying o compete in this, a communications industry, ith machines that can't even communicate with ach other.

An irony not lost n all those who have ıvested in the equip- ıent you see here.

All elements of the ony editing system ave been pro- rammed to speak to ach other uently. ınd to un- erstand ach other erfectly. Vith abso- itely nothing lost in translation or transmission.



You'll find that they're geared to speak equally ell with Sony's Beta® and U-matic® recorders. ot to mention with you.

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The BVE-5000 control panel has the capacity to make an editor feel like an editor, not like a typist.

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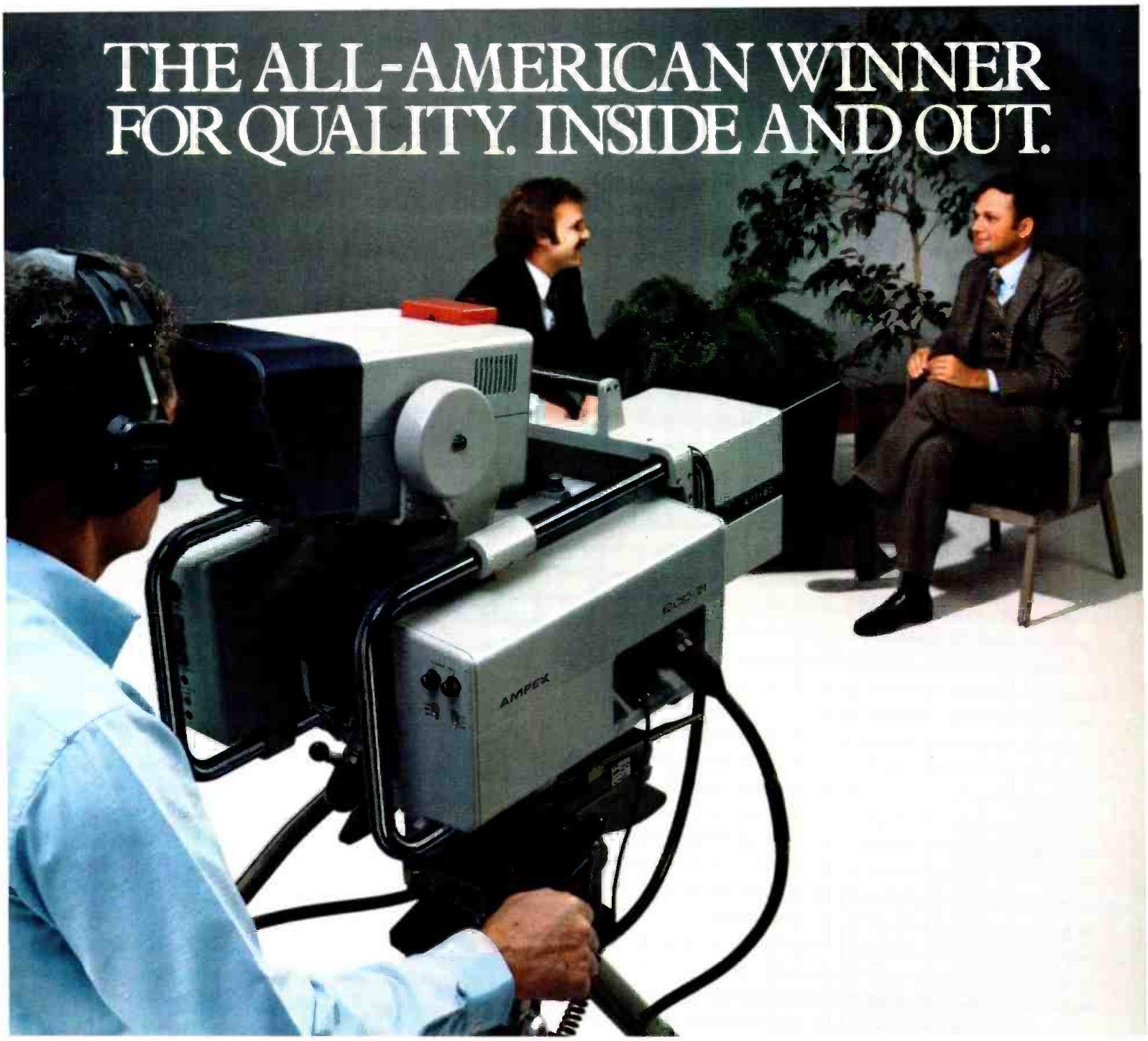

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The Digicam cameras come with impressive features, including: "computer-in-the-head", Spatial Error Correction for outstanding registration and sharpness, remote control, and an optional Automatic Setup Unit for more accurate, faster and simpler setup.

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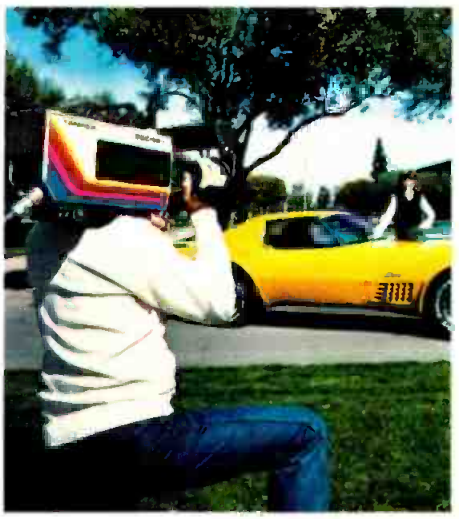

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Circle 149 on Reader Service Card

JULY 1983 • VOLUME 19/NUMBER 7

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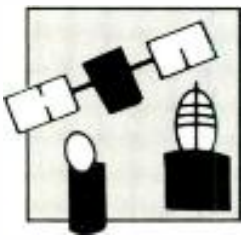
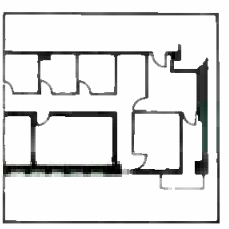
SATELLITES





DEPARTMENTS

INTRODUCING THE NEW PRIMUS™ AUDIO COMPONENTS

CERTIFIED PERFORMANCE

Powerful performance in the palm of your hand.

PRIMUS (Prēē-mŭs): an array of compact, performance-engineered audio electronics from Ramko Research.

The new PRIMUS components are unlike any professional audio equipment you've ever used. Never before has so much advanced performance been put into such compact and rugged packages. Rarely have you had available so many features and options to help get the job done. Never have you had a three-year warranty that's backed up by factory certified proof-of-performance.

PRIMUS is a comprehensive range of components that give you the flexibility to configure an audio sysem limited only by your imagination. Whether you choose from tabletop or rack mounting versions, there's hardly an audio job that can't be improved upon.

Here's a partial list of models currently available:

- ☐ Lab standard mono or stereo turntable preamplifiers.
- ☐ Dual and quad input, gain selectable microphone/line amplifier mixers.
- ☐ Audio distribution amps from three (3) stereo/six (6) mono up to eight (8) stereo/sixteen (16) mono outputs. All models feature individual recessed front panel adjustments or optional high resolution, conductive plastic potentiometers.
- ☐ Mic/Line equalizer amplifiers with balanced I/O and up to ±15 db of reciprocal equalization.
- ☐ Expandable audio console mixers with cueing, selectable EQ, metering phones and monitor.
- ☐ Voicegard™ combination limiter/compressor, noise gate with variable threshold and slope ratio; gain reduction metering.
- ☐ Signal processing VCA's with six (6) independently controlled channels. DC remote control with balanced outputs.
- ☐ R/P and playback, stereo and mono NAB cart machines.

Whichever combination of precision PRIMUS audio components you choose, you're guaranteed outstanding specifications. For example, our stereo turntable preamplifier measures:

Signal-to-noise Ratio: −93 dB (A weighted)
Total Harmonic Distortion: Below .0018%
Frequency Response: 10 Hz to 20 kHZ, ±.25 dB
Stereo Separation: −70 dB @ 1 kHz
Output Level: +25 dBm (10 Hz · 20 kHz)

The simplified and modular packaging of PRIMUS allows us to concentrate the quality where it belongs: in state-of-the-art circuitry. High slew-rate integrated circuits and extensive ground planes insure the highest RFI protection. All IC's plug into gold plated sockets. All models feature quick disconnect I/O connectors and require only 1¾ inch standard rack height.

We've taken another important step, too.

When you invest in PRIMUS, you receive a *Certified Performance Gold Card* that instantly puts you in touch with our Technical Assistance Department on a toll-free line. Just call in your registered serial number and you're in touch with the advice you need.

To put PRIMUS audio components to task on a free two-week trial, call toll free (800) 821-2545 or contact your nearest Ramko Research sales representative or distributor. Put the powerful performance of PRIMUS in the palm of your hand.

PRIMUS audio components are an array of compact, performance-engineered rack mounting or tabletop packages.

PRIMUS is a division of Ramko Research, Inc. 11355-A Folsom Blvd., Rancho Cordova, California 95670 (916) 635-3600

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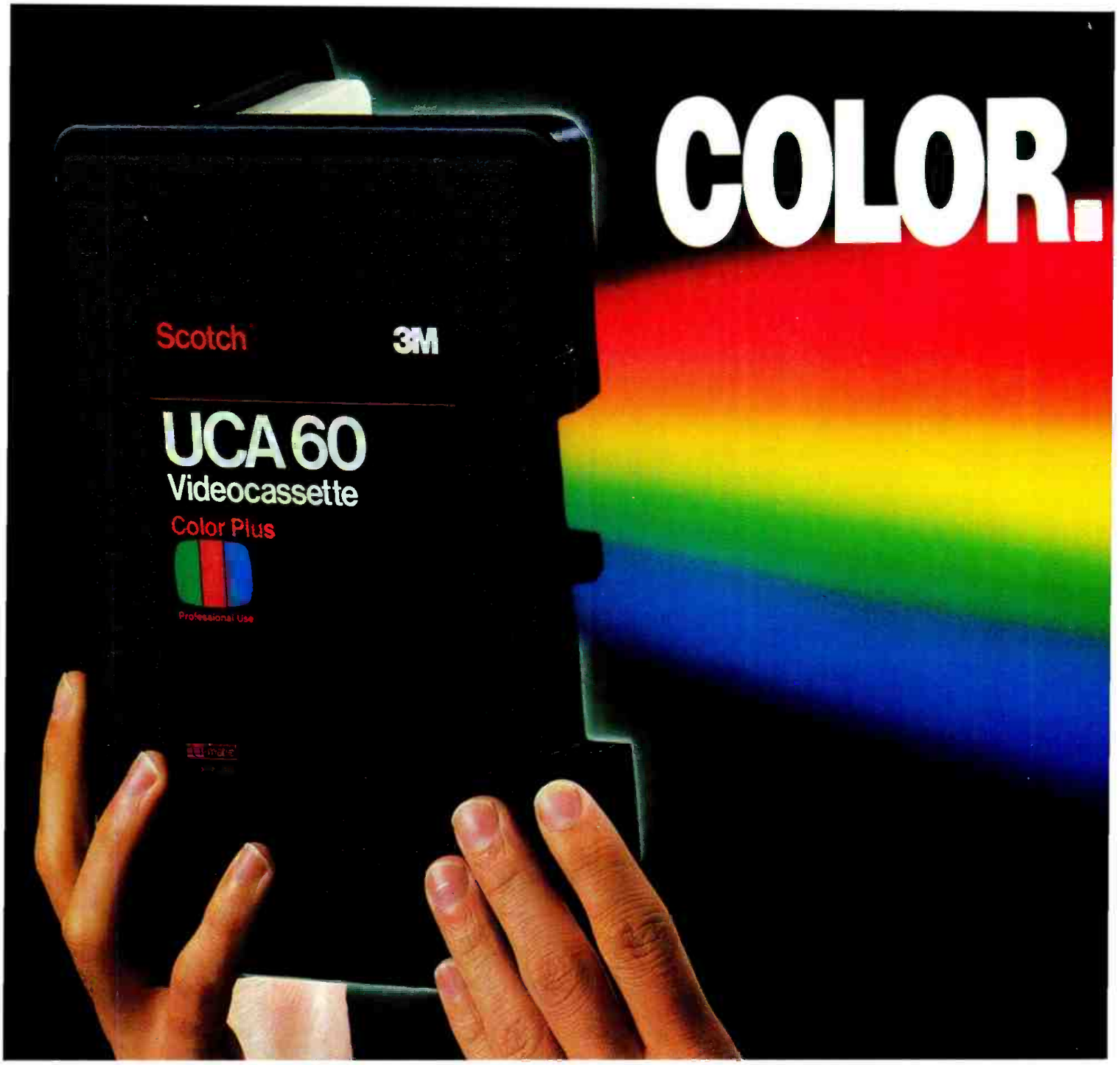

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Find out why Color Plus ¾" Videocassettes give you a color advantage over standard videocassettes. Send for more information and we'll send along a free pair of Color Plus sunglasses.

How many video recorders do you utilize in your facility?

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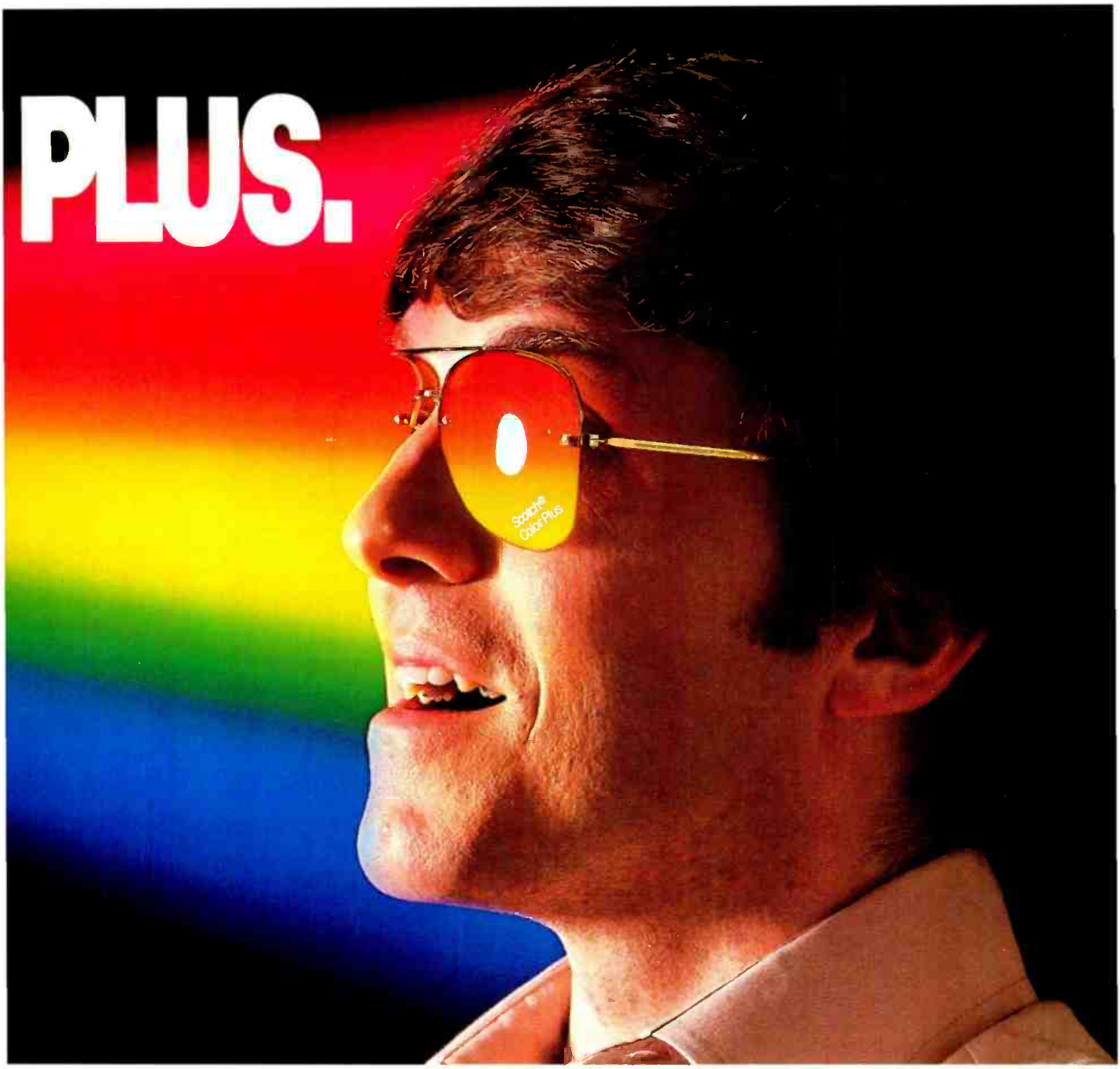

designed for the new generation of U-matic recorders reduces headwear to the lowest in the industry.

Most important of all, every Color Plus Videocassette is consistently made under the highest quality standards, which has made 3M the leading manufacturer of professional use video tape.

For more information about Color Plus ¾" Videocassettes, call 1-800-328-1684 (1-800-792-1072 in Minnesota). We'll send you details on the ¾" tape that lives up to its name.

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EDITORIAL

Hard Decisions Re Satellites

SATELLITES REPRESENT AN OPPORTUNITY for broadcasters. But like most opportunities, satellite use presents problems both technically and financially. The "invasion from outer space" will go on and broadcasters will have to face the tough decisions regarding satellites.

While network and affiliate relations are ordinarily considered family affairs, the stalemate over buying earth station equipment deserves comment. The reluctance of affiliates to purchase the systems approved by the networks is holding up progress in satellite use; therefore, we think that the "big guns in New York" should reconsider their policies in order to break any potential deadlock.

It appears that offers of free earth stations from RKO and a commitment of just $7000 to procure the Mutual dish have justifiably caused most affiliates to hold off the decision to buy the more expensive network-approved equipment. As a result, the heavy investment in satellite transmission by the networks will not mean much if there is no one on the affiliate receiving end.

Meanwhile, at the ultimate receiving end, consumers are being lured into buying their own dishes for DBS pickup. DBS offers new opportunities for broadcasters, but there is a problem to be resolved among the half-dozen or so DBS suppliers over a common transmission standard. The FCC no doubt will stick to its marketplace policy on this issue; however, there is danger that consumers will balk at the idea of having to acquire a different descrambler/converter for each satellite service. Clearly a single unit capable of handling all DBS services would be in order. If the FCC does not take a stand, then it may be up to an industry group like the EIA to work out a standard.

At the heart of the satellite situation is the need for station management to appreciate the many ramifications of dealing with the birds. The options are many and the stakes are high. This is the time that engineering and station management must work together.

For example, both need to analyze the options and develop a long-range plan. Getting the lowest-price receiving system that works today may not work in the future when the number of satellites grows and the possibility for interference increases. Another key issue is the need for reliability and redundancy. Moving into TV transmission, the three major networks have put reliability and backup high on their priority lists, and so should the broadcast stations. Finally, there is indeed a need to plan for very heavy use of satellite signals in the future. With this heavy use comes the need for keeping the plant simple in order to ease maintenance. A patchwork, quick and dirty approach will not do.

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It's a small price to pay for the 'SOLUTION'

Selecting a new audio console can be a problem if you are a busy executive engineer with broad responsibilities.

Your audio needs, however, are probably *not unique*.

We have identified several common needs in broadcast audio and have configured specific consoles to meet those needs.

One of the most common is 16 inputs with two program feeds (stereo or mono) and four auxiliary outputs. We have integrated a generous patchbay, space for two stereo-line input modules, and called the answer the 'Solution'. All interconnections are by way of XLR or easy to use DIN standard 30-pin connectors.

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*Prices shown are for direct factory sales in USA, FOB Factory, installation not included. Commissioning into a prepared facility is included. Prices outside of the USA are higher due to freight, duty, dealer service support, etc. Normal payment terms are 30% with order, 70% prior to shipment. Price, specifications, terms, and availability are subject to change and are determined only at the time of sale.

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LETTERS

EC AT NAB

To the Editor:

If you were hoping to experience the exhilaration of electronic cinematography at the recent Vegas NAB, then perhaps you also experienced the frustration of our industry's latest exercise in futility.

For example: judging by Ikegami's approach, one might be tempted to believe they have neither concrete marketing plans nor serious intentions regarding the EC-35. While Ikegami touts the new camera as capable of handling harsh lighting ratios (one of their major claims for rendering the "film look"), the display featured a soft-lit set with little or no backlight—and the set practically was turned off.

Contrast this with Panavision's preparation. Catering to an "invitation only" audience, the company treated those who were fortunate enough to attend to a first-class presentation. Complete with harsh backlight and a blinking *neon* sign, Panavision ideally simulated the actual requirements of a motion picture set.

Objectively speaking, one yearns for the best of both worlds. As we move closer to negotiable tape-to-film transfers such as 24 fps Imagevision, the combined genius of Image Transform, Merlin, and Bosch—EC looms ahead as a viable alternative to the more mechanical film processes.

Manufacturers should understand that studios and production companies will take electronic cinematography just as seriously as they do.

Considering that all sorts of ho-hum ENG/EFP cameras were given such lavish attention, perhaps by the next NAB or sooner electronic cinematography will receive the attention to detail and proper promotion it so rightly deserves.

Elliot Van Koghbe
Blustarr/Balcom Enterprises

AUDIO PROCESSING

To the Editor:

Your article "Audio Processing" of August 1982 brought a response from a CE in Toledo and a PD in Denver. As an engineering consultant with a Master of Arts degree in Radio and Television, I would like to offer a few more observations on the subject.

Both the prior respondents appear to be fiercely guarding their own little empires. While the PD accuses the CE of labeling the station equipment as "his," the PD establishes indefensible limits for his own authority, and commits the same error to even a greater degree. Clearly PDs and CEs are made of different stuff, but a successful station requires both. If disagreements continually arise, clear lines of responsibility must be drawn. The program department, in my view, has no business making adjustments in the Optimod, whether or not the manual was consulted prior to doing it. On the other hand, an engineer who does not make these adjustments properly and deliver quality sound on the air should be held immediately accountable to higher management.

The definition of quality sound, however, could remain at issue. It is amazing to me how predictably my client stations will demand more of everything. They have little interest in obtaining just the right amount. They diagnose their rating anomalies as insufficient technical facilities requiring more bass, more treble, more compression, more limiting, more signal, and especially more loudness. It becomes a little awkward at times to explain that there are no free rides.

I am a believer in the "less is more" theory. Whenever I patch around all those processors, it is wonderful to behold the natural untortured sound once again. Some compromise of technical purity is required for competition, but as listeners obtain superior receivers, purity becomes an increasingly recognizable quality. Most stations do not yet realize that the pendulum has swung back the other way.

Roger W. Knipp
Consulting Radio Engineer
Fountain Valley, CA

CART AUTOMATION

To the Editor:

Your comments regarding the ACR-25 in the April 1983 issue require a comment.

First, at KTVU we have two ACR-25s with over 1,725,000 threads. We run all of our breaks, controlled from a GVG-4S M204 automation system. Our on-air discrepancy rate is extremely low and we credit this to our fine maintenance people, a good machine and quick supply and backup by Ampex.

While I agree the time is now for a replacement system using the latest technology, please don't sell good people and equipment short.

Ray Swenson
Chief Engineer, KTVU

The M-30 Mobile Production Unit featured at NAB. Equipped with field proven Hitachi HR200E VTR's.

Midwest and Hitachi... a track record for keeping your show on the road.

Whether you're covering a concert or a play-off game, Midwest can get your show on the road fast ... with a fully equipped mobile production unit that meets the tough demands of on-location shoots.

From mini-vans to 45-foot tele-production units, Midwest designs fully integrated mobile systems using only the finest equipment by the finest manufacturers ... like Hitachi. Hitachi's HR200E Type C One Inch VTR is used in Midwest's Model M-30, and features full studio capabilities plus diagnostics for easy field maintenance. Hitachi builds them for stable performance and durability, and it shows in their proven track record in Midwest mobile units.

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HAWKEYE

PHILADELPHIA NEWS CREW SWITCHES FROM FILM TO VIDEO

WKBS-TV in Philadelphia has "localized" its news operation with HAWKEYE. And they've done it with a crew that was previously only experienced with film!

The changeover was quick and easy according to Glenn Romsos, Engineering Manager. "We had a hurry-up training program and then our crew hit the streets. The HCR-1 recording camera is easy to operate and our people readily adapted to this new concept in news gathering."

The versatile HAWKEYE HCR-1 recording camera captures local stories which are then programmed in with the station's CNN Headline News.

The station also has a complete HAWKEYE HR-2 studio recording/editing system and final story segments are transferred to a cartridge recorder for airing. It's all part of a new WKBS emphasis on news.

"Far Superior to ¾" Recordings"

"The HAWKEYE ChromaTrak recording format is giving us video far superior to ¾" recordings," reports Romsos. "Picture quality is one of the key reasons why we went with this system. When you compare our news footage with the same story coverage on ¾" by other stations in the city, the difference in quality is incredible."

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Radio Deregulation Gets Appellate Court Approval

The FCC's deregulatory policies won an important battle in May as the U.S. Court of Appeals for the District of Columbia Circuit gave its approval to most aspects of the Commission's 1981 radio deregulation action.

The court's mixed feelings about deregulation, however, were evidenced in its remanding to the FCC the deletion of the program log requirement for radio stations. In addition, the court, in an opinion penned by Judge Skelly Wright, suggested "that Congress, and not the Commission, may be the more appropriate souce of such significant deregulation."

The January 1981 deregulation, which had been appealed by the United Church of Christ, Henry Geller, Classical Radio for Connecticut, and others, lifted radio regulations in four areas. It eliminated quantitative guidelines for nonentertainment programming, retaining a more limited obligation; eliminated formal ascertainment procedures; eliminated quantitative guidelines for commercial time; and eliminated the requirement for maintenance of program logs.

Rejecting the petitioners' arguments, the court called the FCC's modification of the nonentertainment programming rules "a reasonable interpretation of the public interest standard." The court continued, "Seeking to maximize the journalistic discretion of licensees, especially in the constitutionally sensitive area of informational programming, is clearly consistent with the Commission's statutory duty."

Elimination of formal ascertainment, according to the court, simply restores the situation in effect before the 1971 adoption of the ascertainment rules. The court upheld the FCC's dropping of commercial time limitations, but expressed unease about "the Commission's decision never to consider formal challenges to the possibly blatant commercial excesses of any individual station."

In remanding the program log decision to the FCC for further consideration, the court said it felt the FCC had given insufficient thought to its informational needs and had failed to explain adequately why licensees should not be required to make records of their issue-responsive programming available to citizens' groups. It asked that the FCC reconsider a logging requirement.

BDA Competition Fetes Creative Broadcast Design

"Tiempo" opener, a certificate winner for Michael Gass and Dan Paterna of WABC-TV, New York City. Done on Chyron.

Norman Leong's "Dr. Tomorrow" design won a silver award for video-generated news still graphics for KRON-TV, San Francisco. Done on Aurora.

Should anyone doubt the refinement of the state of the broadcast design art, let him consider well the results of the Broadcast Designers' Association's fifth annual design competition. From a field of over 3500 entries—received from local television and radio stations, U.S. and Canadian networks, production houses and cable companies—the judges named 307 to receive certificates of excellence. In addition, 22 of the certificate winners received gold awards and 32 silver at the BDA/BPA awards ceremony June 25 at the Fairmont Hotel in New Orleans. A special award for art direction went to Maria LoConte, WNEV-TV, Boston.

Among the gold award winners were: Sharon Hoogstraten and Barbara Cochran, WLS-TV, Chicago (small budget animation); Patricia Morley, CITY-TV, Toronto (promotional and sales animation); James Allen Houff, WDIV-TV, Detroit (nonpromotional animation); Paul Sidlo of Cranston/Csuri Productions and Drew Takahashi of Colossal Pictures (commercial animation); Kevin Hamilton of The Weather Channel, Patricia Cupples and R. Derhodge of TVOntario, and Mike Ellison of KNXT, Los Angeles (on-air illustration); William A. Stage and Judy Sternberg of CBS/New York, Sharon Romero and John Rix of CBUT, Vancouver, Ed Hassenfratz and Rick Rippon of WNEP, Avoca, PA, and R. Scott Miller and Robb Wyatt of WPLG, Miami (news still graphics); Linda Fox, WLS, Chicago (station ID graphics); and Larry Lindahl, KABC, Los Angeles (title still graphics). Other gold awards were in promotional or print categories.

Those who missed the BDA show in New Orleans, which featured all the winners, can catch it in New York August 8 through September 30 and at Kent State University in Ohio next spring.

House Hears Testimony on Public Interest Standard

In a classic legislative tradeoff maneuver, Rep. Timothy D. Wirth (D-CO) recently withdrew his staunch opposition to broadcast deregulation pending in the House on the condition that its proponents return it to the subcommittee process and consider inclusion of a quantified public interest standard, with specified percentages of nonentertainment programming.

Wirth, whose opposition had been viewed as the biggest stumbling block to the deregulation bill, had objected to the bill's consideration in the full House Energy and Commerce Committee, rather than in the Telecommunications Subcommittee, which he chairs. Several versions of the legislation had been introduced, all designed to codify radio deregulation and extend it to television. Most were similar to S. 55, the Senate-passed deregulation bill. The House bill was under discussion as a rider to the FCC budget authorization bill, H.R. 2755.

The codified public interest standard of particular interest to Rep. Al Swift (D-WA), whose own deregulation bill, H.R. 2370, included such a provision. All the bills had been the subject of unusually heavy lobbying efforts by the NAB, which had originally tried to sidestep Wirth's opposition. Hearings

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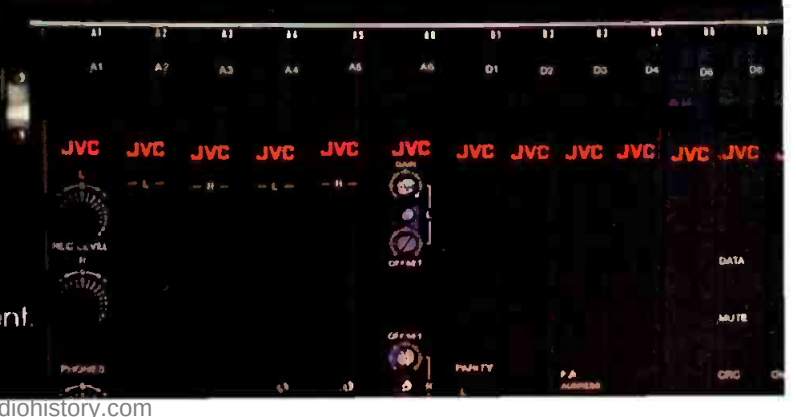

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NEWS

on the public interest issue were held only a few days after the surprise compromise, with testimony falling along expected lines—FCC chairman Mark Fowler and broadcasters opposed, citizens' groups (such as Action for Children's Television and the National Black Media Coalition) in favor.

Some friction was generated between NAB and NRBA when NRBA protested NAB's stated willingness to consider quantification "in a spirit of compromise." In an open letter to its membership, NRBA called the NAB efforts "ill-advised and short-sighted," saying that its own work toward total deregulation for radio had been "shattered."

At the same time, Reps. Tom Tauke (R-IA) and Billy Tauzin (D-LA), who had cosponsored another of the deregulation bills, H.R. 2382, surprised listeners by admitting to doubts on the quantification issue. Tauke suggested any quantification of programming standards should be broad enough to avoid trampling on broadcasters' free speech. Similar concerns were raised by Fowler, who expressed concern that quantification could pose First Amendment conflicts.

Rockefeller Center to Buy Outlet for $300 Million

Outlet Co., owner of five radio and five television stations, will be purchased by Rockefeller Center, Inc., under a recently concluded agreement between the two companies. The group broadcaster divested itself of its nonbroadcast holdings, mainly in the retail area, a few years back, and had been looking for a merger since that time. A possible merger with Columbia Pictures had been under discussion two years ago but was dropped.

According to Outlet, Rockefeller Center will pay $68 for each of Outlet's 3.6 million outstanding shares and will assume $87.3 million in debts. The total deal comes to $332.1 million. Outlet's top management will remain essentially unchanged under the agreement, with president and CEO Bruce G. Sundlun staying on as chairman and CEO of the new subsidiary of Rockefeller Center. David E. Henderson, now executive vice president of Outlet Co. and president of the broadcasting division, will be president and COO of the new entity.

Business has been looking up at Outlet, which announced a three-for-two stock split and 12.5 percent increase in its regular dividend a month before the merger became public. The company also reported record net earnings of

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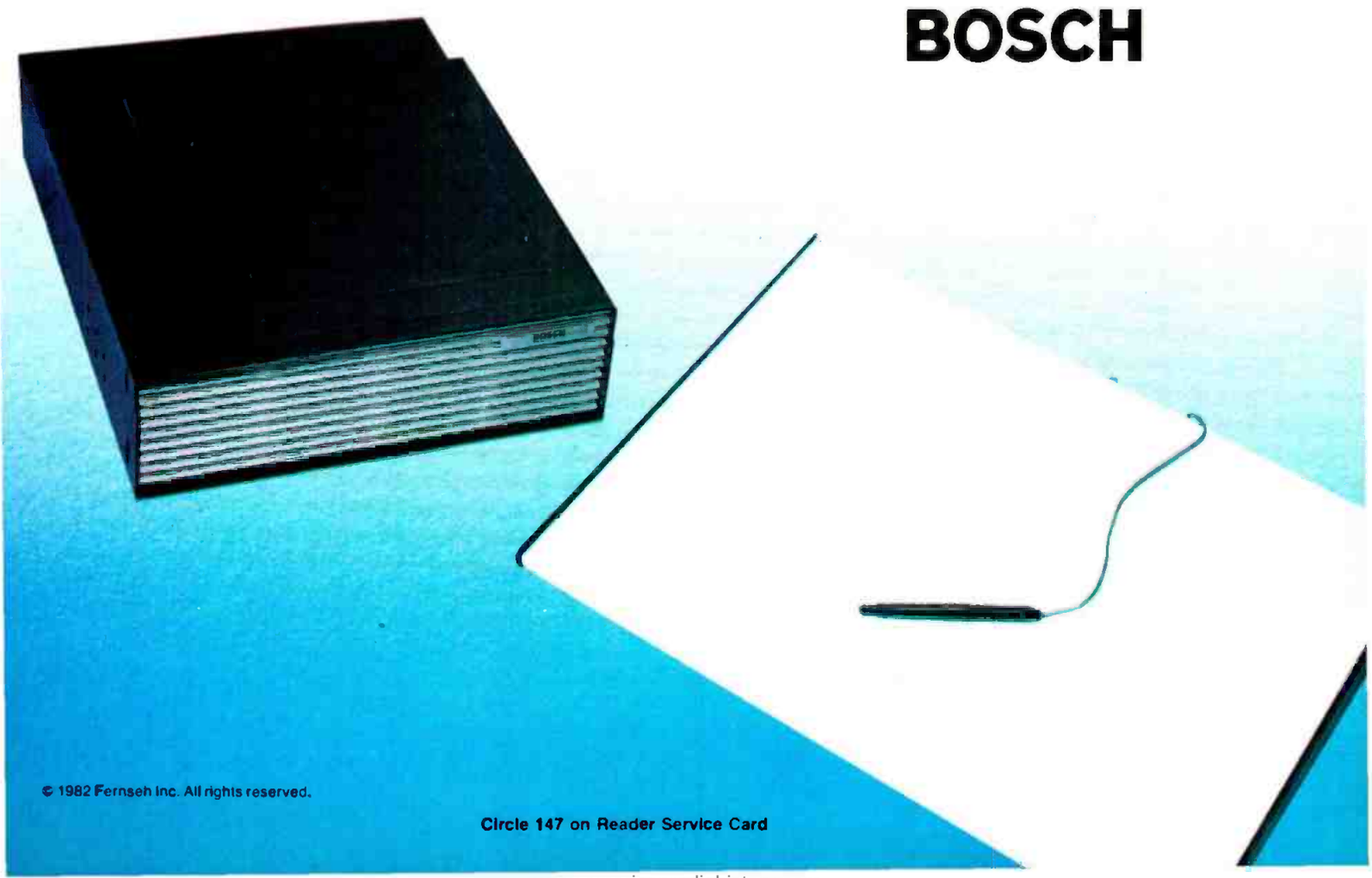

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over $18 million.

Outlet's broadcast holdings include WJAR-TV, Providence, RI; WCPX-TV, Orlando, FL; WCMH-TV, Columbus, OH; KSAT-TV, San Antonio; KOVR-TV, Stockton-Sacramento, CA; WTOP-AM, Washington, DC; WIOQ-FM, Philadelphia; WQRS-FM, Detroit; KIQQ-FM, Los Angeles; and WSNE-FM, Taunton-Providence. It has an application pending before the FCC to buy WHFS-FM, Bethesda, MD.

Satellite Spacing Slashed; 19 Launches Authorized

In a move that reaffirmed its 1972 "open skies" stance, the FCC has authorized the launch of 19 domestic communications satellites and reduced orbital spacing between satellites from three degrees to two degrees.

The reduced spacing will take effect immediately in the 12–14 GHz Ku band, where only three satellites are presently in orbit. In the 4–6 GHz C band, however, the spacing will be implemented gradually to accommodate the 12 satellites that reside there. The new Orbit Assignment Order adopted by the FCC provides for an interim arrangement combining three, 2.5, and two-degree orbital spacing in the C band until uniform two-degree spacing can be achieved in the future.

In its decision, the Commission rejected the possibility of assigning three-degree spacing in the C band, saying that it would not provide sufficiently for future expansion.

According to the Commission, the reduced spacing will require some technical adaptations on the part of satellite operators and users. To accommodate the two-degree spacing, existing antennas will have to be upgraded or replaced, and system operators will have to coordinate their activities to a greater degree.

The companies authorized to launch new satellites under the recent order are: Advanced Business Communications (two in orbit plus an on-ground spare); AT&T (one satellite); American Satellite Co. (two hybrid birds in orbit and one on the ground); Hughes Communications (one); Rainbow Satellite (two in orbit and an on-ground spare); RCA American Communications (five launches and a ground spare); Satellite Business Systems (two); Southern Pacific Satellite Co. (one launch and one ground spare); United States Satellite Systems (two in orbit and one on-ground spare); and Western Union Telegraph Co. (one).

The new launches will bring the number of U.S. domestic communications satellites in orbit to 38 by 1987.

Murdock Inks SBS Deal for Five-Channel Rural DBS

Armed with financial backing from Australian publishing entrepreneur Rupert Murdock, a new joint venture has been formed to provide a DBS service with an agricultural slant to viewers in the rural U.S.

The new company, Inter-American Satellite Television, arranged with Satellite Business Systems to lease five 20 W transponders on SBS's SBS-3 bird for six years, with an option to buy or extend the lease for one year at the end of the period. Cost of the lease agreement is reported at $75 million.

The company's plan is to aim five channels of information, entertainment, and agricultural information to rural viewers. There has been some speculation that the inclusion of farm

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news could make the service tax deductible to farmers, at least in part. Launch is scheduled for the end of this year, which would come hard on the heels of another Ku-band DBS service, that of United Satellite Communications, Inc. The USCI service is scheduled to start November on Canada's Anik-C satellite.

Headed by president William J. Kommers, IAST is working in concert with Murdock's News Satellite Television of Britain. Under the agreement, NST is leasing the transponders and IAST is programming them. The 20 W signal reportedly will be receivable by dishes 1.2 to 1.8 meters in diameter.

In other DBS news, Satellite Television Corp. (STC), the Comsat subsidiary that was the first to file a DBS application, has announced that it will launch its five-channel service two years earlier than originally planned.

Bornstein at NPR Helm as Mankiewicz Steps Down

With Ronald C. Bornstein in place as interim chief operating officer for a six-month period, National Public Radio president Frank Mankiewicz has handed in his resignation. The leadership change comes as NPR is faced with a major financial crisis that may force the net to curtail some of its programming.

NPR membership, at its recent annual meeting, called on the network's board of directors to make preservation of *All Things Considered* and *Morning Edition* its top programming priority. The two acclaimed news shows are among NPR's most popular offerings. The meeting also asked the board not to impose a programming fee—suggested by Mankiewicz at the earlier NPR conference—but rather to consider a variety of other funding options.

With a deficit approaching $6 million, however, programming cuts of some sort seem almost inevitable. Management has suggested cutting the news budget to $3.3 million from the current $5.1 million; others have offered suggestions for less drastic cuts. NPR vice president for news Barbara S. Cohen has stated that she hopes a $4.8 million news budget can be agreed on.

Bornstein, who will hold the half-time position as COO until October 1, is director of the Telecommunications Division of the University of Wisconsin Extension. He is taking a temporary leave from his university duties to work at NPR, where he will be responsible for the day-to-day management operations. Bornstein had previously served as vice president for telecommunications at the Corporation for Public Broadcasting.

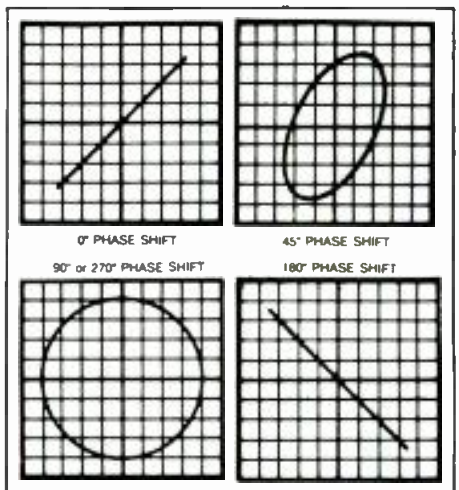
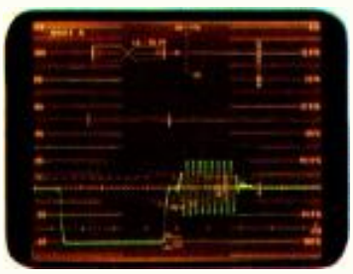


Figure 3. Oscilloscope phasing patterns. (Courtesy 3M ITC.)

Correction: In the May 1983 story, "State of the Cart" (p. 63), legends for Fig. 3 on p. 66 were accidentally transposed. The figure is reprinted here correctly.

JVC engineers another breakthrough in video cameras.



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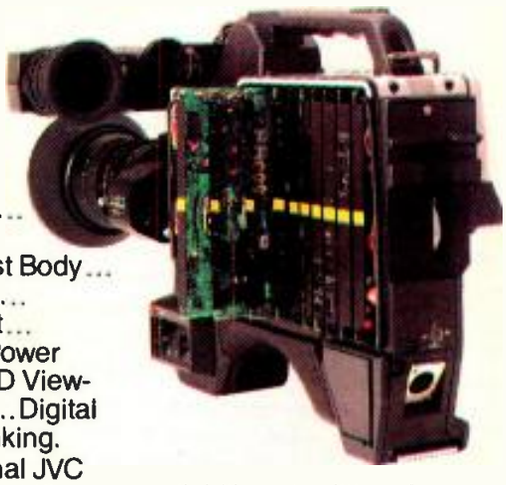

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CBS *Newsmark* Series Revisits Wounded Knee

WHAT DO YOU DO about a controversial issue (the massacre of the Sioux Indians by government troops at Wounded Knee, SD) which wasn't even covered the first time (about 100 years ago) and, by some accounts, was misrepresented the second time (10 years ago)? You do it again. This is precisely what Rob Armstrong, correspondent for the CBS Radio News Network, and Carol Pauli, producer for CBS News, set out to do. They went back to Wounded Knee 10 years after the American Indian Movement (AIM) clashed with government troops in a firefight over tribal government and ownership of sacred land. The idea was to find out what has happened to the Lakota Sioux in the time since that encounter, giving the news story an historical perspective as well as an immediate information value.

"I suggested last year to Charles Reeves, executive producer of the *Newsmark* documentary series, that we go back to South Dakota and see if there had been any progress. We would be able to broadcast it in March 1983 as a 10-year retrospective," says Armstrong. "We could also use it as a way of viewing the plans concerning Indian reservation issues for the next 10 years." Reeves and a committee of people involved with *Newsmark* discussed the issue and gave it a go, assigning Carol Pauli as producer.

Armstrong, technical supervisor Buzz Turner, and producer Carol Pauli (above) review script for *Newsmark* program on Wounded Knee.

CBS News correspondent Bob Armstrong with Indian family affected by Wounded Knee uprising (left).

Producing the *Newsmark* series

Originally, *Newsmark* was handled by one producer. Recently, however, divisions in CBS News have undergone revamping, with the result that *Newsmark* has a rotation of producers from the 25-minute documentary series to three-minute short announcements to public affairs programming. This, says Reeves, keeps the ideas fresh and gives the talent continuous challenges.

The documentary series is a part of the CBS Network News Service and, as such, is available, free, to all affiliates who choose whether or not to pick it up. No advertising is sold during the program, but local management may choose to place spots before and after the broadcast. The documentaries are monthly programs which stations may run at the time and date of their choice.

Documentaries require preparation

Rob Armstrong was a news correspondent for NBC 10 years ago when the AIM uprising took place. His idea to return 10 years later grew from a feeling that not all the issues were dealt with fairly the first time, and that from the current remove of time, perhaps a more objective report could be done concerning what was accomplished there at Wounded Knee. In order to do this, a great deal of preparation was necessary.

Prior to the actual 10 days spent at the different reservations in the area, and at the battle site itself, Armstrong and Pauli started with phone calls six weeks in advance. The phone calls involved a process of renewing contacts from previous experience in the area and setting up interview times. Two trips were arranged: one to Washington, DC for interviews with people at the Bureau of Indian Affairs and other government departments, and one to Rapid City, SD, the jumping-off point and location of the local CBS affiliate.

In South Dakota, Armstrong, as correspondent, provided the impetus and editorial direction for the story, while Pauli, as producer, supplied editorial balance and organizational legwork.

This segment of *Newsmark*, entitled "Wounded Knee: The Legacy," was handled in a different way than other documentaries because of the nature of the report and because of the rough terrain. Many of the interviews were over 60 miles from each other in remote areas of the hills. One of the reasons for this, besides the value of actuality in the programming, is that CBS News has a policy: If you are going to say, "Here at Wounded Knee," you have to be at Wounded Knee when you say it.

Such a demand required that Pauli and Armstrong change the way the documentary might normally be recorded. Usually, the reporter will go into the field, record the information and come back into the studio to polish it up. After meeting with the producer and writing the script, the two will join an engineer and do the actual editing and mixing. For this segment, however, the script was written on-site the last day in South Dakota, after all the interviews had been collected. After having done a full day's worth of interviews, Pauli would sit down and take notes or actual transcripts of the tapes while Armstrong was out doing more interviews. Pauli also did interviews and sat in on the sessions conducted by Armstrong.

Later, on the last day, the script was written right there so Armstrong's commentary could take place next to Wounded Knee Creek. The only element of the final broadcast which was taken from the studio was sound from CBS archive tape as a review of what was recorded in 1973 for background purposes. This was put together before Armstrong and Pauli left.

Demands on equipment

The actuality requirement by CBS places demands not only on the personnel, but on the equipment as well. Owing to the type of production, certain equipment had to be used. Trudging in and around mountains, deserts, and rivers is generally acknowledged as a rough way to treat sensitive electronic equipment. The two-person crew took two Sony TC-5000s and a Sennheiser shotgun microphone. They felt these products were small enough and tough enough while still offering a good enough recording to use after editing and dubbing back at the studio.

In fact, after returning to New York and beginning the editing process with the help of technician Buzz Turner, only one piece of work out of almost 200 edits was unsuitable. At the CBS studios, the supply of 18 cassettes was dubbed onto quarter-inch tape using Ampex 350 mono and MCI half-track stereo reel-to-reels. There were a lot of natural sounds and events other than voice, posing a difficult mixing job which was done using both an old RCA console and a customized McCurdy board. Crown DC-300A amplifiers were used along with JBL 4312 monitors. After the cassettes were dubbed to quarter-inch reels and edited, they were run through either the Orban or UREI graphic equalizers. This was necessary because of the lack of uniformity in sound due to rigorous field conditions.

Upon looking back, one point of interest that many people were not aware of as Pauli and Armstrong ventured into the Black Hills of South Dakota was that the 1973 conflict was a three-way encounter. The American Indian Movement was dissatisfied with what they claimed was corruption on the part of the Indian tribal council, as well as being distrustful of the government in Washington. From a current perspective, many people now realize that the value of a news story is not only that it's new, but that, in retrospect, historical worth and future ramifications are just as important for news coverage. **BM/E**

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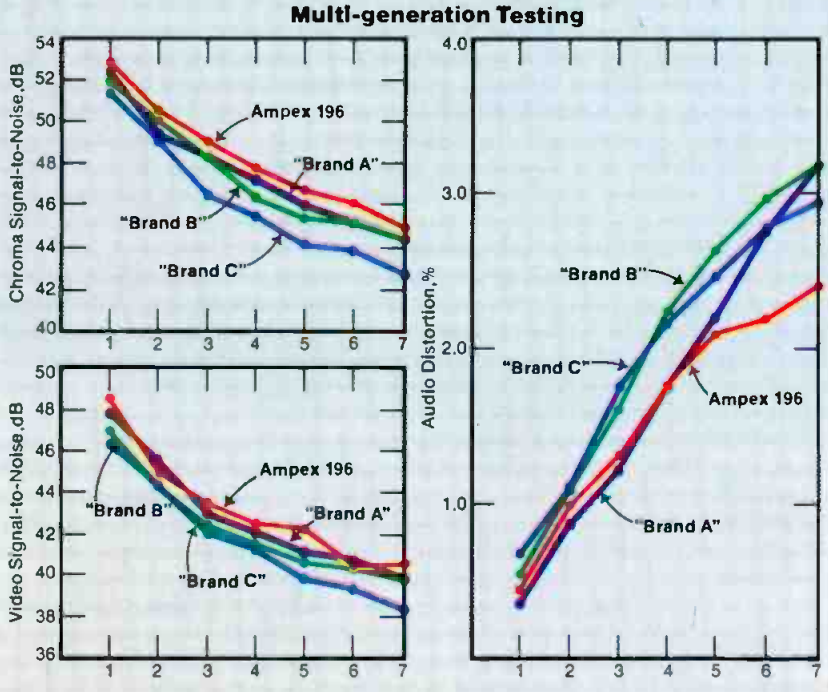

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Documentary Producer Leaves Film for Half-Inch Video

FEW PRODUCERS ARE FOOLISH enough to make a major technology switch without ample thought, and Christopher Jeans is no exception. Jeans, documentary producer for Capital Cities Television Productions, has dropped 16 mm film, his preferred medium for many years, in favor of Sony's Betacam half-inch video format for his latest Cap Cities job, a documentary on adult illiteracy.

Capital Cities Communications, group owner of six TV stations as well as seven AMS and seven FMS, founded its teleproduction arm in 1976 with the aim of producing and distributing programs that served the public interest. The work of Capital Cities Television Productions is divided into two categories, documentaries and family dramas. Five Cap Cities dramas numbered among 1982's top 20 syndicated specials, according to Nielsen figures; one of the company's documentaries also made the top 20. A year earlier, in 1981, Capital Cities also boasted six of the top 20 syndicated specials.

The dramas are all produced on location by Paulist Productions, a Catholic church-related group on the west coast. Paulist Productions works closely with Capital Cities in developing and producing the shows. The documentaries are produced by Chris Jeans Productions in New York, also on location. Host for the last three documentaries was Tom Wicker, associate editor of the New York Times; public television's Robert MacNeil was the previous host.

As of press time, the group had produced 20 family dramas and 11 documentaries, not counting the in-progress work on adult illiteracy, untitled as yet. In addition to the specials themselves, which are offered to stations on a barter basis, Capital Cities produces promos for the shows and PSAs on the problems highlighted by the dramas—which have included drunk driving, teenage pregnancy, and youth unemployment. The national syndication network for the Capital Cities shows has consistently reached 90 percent of U.S. viewing households, according to the group.

Jean's interest in video dates back as

At work on the illiteracy documentary, producer Chris Jeans (far right) conducts an interview as camera operator Bob Ipcar and sound man Rick Patterson tape. Patterson's Sony professional cassette recorder is in shoulder bag.

Ipcar tapes a scene with the Betacam. WRR-27 receiver for wireless mic is temporarily taped onto the rear of the camera; a base plate is on order.

far as 1976, when he was the head of U.S. operations for the BBC. At that time, he produced an hour-long documentary, "Plains Goes to Washington," entirely on videotape. The show followed the "Peanut Brigade" train as it journeyed from Jimmy Carter's home town of Plains, GA, to Washington, DC, for Carter's presidential inauguration. In addition to the footage of the train journey, which lasted a day and a half, the show featured videotaped interviews with Carter supporters back in Plains, and library material of his political journey.

As Jeans remembers it, the crew flew the cassettes up to Washington, where they conducted a "massive three-room edit job" prior to sending the show to the U.K. the same night. "We put the narration on live to satellite as we were transmitting to Britain," he recalls.

Not surprisingly, given the time constraints of the job, Jeans was impressed with the speed of videotape production and post-production. "The huge advantage was time," he says. Still, he felt that what he perceived as videotape's many disadvantages made film preferable for the majority of his work.

First among the disadvantages of video, according to Jeans, was the necessity to tie the camera to the recorder. "It was like going back to the 1950s in film, before the crystal-controlled film camera," complains Jeans. Another cause for complaint, he felt, was the quality of the ¾-inch videotape image, "especially down a generation," and especially in comparison to film. Jeans's final gripe was that the editing systems available in the mid-'70s were unable to read time code accurately, except for highly sophisticated two-inch systems. "I decided," he relates, "to hold my horses until a video system came on the market that rectified these problems."

Worth the wait

Jeans found the answer to many of his difficulties with video in the new half-inch recorder/camera systems. After spending about four months evaluating the competing formats, he decided to go the Betacam route. Lack of a unified format, which continues to concern some broadcasters, has not been much of a problem for Jeans. "I'm acutely aware that SMPTE hasn't decided on a format," he remarks, "but I'm going to be delivering my shows on one-inch, so it doesn't matter as much." As a single producer, Jeans feels he was able to decide on the benefits of the format alone, with no worries about interfacing with other stations.

"I'm extremely confident that the three-tube Betacam is a major advance over the M-format in quality," Jeans asserts. At this point, he is using the single-tube version of Betacam, which has poorer sensitivity than the three-tube version, requiring more lighting setups and wider apertures. A three-tube model is on order, however, and Jeans expects it this month.

Besides its good video quality, Jeans sees several advantages to the Betacam in terms of packaging. "It seemed to me," he explains, "that the M-format camera was large and cumbersome." He also notes that the M-format sound was not Dolbyized and that some camera models lacked film-style mic compatibility. One of the nice features of the Betacam, according to Jeans, is that the camera operator can monitor sound while shooting. "It's not very important," he concedes, "but it's good packaging."

Jeans is making sure he won't have to wait any longer than necessary to edit on half-inch; he has already ordered the

Betacam player/recorders, which Sony had on display at April's NAB show.

Until those recorders are delivered, Jeans is doing his off-line editing for the adult illiteracy documentary on ¾-inch, using a Convergence ECS-104 editing system. Later assembly will be on one-inch at a local production house that offers half-inch to one-inch editing.

Developing the show

According to Jeans, the idea for this latest Capital Cities documentary—adult illiteracy—came from William G. Mulvey, director of marketing for Capital Cities Television Productions. Usually, the ideas for the documentaries are generated by Jeans or Charles Keller, vice president and general manager for the production arm. In any case, a consensus is required before Jeans can start work. "Unless we all agree, we don't go ahead with the project," he states.

In this case, preliminary research was especially crucial and delicate. "I'm very concerned to make sure that we've got the right people to talk to," Jeans explains. "Illiterates are usually very shy and disinclined to come forward. They find it embarrassing." Although production was under way when this story was written, the process of identifying interviewees was still in progress.

Jeans feels that working in video has already favorably affected the show. "There's a professor at Harvard who's done some work showing how the teaching process may adversely affect children," Jeans relates. "We photographed her observing a Boston classroom, along with shots of the teacher and students." After taping the segment, Jeans put the cassette in a playback machine and taped the professor's reactions as she watched the class in session. "That kind of thing you just can't do with film," Jeans says. "Video opens up lots of creative possibilities like that."

Sound setup

One feature of the Betacam that Jeans is finding particularly useful is a base plate on the camera's rear that takes a radio mic receiver. Jeans is taking advantage of this feature by feeding the sound from the mics into a small mixer, then transmitting the composite signal to one of the Betacam's two audio tracks, using Sony's WRT-27 transmitter at the mixer and WRR-27 receiver at the camera. As insurance against RF dropouts, Jeans is making a backup sound recording on eighth-inch cassette tape with a 60 Hz sync tone. This method of working the sound, Jeans says, allows the sound person to remain "free and clear" of the camera operator.

Jeans has not found the built-in mic on the Betacam to be very useful, however. Even though he had the company check the mic over, he says, it produces a serious hum problem on the audio track, making it impossible for him to use the mic for recording his soundtrack.

The question of time code has been "superbly resolved" by Sony with a built-in time code generator and user bit track, according to Jeans. With a video format he can feel comfortable with, Jeans is able to enjoy the advantages of video—the lower price of raw stock, the absence of syncing problems when sound is recorded directly on videotape, and the ease of editing and conforming, with an edit list generated off-line for final assembly editing. With his switch to video, Jeans is enlisting technology as an aid to creativity. **BM/E**

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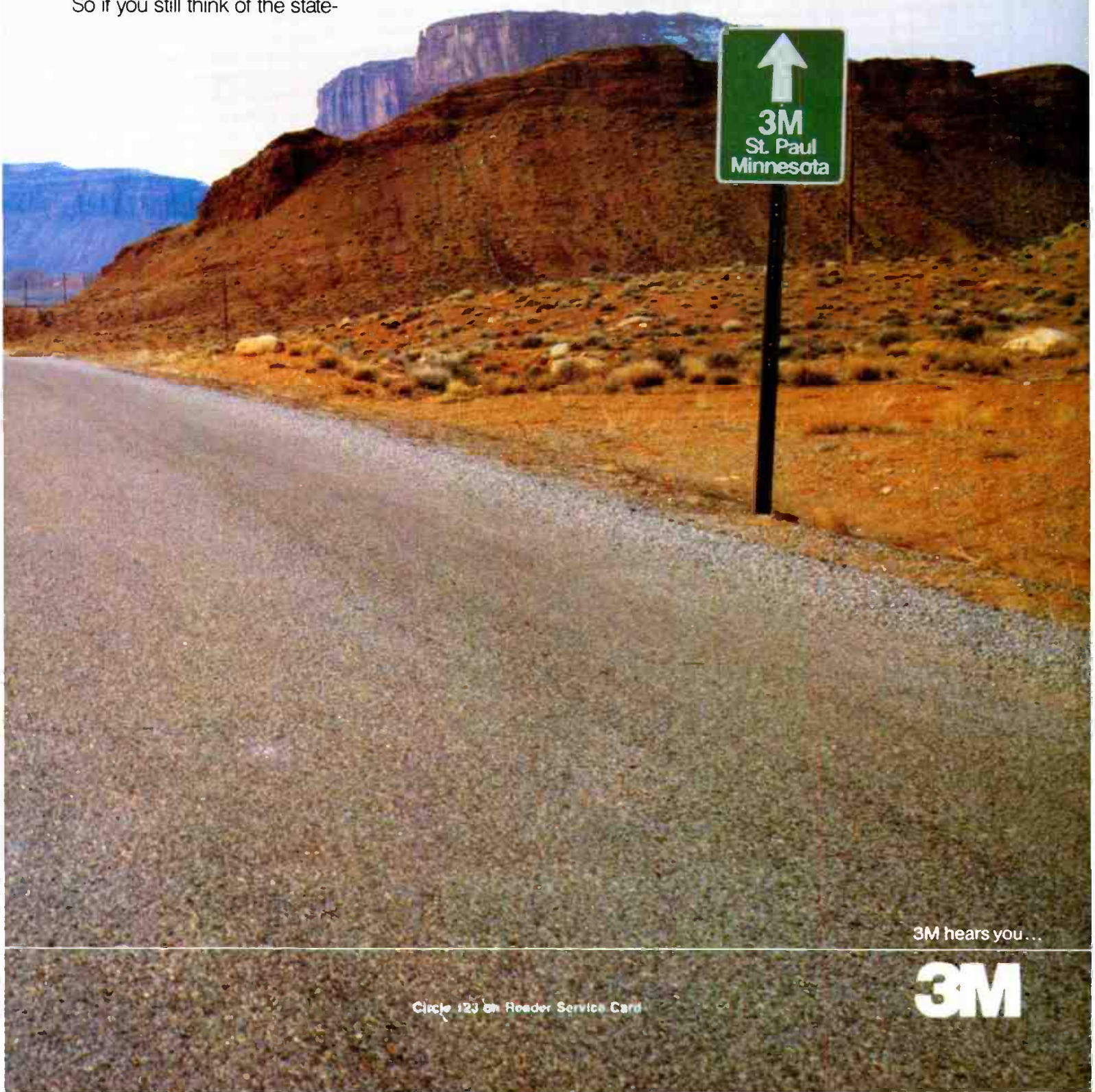

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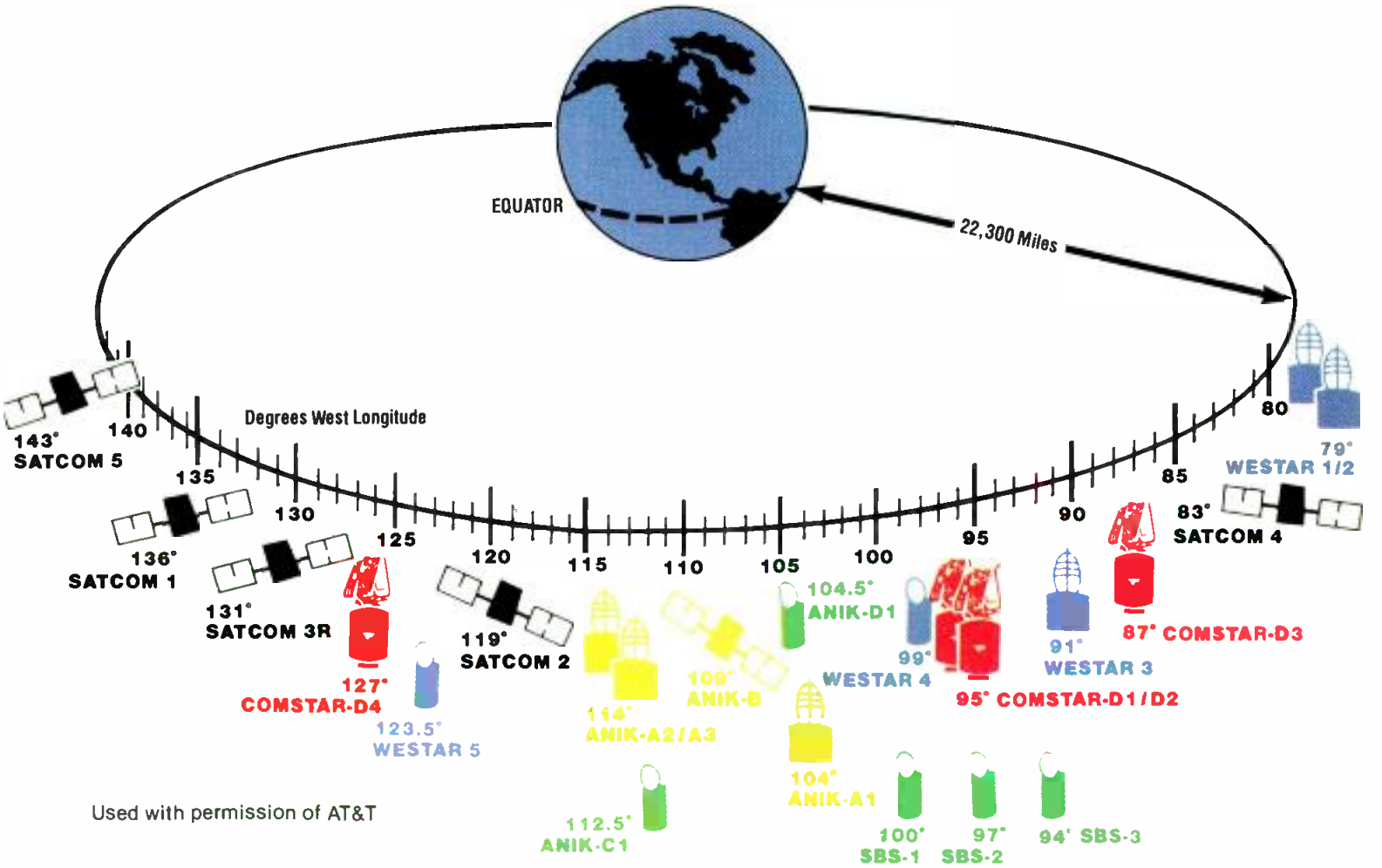

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INVASION OF THE SATELLITES

They came from outer space and spread across the country into the smallest communities. Soon no broadcaster could deny their overwhelming power.

By James A. Lippke, Editor Emeritus and Robert Rivlin, Editor

Time was, not all that long ago, when communications satellites were thought of as belonging only to other services besides broadcasting. Telephone and data transmission were their primary uses, together with cable TV program distribution. And if a broadcaster used information from a weather satellite, or participated in an occasional ad hoc network to distribute local sports nationally, it was considered a major innovation.

Now, suddenly, satellite programming is everywhere—over 160 programs on 113 transponders of 14 satellites. Much of it, of course, is still cable-oriented—all the various CNNs, ESPNs, HBOs, and Showtimes, to say nothing of the new trend towards cable audio (see news feature in this issue).

More and more of it, however, *is* intended for the commercial broadcaster. On the radio side, there are the syndication services offered by Bonneville, RKO, ABC; services such as WGN, which offer their standard broadcasts as material for syndication; and so forth. Mutual, NPR, AP and UPI, of course, have been on satellites for years. And on the TV side, local or regional networks are being joined more and more frequently by full-scale network distribution systems.

Just as an example of how busy broadcasters are with satellites, consider the case of Don Larsen, director of engineering at Rapid City, SD's KOTA—an NBC TV affiliate and a CBS radio affiliate. Using an Antenna Technology Corp. Simulsat 5 sys-

tem which looks at two satellite feeds at once, Larsen regularly receives programming from six different satellites. Radio comes in from Mutual on Westar IV, NBC and RKO on Westar III (received on Harris and a Microdyne 1100 receivers, with a Scientific-Atlanta DAS system on the way for the CBS digital signal); plus TV programming on Westar V and Satcom 3 and 4 and a prime feed from NBC on Comstar 3 (received with three S-A 7500s). All this in addition to the UPI news feed.

As Bruce Hough, VP and GM of Bonneville Satellite, puts it, "I think the fact that over 150 markets can now be reached with programming delivered by satellite demonstrates a strong endorsement by broadcasters of the flexibility and benefits which satellite transmission provides. We are about to the point where the universe of earth stations, originally installed experimentally, has become indispensable."

And, within the next few months, the birds will become even more crowded, as the major networks switch from landlines to the new digital audio service on Satcom 1R. CBS Radio is making a total switch to satellites for program distribution. According to a letter distributed to its affiliates in May, landline delivery or programming to the northern tier of the United States "will be cancelled as of 11:52 (ET) Friday, Sept. 30. Effective Saturday, October 1, the CBS Radio Networks will be fed only by satellite to that part of the country." Affiliates are advised to move immediately to purchase the $10,000 Scientific-Atlanta digital audio earth station systems. ABC began the digital audio service in December last year and over 40 stations have made the conversion to date.

Rumblings are reported, however, among all three network affiliate groups, which are balking at having to spend their own money to install the S-A systems. A report is that only one in five affiliates has ordered, and that interest has slowed to a trickle. Perhaps offers of free earth stations from RKO or the commitment of only $7000 to purchase the Mutual dish system have convinced some affiliates that it might be more worthwhile to switch than fight. It is also possible affiliates are waiting for another manufacturer besides S-A to begin manufacturing digital audio receivers, hoping for a lower cost.

Not only are the radio networks about to convert over, but all three television networks can be expected shortly to begin program distribution to their affiliates via satellite—after both ABC and CBS begin 24-hour-a-day satellite feeds of news, sports, and other programming from Europe to the U.S. through Comsat's Intelsat.

According to Dave White at CBS, VP Administration, Production Facilities and Engineering, the network will begin Phase 1 of its satellite conversion program by sending signals to nine southwestern affiliates stretching from Wichita Falls to Los Angeles. "Phone companies just can't keep up with broadcast demands these days," observes White. "What with independent stations doing their own programming and local and regional sports and increased news operations, they're already overbooked. So we have to expand someplace."

Although the satellite system supplier had not been picked as of this report, White wrote the specs to which the system must adhere. The main downlink antennas will be seven meters, but an auxiliary dish—five to six meters—will be required in case of solar transients or a malfunction; the cost to the affiliate will be $100,000 to $150,000. Nine-meter uplinks will be located at all O&Os except St. Louis and Philadelphia.

Julie Barnathan at ABC also plans to have satellite distribution to affiliates in the Western time zone by the second quarter of 1984. A supplier was to have been picked by now (rumors have pointed to Andrew Corp.), but again the decision had not been announced at press time. Specs for the ABC system are for a 9 m steerable antenna as the main dish, plus a 4.5 m antenna as a backup.

It will be NBC, however, that will get the jump on the other two by beginning satellite distribution to 24 affiliates on January 2, 1984, with expansion to a full satellite

Hollywood, CA harbors the west coast satellite facilities of Metromedia Inc. As part of the extensive array of equipment, three Harris earth stations are located just outside the main building. The two 9 m dishes in the foreground are uplink units with responsibilities for cable news and syndicated programming distribution, while the 6.1 m dish in the rear is a receive-only.

Master control for all satellite functions is executed from the Harris computer. All three steerable dishes and the entire earth station shelter are controlled from the keyboard. Maintenance and power functions can also be attended to from this operator position.

The earth station shelter contains four 3 kW Klystron HPAs (high power amps from Varian) with receivers and exciters to the left. An intricate RF switching network is located atop the Klystrons. The system was designed and installed by Harris Corp.

system by the following September. Although NBC hasn't yet officially announced whose hardware it will use, the distribution plan will be handled by Comsat under a 10-year contract (worth several hundred million dollars). Until 1985, the service will operate over the Ku-band Satellite Business Systems bird, and will then convert over to Americom satellites.

Perhaps more importantly, NBC has apparently decided that its two-year testing program of the Ku band for satellite transmission is acceptable (both ABC and CBS have apparently locked in on the C band). Ku offers the advantages of requiring less power, although critics point to potential interference problems that can be caused by rain, even though solar transients can be expected to interfere with satellite transmissions at least twice a year even on the C band. As NBC's Mike Sherlock pointed out in an exclusive interview last January, however, the occasional interference that might be caused in a heavy rainfall area (the problem arises at the downlink, not the uplink) is certainly no worse than the occasional outages found with current landline use, and the advantages—among them the ability to locate the dish almost anywhere, without fear of terrestrial spectrum interference—far outweigh the disadvantages.

Ku band advantages

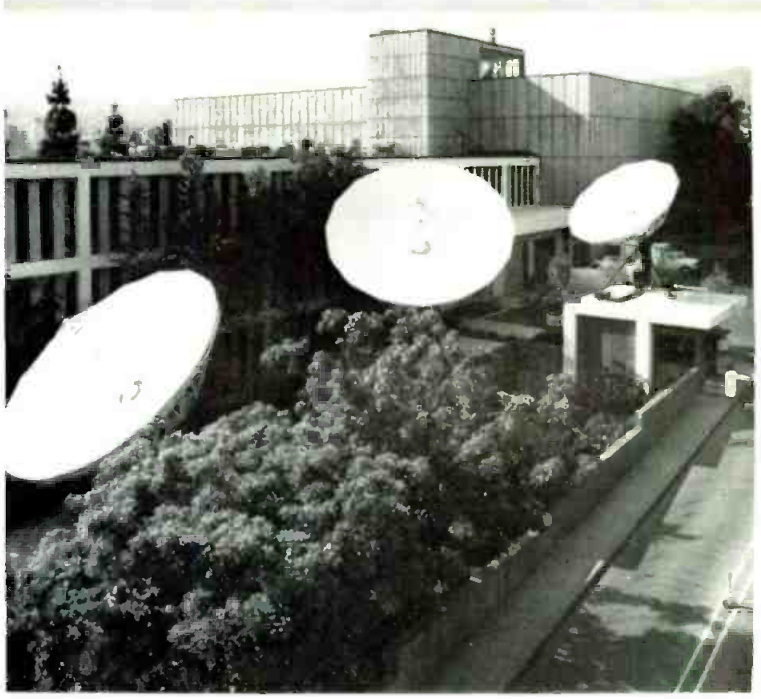
The 12 GHz Ku band has become the broadcast satellite of choice for the '80s, especially since every C band slot at four-degree spacing is filled for the next 10 years. Virtually every major satellite system now being planned is either entirely Ku band or incorporates both Ku- and C-band capabilities. Microdyne, for instance, has just received a $300,000 contract from VideoStar to install 50 earth stations for Hewlett-Packard that will accommodate H-P's teleconferencing needs on the Ku band. Ford Aerospace Satellite Services Corp. plans a 1987 launch of a three-satellite system, each containing 54 transponders, with 23 on the C band and 30 on the Ku band. These are medium-power Ku signals. RCA has filed to launch a high-powered Ku satellite in 1985.

And the field may become even more crowded if SMATV operators heed the advice of Americom's former president Andrew Inglis and switch over to 40 W Ku band transponders as being the most economical and logical way to go (see discussion on SMATV later in this special report).

The 12 GHz Ku band was established by the 1979 WARC conference in Geneva, which allocated the 11.2 to 12.7 GHz C band for fixed satellite services demanded by telephone, cable, data transmission, teleconferencing, and similar operations, and the 12.2 to 12.7 GHz Ku band for broadcast satellite services such as DBS. The distinction may be moot, since the FCC has indicated it may allow the two bands to be combined and used for either service. And the FCC must still resolve where to reallocate current microwave users of the Ku band, which include public safety radio operators. But in the meantime, broadcast use of Ku continues to grow.

C band is still very much alive. One of its chief proponents is AT&T, whose Satellite Television Service, operating out of a central receive/transmit site in Hawley, PA over the Telestar 3 satellite, boasts impressive signal characteristics. Video S/N in clear air is better than 56 dB (54 dB in rain); audio S/N is 63 dB with 0.2 percent harmonic distortion at 18 dBm. Assuming that the FCC permits C-band operation for the networks in the future, this will almost certainly be the way ABC and CBS will go.

NBC, of course, is following the RCA corporate line on Ku band, since RCA Astro itself has been committed to the Ku band since the 1978 launch of the Canadian Anik-B communications satellite. Anik currently offers coverage in the 6/4 GHz band shaped to match the outline of Canada as seen from geosynchronous orbit, and four 14/12 GHz spot beams. It would not be unreasonable to suppose that the future of NBC's plans might revolve around the same concept.



DBS opportunities

NBC's interest in Ku for its network transmissions may be tied into an even larger use of satellites—direct-to-home DBS service. It is in this area that broadcasters can expect immediate expansion, because enormous revenue potentials exist. For as many broadcasters as are now involved with various aspects of cable distribution—contributing to cable news services, distributing their programming for cable service syndication, and so forth, even more may find themselves with new opportunities through DBS.

Much of the recent flurry of excitement over DBS has been caused by a provision in the FCC approval of some nine DBS plans last year which mandated that construction orders be placed by the end of this year. To date, only the Comsat project described below has complied, but the rest are expected shortly. Still to be resolved is whether it is possible to get all the DBS applicants together so that transmissions will be on a common standard, offering the viewer a choice of 20 to 30 channels of service with two or three from each DBS service. This is an area in which the FCC is being urged to take a stand, but in which the com-

A trial of the Alcoa-NEC DBS system.

Applicants for DBS Satellite Service

Name	Parent Company	# Satellites	# Channels	Primary Business	Remarks
CBS	CBS, Inc.	4 (2 Spare)	3	Broadcast Network	HDTV/ Programmer
DBSC	Satellite Systems Engineering, Inc.	3 (1 Spare)	6	Consultant	Common Carrier
Focus	Focus Broadcasting Company	1 (Western Union)	1	Subscription TV	Lease Channel
Graphic Scanning	Graphic Scanning Corp.	2 (1 Spare)	4	Radio Common Carrier	Programmer
Satellite Television Corp.	Comsat	4 (2 Spare)	3	Satellite Service	Programmer
RCA American	RCA	4 (2 Spare)	6	Electronics, Broadcasting (NBC)	Common Carrier
United States Satellite Broadcasting	Hubbard Broadcasting	2 (1 Spare)	3	Broadcasting Stations	Programmer
Western Union	Western Union	4 (2 Spare)	4	Common Carrier	Common Carrier
Video Satellite System	Video Satellite Systems	2 (1 Spare)	2	Newly Formed	Carrier for Dominion Sat. A Related Company

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mission will undoubtedly follow the marketplace policy, as it did with issues like AM stereo and teletext.

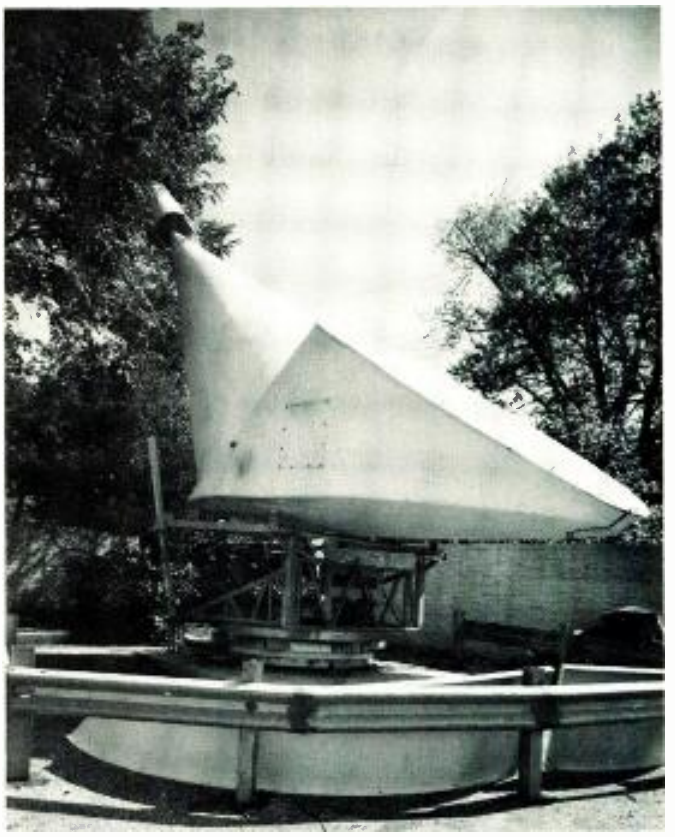
All the plans have in common the use of Ku-band satellites with 200 W transmitters aimed at dishes some 24 to 30 inches in diameter (typical cable service on the C band, for instance, transmits with only 5 W of power and therefore requires much larger receiving antennas). All plan to offer multichannel service, which would presumably include both free channels and premium channels of news, sports, and entertainment—especially movie—programming, together with stereo audio. All will operate off networks of satellites that cover the entire country, with one or more as backups. And all will presumably charge consumers between $500 and $650 for the rooftop antennas, plus additional monthly fees on either a pay-per-view or flat monthly charge basis. It is also possible, given the technology, to transmit data along with the picture and sound, to provide teletext/videotex-like information.

Another possibility is the use of DBS to provide HDTV service directly to the viewer's home, or to regionalized, wide-screen "movie" theaters. Both DBS and HDTV are being actively researched in Europe in experiments which American broadcasters are eyeing with more than casual interest. (The Montreux TV Symposium this year had major demonstrations of both DBS and HDTV, and *BM/E* will carry a full report in the September issue.) From the local broadcaster's point of view, DBS not only offers a viable alternative to the competition which cable provides, but also suggests innumerable programming possibilities in which the station could participate in a direct-to-home satellite network of its own.

The RCA Astro/Comsat plan will launch four satellites in 1986 which will blanket the country with Ku-band coverage, each satellite serving roughly one time zone, though capable of being reoriented toward another. Initially three 200 W DBS channels will be carried on two satellites being built under a $100 million contract for Satellite Television Corp., a wholly owned subsidiary of Comsat, and will carry a diverse selection of popular entertainment, sports, education, culture, and public affairs programming to the eastern and central time zones. The service will operate from a massive $800,000 new facility being built in Las Vegas, equipped with $250,000 in hardware.

Even before service begins on the high-powered (200 W) delivery systems to DBS receivers in 1985-86, however, several short-term projects are likely to introduce American viewers to "medium-power" DBS broadcasting, probably by the end of this year.

One of the most aggressive in this area has been United Satellite Television, which will jump on the bandwagon by using transponders on Telecast Canada's Anik-C2—a satellite which normally covers Canada but which has been approved for use by GTE Satellite Corp. to serve the American market by both the Canadians and the FCC. The service, which had originally been projected to begin this September, has now been postponed to early next year, and will then convert to GTE's own GSTAR bird when it is launched in April 1984. The 15 W USTV signal will be transmitted to earth stations four feet in diameter to achieve theoretically the same TASO grade as the high-power systems coming later. It will be done with the use of the larger antenna and General Instrument's improved downconverter for lower noise and threshold extension



Microdyne's horn antenna at WTTG in Washington, DC.

techniques. Four channels of service are planned—movies, sports and news and information, plus a pay-per-view premium channel billed through the subscriber's telephone. The antenna and receiver are projected to cost around $550, billed to subscribers at $15/month, with an additional $15/month paid for the programming.

Interest in Ku-band DBS service has also come recently from publisher Rupert Murdoch. A company which he is financing, Inter-American Satellite Television, has agreed to lease five Ku-band transponders on the Satellite Business Systems SBS-3 bird. Some idea of the worth of this market might be indicated from the more than $75 million expected to be spent in the long-term lease (six years), and the $23 million Murdoch is reported to have invested in setting up the IAST operation. Also involved in this project will probably be Alcoa/NEC, which manufactures the rooftop DBS receivers in the 1.2 to 1.8 meter (24- to 30-inch diameter) size range, possibly marketed nationwide by an organization such as Sears. Tests with 20 W signals using a 1.2 m experimental dish were said to yield good-quality results. At the International Association of Satellite Users Conference in Orlando in April, Sony demonstrated DBS with stereo sound.

SMATV developments

Satellites are, of course, primarily a means of distribution, and the chief advantages of DBS will be to deliver high-quality signals into areas of the country where it is not economically feasible to lay down a cable TV system. Subscribers in these areas will still not have access to the multiple channels of a typical cable system, and thus DBS becomes more like a nationwide LPTV distribution system than it does a full-fledged broadcast service. Many in rural areas have already bought larger earth station systems—

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costing from $1200 to $2000—in order to grab whatever is available on the satellites, including pay-TV services such as HBO. Home Box has recently decided to scramble its satellite signals to avoid piracy, now that some 10,000 consumers are said to own their own TVROs.

The legal way to do it is for the individual TVRO operator to become part of the 12,000-unit TVRO industry connected with CATV service. This is the idea behind Omega Satellite's plan to rent eight-foot TVROs in Indiana for $39.95 a month, plus a $200 installation charge. The eight-foot dishes would enable the reception of 24 channels. Ten thousand units have been ordered and Omega was to have commenced installation May 2.

This type of service for rural areas is the equivalent of one of the hottest new areas of satellite development for broadcasters—SMATV (satellite master antenna service)—which is coming to cities across the country. By placing a single TVRO on a rooftop, subscribers in a large apartment building or condo can all enjoy the benefits of satellite-delivered programming without each having to install an antenna and receiver. SMATV adds up to smart practices for the broadcasters, for whom it can be a way of participating directly in the home delivery market without necessarily buying a cable system or even competing with cable franchises already awarded.

One such operation recently initiated by Early Bird Satellite Services allows residents of condos in the Fairfax County, VA area to receive a 10-channel service including both HBO and Cinemax, plus CNN, ESPN, C-Span, MTV, Nickleodeon, the Health Network, and the Weather Channel for $23.95 a month. A basic five-channel service is available for $11.95. The installation fee is $19.95.

According to a report on SMATV market opportunities recently prepared by International Resource Development, Inc. of Norwalk, CT, the principal problem with SMATV today is that both HBO and Showtime are reluctant to deal with SMATV systems even in areas where cable has little chance to penetrate. This means that even though a SMATV operator may have an apartment building receiving services such as ESPN, Nickelodeon, USA, CNN, and so on, its subscribers still can't get a premium movie service because the premium services do not like working with such small numbers.

To counteract this, the National Satellite Cable Association was recently formed to represent the collective voice of the SMATV operators, perhaps in an attempt to negotiate a group contract with HBO and/or Showtime. Another activity will be to defend the rights to SMATV against the intrusion of cable and the laying of cable in areas already served by SMATV. An example of what cooperation can achieve is that the group has already leased one transponder and is distributing the ESPN signal plus other programming designed for SMATV to its participating members.

Radio involvement

Not to be forgotten in a discussion of satellites in broadcasting is the increasing role which they are playing in the radio market.

Satellite distribution of radio programs is certainly not a new technology and major distribution systems are familiar to all. National Public Radio's satellite distribution network was established over five years ago. Mutual's

Part of the Mutual Radio satellite complex. More than half its 650 terminal system has full-time stereo multicasting.

service was launched in early 1980. AP and UPI distribution via satellite has been around nearly as long. Last year, the three major networks, ABC, CBS, and NBC, decided to switch to satellite distribution and all three selected the new digital audio service developed by RCA Americom. RKO picked this system too. Programmers ready to capitalize on satellite distribution have sprung up all over. Satellite Music Network made a name for itself almost instantly and within one year had over 100 stations carrying its music syndication program. This last year, regional state networks using lower-cost narrowband channels have popped up in several states.

Despite this impressive growth, many radio broadcasters believe satellite distribution is in its infancy. Certainly not many radio broadcasters are able to uplink today—one capability that is certainly coming. In the future, radio broadcasters will be able to exchange programs with almost anyone—other broadcasters in the state, or anywhere in the nation for that matter. The challenge is to take advantage of satellite distribution as a practical, viable way of expanding business. A broadcaster should not need to invest in three or four different earth receiving stations, as now seems the case, to receive and uplink the programs that are in orbit.

Perhaps some day distribution will gain some semblance of order, with specific satellites and their transponders being known as radio satellites, others as TV satellites, and still others as cable satellites, thus minimizing the problem of multiple reception and transmission. Until that happens, four or five satellites will be used, and therein is the dilemma. If a radio broadcaster makes a big investment in a satellite earth receive sta-

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

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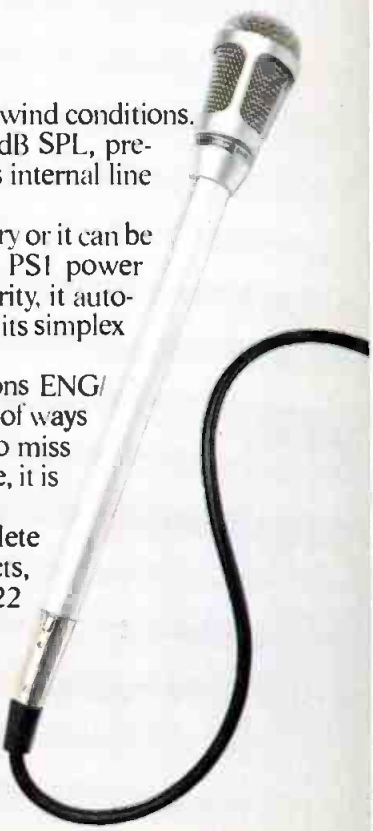

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tion, how does he know the system will be adequate for tomorrow's service?

Going to satellites wasn't a hard decision to make until recently. Mutual gave away earth station receiving equipment initially (it now claims 650 earth stations in its system, with 200 more planned), and AP and UPI offered terms cheaper than leasing landlines. But last year when ABC, CBS, and NBC told their affiliates that they would have to lay out $15,000 to $20,000 to get their network program in the future, quite a few broadcasters began to think about what they should do. First and foremost was the question, "Do I need the network?" "Will I make more money with it, or without it?" "Should I switch affiliation to use the less expensive analog service?"

One station that has been thinking about alternatives and the future is WRJN (AM), Racine, WI, owned by Sentry Broadcasting. WRJN is fortunate that its CE Rees Roberts has looked at the future and is not backing away from it. WRJN has been a UPI satellite subscriber for some time and it is also an ABC affiliate and thus began taking the digital satellite feed from ABC last December. Rather than installing two separate systems, Roberts turned to the ATC Simulsat which had been originally developed for television. ATC responded to Roberts' inquiries and came out with a three-meter version. WRJN got the first production model in May. Equipped with two LNAs, one for the UPI feed and another for the ABC feed, separate cables run to two receivers, the Model 7300, which Roberts bought from S-A, and the Harris receiver purchased for the UPI feed. (With a crystal change, Roberts could alternately pick up some other ABC program or the CBS, NBC, or RKO feed.)

One rather than two antennas is a plus in Roberts' mind, but he's not satisfied and he views a generic receiver as another need—a receiver that could pull in any signal, analog or digital, wideband or narrowband, and process it accordingly. Some of the features of a generic receiver would be automatic volume compensation, automatic dynamic range control, various decompanders to bring different standards, and noise reduction circuits. Since there is now a variety of ways being used to send audio—SCPC and Wold's SSTC for instance—the generic receiver should not be limited in this regard. Roberts says several manufacturers are thinking in this direction, and he mentions Arunta Engineering of Phoenix and Automated Techniques of Tulsa as having possible solutions. Of course Roberts wants to be able to uplink too. ATC reports they expect to be able to offer uplink capabilities on their Simulsat antennas (both radio and TV) before year's end.

One thing is clear from all the recent interest and activity in the satellite field: The birds are not just for cable TV and the telephone companies any more. For the broadcaster today, satellites are a viable alternative as a means of signal distribution. For the broadcaster three years from now, satellites may well be the only reasonable choice. **BM/E**

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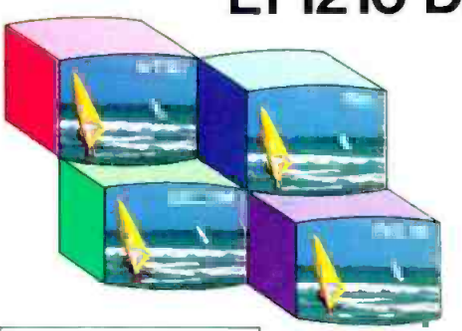

Professionals demand an uncommon level of picture quality in TV standards conversion. And production on the road requires a compact, reliable unit. Oki Electric built the LT1210 to deliver. It's the world's smallest converter able to handle NTSC, PAL, and SECAM, with PAL-M conversion as an option. Yet it incorporates every function and feature needed for producing studio-quality programming. The image enhancement function, for example, ensures a high-definition picture with outstanding image clarity. This converter is also a totally integral unit so no adaptor or changing of encoder/decoder modules is required for conversion between NTSC, PAL and SECAM.

The cost-performance of the LT1210 is nothing less than outstanding. Oki Electric's proven expertise in standards conversion combined with the latest in LSI technology results in a highly reliable, easy-to-use converter. The LT1210. Check it out. Anywhere.

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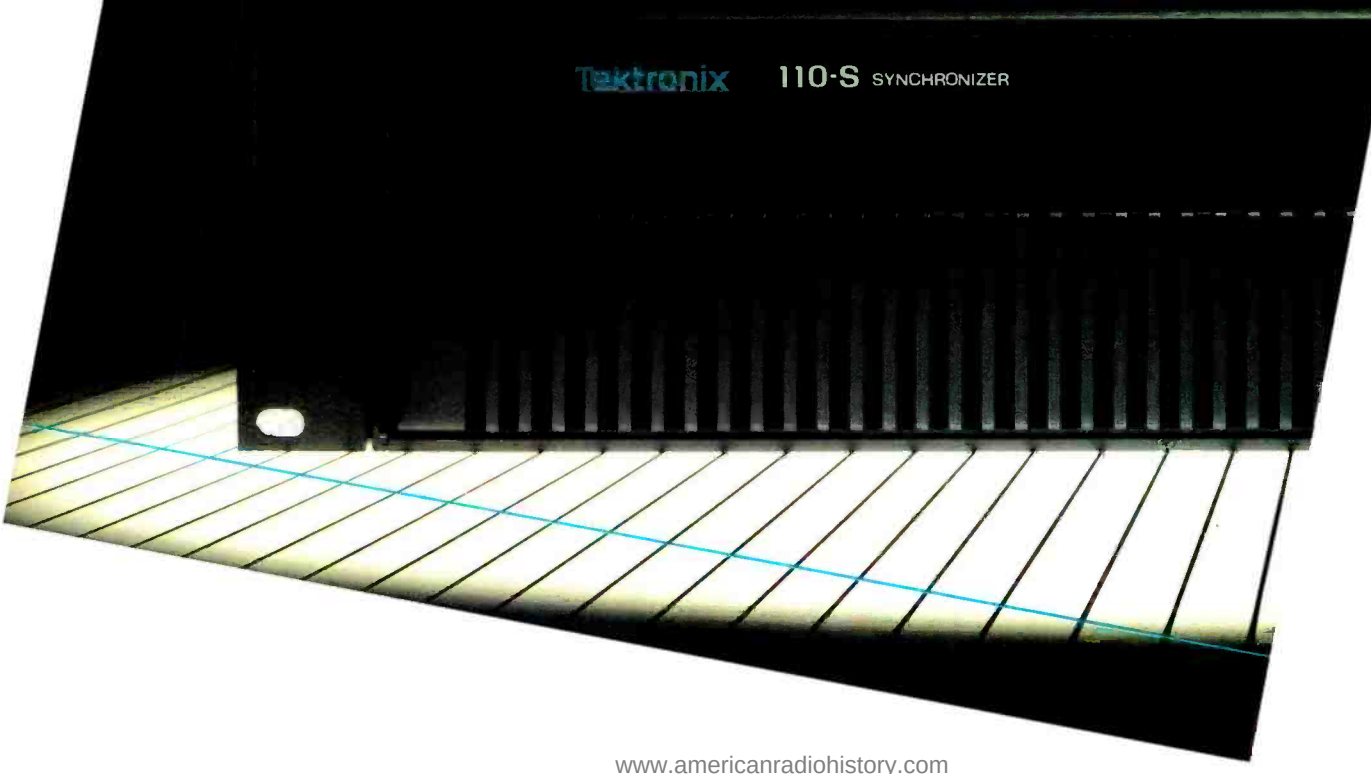

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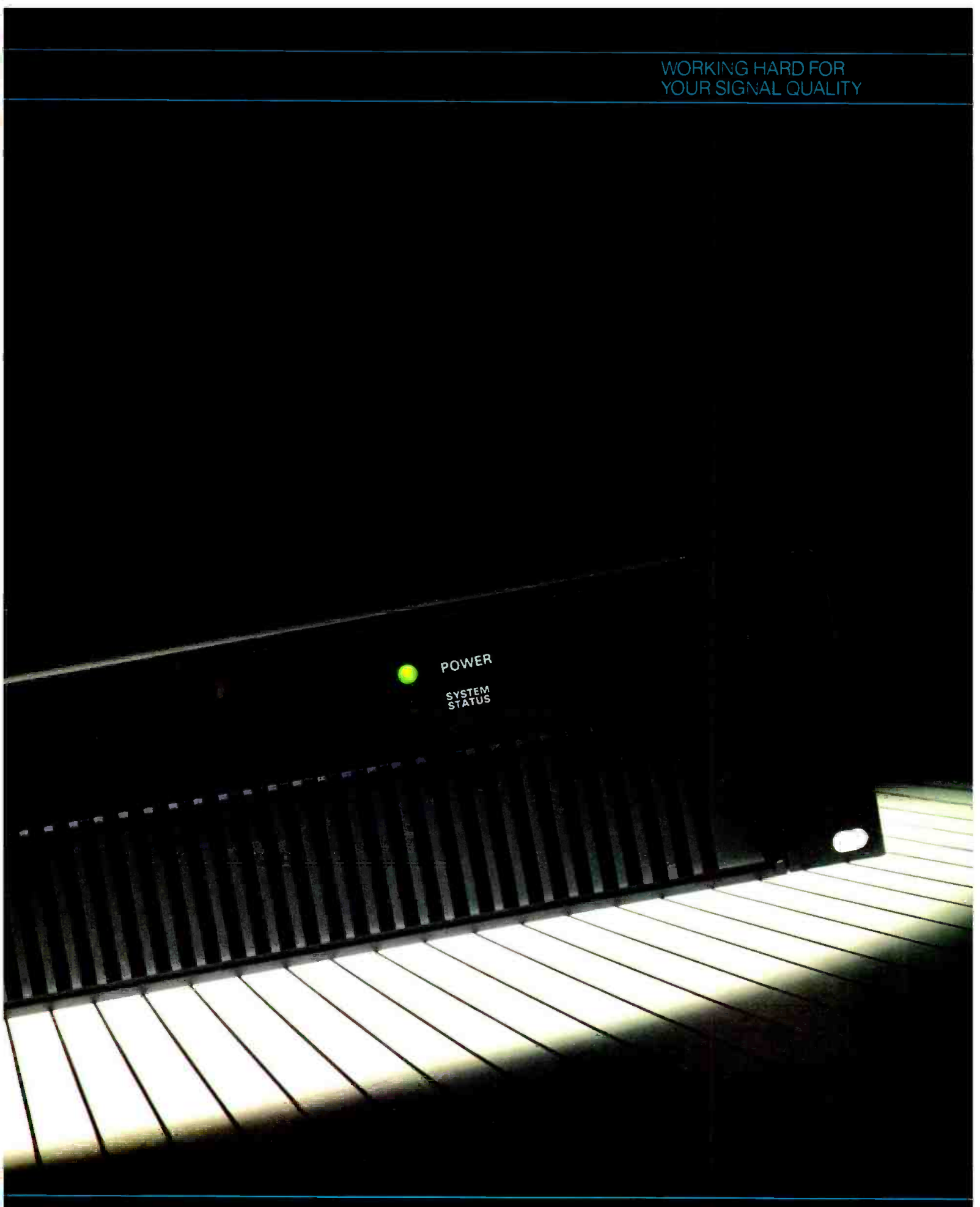

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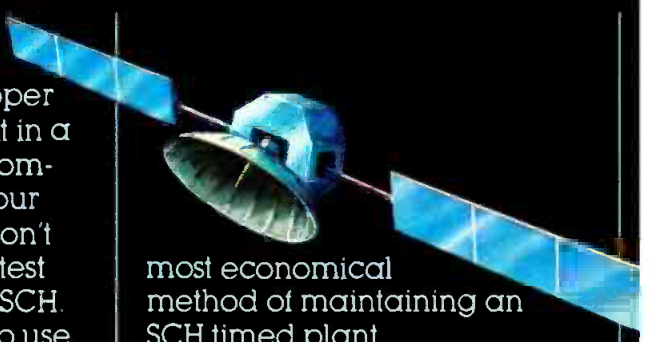

And it comes packaged with normally required features: a processing amplifier and sync generator and other optional features. Our expanding line of unique process and control products for the broadcast industry include color encoding, satellite transmission processing, machine control and many other state-of-the-art developments, and beyond.

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Satellite hardware and services dominated the parking lot in Las Vegas.

Diversity of Satellite Hardware and Services at 1983 NAB

Staff Report

Over two dozen exhibits, either on the exhibit floor or in the parking lot outside, were at this year's NAB Convention—advising broadcasters on how to take advantage of programs now, or soon to be, in the equatorial orbit. There was something for both radio and TV broadcasters. Among the highlights were new network control systems (all designed to win the favor of national network programmers such as ABC, CBS, and NBC), several new antennas, and new radio receivers capable of narrowband reception.

Controllers

The Earth Station Controller, S-A **7600,** designed to monitor and control video earth stations on a single CRT screen from afar, was a key element in **Scientific-Atlanta**'s setup for broadcasters. With a pair of voice-grade phone lines, and a remote option, the controller can be almost anywhere in relation to the earth stations. Designed to be compatible with the 8840 Series of antenna controllers, operation is controlled by following menu-driven displays. The S-A 7600 can be programmed in the field for almost any station configuration, including a wide variety of combinations of antennas, receivers, and uplink equipment. A single 7600 can control stations with up to eight antennas. The processor is a DEC LSI-11 minicomputer. A floppy disk holds the software.

Although the highlight of the **Harris** exhibit was its new 6.1 m delta gain antenna, to be described later, Harris, too, had a flexible satellite earth station controller, the **9125/9165.** The 9165 goes further than any other controller, says Harris. It will automatically monitor everything it has been instructed to watch.

The 9125/9165 can handle day-to-day dish movements and TVRO or uplink control functions automatically. The system simply alerts operators at the studio that an event has occurred and been taken care of; if not, it sets off an alarm. The 9165 remote-control unit allows the control and tuning of up to eight receivers, four exciters, and four HPAS. Twenty-five entries for azimuth, elevation, polarization, and so on can be preset and activated automatically.

Andrew Corp. used the 1983 NAB to unveil its new earth station system controller, the **ESC-200.** It offers the control features of the S-A unit, the control and automatics of the Harris system, and even more in terms of capacity. The ESC-200 can be programmed for fully automatic

operation of 40 antenna positions and 200 events. Individual station addressability and computer interface capability allows remote control operation and multiple-station networking. The unit also features "fail-safe" design, says Andrew, controlling antenna azimuth, elevation, polarization, ground communications equipment, on-line system status, and alarm panel status.

Although S-A, Harris, and Andrew were the big three at NAB in terms of systems, there were other controllers shown. **Pinzone Communications** had a line of **receivers** that were adapted for a special network computer interface. This system can be programmed to do much of the control needed in network control.

And **CAT Systems** showed its remote-control system configured to handle earth receive station switching matters. The **5250** in use at WCCO-TV controls two HPAs, three LNAs, two exciters, two receivers, four switchers, and more.

Grumman unveiled what it calls a fault-tolerant **earth station controller** for an entire network. Using "triple redundant" hardware and software reliability features developed for NASA and the military, the system detects transmission error to the bit level, notifies the operator, corrects itself, and makes the appropriate switch connections. Network routing is possible, as is continuous status monitoring and control of the network.

Antennas and other video developments

The big news in antennas was the **Harris 6.1 m delta gain unit,** which it calls a breakthrough. Although smaller in size, its performance is equal to or better than that of 7 m dishes. Its special shape and unique subreflector improves both efficiency and overall sidelobe performance. Essentially, the delta gain has taken some of the advantages of the horn, the prime focus antenna, the Cassegrainian, the Gregorian, and the dual offset-fed antennas, eliminated their disadvantages, and melded their advantages into one. The improved sidelobe performance makes it possible to meet two- and three-degree satellite orbital spacings recently affirmed by the FCC as the U.S. proposal at this year's Region II Administrative Regional Council meeting to increase the number of satellites available in the Western hemisphere.

Andrew's new **9.3 m dish** stresses high gain and high efficiency, especially for broadcasters. Through computer optimization of the Gregorian dual-reflector design, gain at 4 GHz is rated at 50.7 dBi and it has closely controlled patterns. Efficiency is rated at 77.2 percent (at 4 GHz measured at the orthocoupler output flange). Patterns comply with two-degree satellite spacing. The all-aluminum stressed skin reflector and back structure ensures consistent performance over the full temperature range of -40 to 125 degrees F. It has an elevation-over-azimuth mount that can be coupled to Andrew's new ESC-200 controller for rapid repositioning. Yet another new antenna from Andrew was a 3 m receive-only unit described as "offering superb high performance at an affordable price."

Comtech Data Corp. showed a new **7.3 m antenna** as a high-performance type. Featuring a dual-axis mount, the full satellite arc can be covered from any location in the U.S. The antenna can be aimed at different satellites rapidly, using optional high-speed drive systems (1.5 degrees per second). Also optional is a new EC7 microprocessor control system that is capable of storing up to 40 satellite positions.

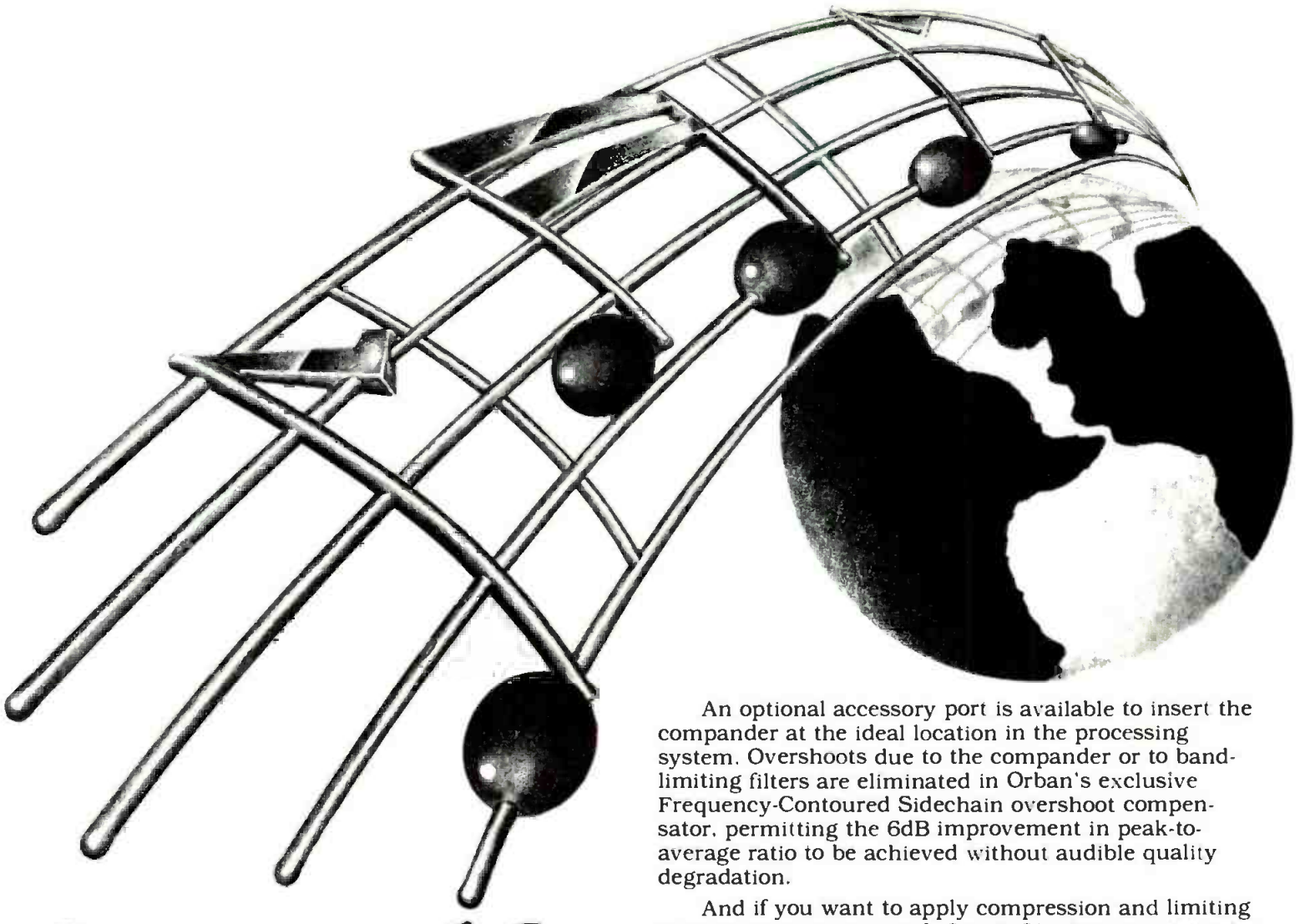
Transportable dishes from Pinzone.

Scientific-Atlanta's featured antenna was the **Model 8010C,** a 7 m dish described as a second-generation antenna offering elevation-over-azimuth geometry. Using either a manual or a high-speed (120 degree/minute) motorized actuator, a 110-degree arc can be scanned quickly. Coverage of 180 degrees is possible by repositioning the azimuth lever arm. This control permits steering with a minimum of space, allowing the antenna to be mounted near existing structures. Midband gain of this dual reflector Cassegrain type is given as 47.7 dBi (receive).

The **Series 7500** video receiver, designed to exceed the performance specs of RS-250B/NTC-7, is easy to control. The frequency (using a phase-locked frequency synthesizer) can be entered via a keyboard, as can the transponder number. Any one of six channel settings can be preprogrammed. Threshold extension demodulation cuts in when the input C/N falls below 11-12 dB. There is provision for three audio subcarriers.

One of the more unusual antennas set up in the parking lot was the **Antenna Technology Corp. Simulsat** multibeam antenna. Although introduced last year, and an instant hit with cable operators wishing to tune in more than one satellite without repositioning (you can see all domestic satellites simultaneously from 75 degrees west to 135 degrees west), this unit is now getting serious attention from broadcasters. New Simulsats include a 7 m unit for TV broadcasters and a 3 m Simulsat for radio. Can you get away with an antenna that does not need to be steered, especially if you are not uplinking? ATC says you can, since Simulsat is able to accommodate up to 20 feeds and has a capture angle of 60 degrees, with uniform gain across the band.

The antenna can handle two-degree satellite separations. Although 7x12 m in size, Simulsat 7 can survive 125 mph winds. The design is something of a cross between a parabolic antenna and a spheroid. With the price of the Simulsat 7 being only $45,000, the advantages of a fixed satellite are obvious. The Simulsat 3 for radio is priced at $8,500, and the Simulsat 5 for cable is listed at $19,500.



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An optional accessory port is available to insert the compander at the ideal location in the processing system. Overshoots due to the compander or to band-limiting filters are eliminated in Orban's exclusive Frequency-Contoured Sidechain overshoot compensator, permitting the 6dB improvement in peak-to-average ratio to be achieved without audible quality degradation.

And if you want to apply compression and limiting to your program material, OPTIMOD gives you an extra bonus: a superbly natural-sounding multiband compressor ahead of the limiter. That completes the second-generation OPTIMOD system: a system that's provided more than a thousand FM and TV stations with super quality and tight modulation control. It can do the same for your uplink.

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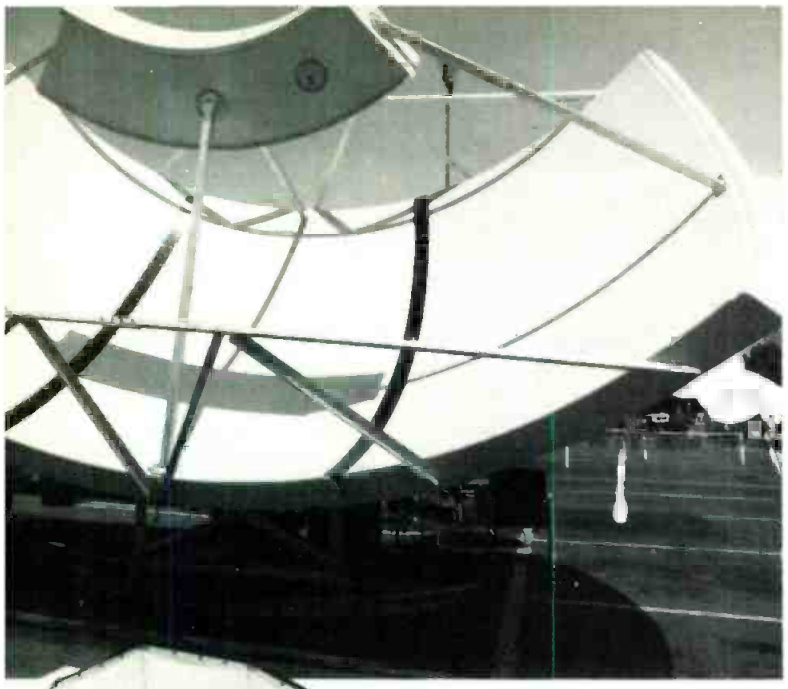


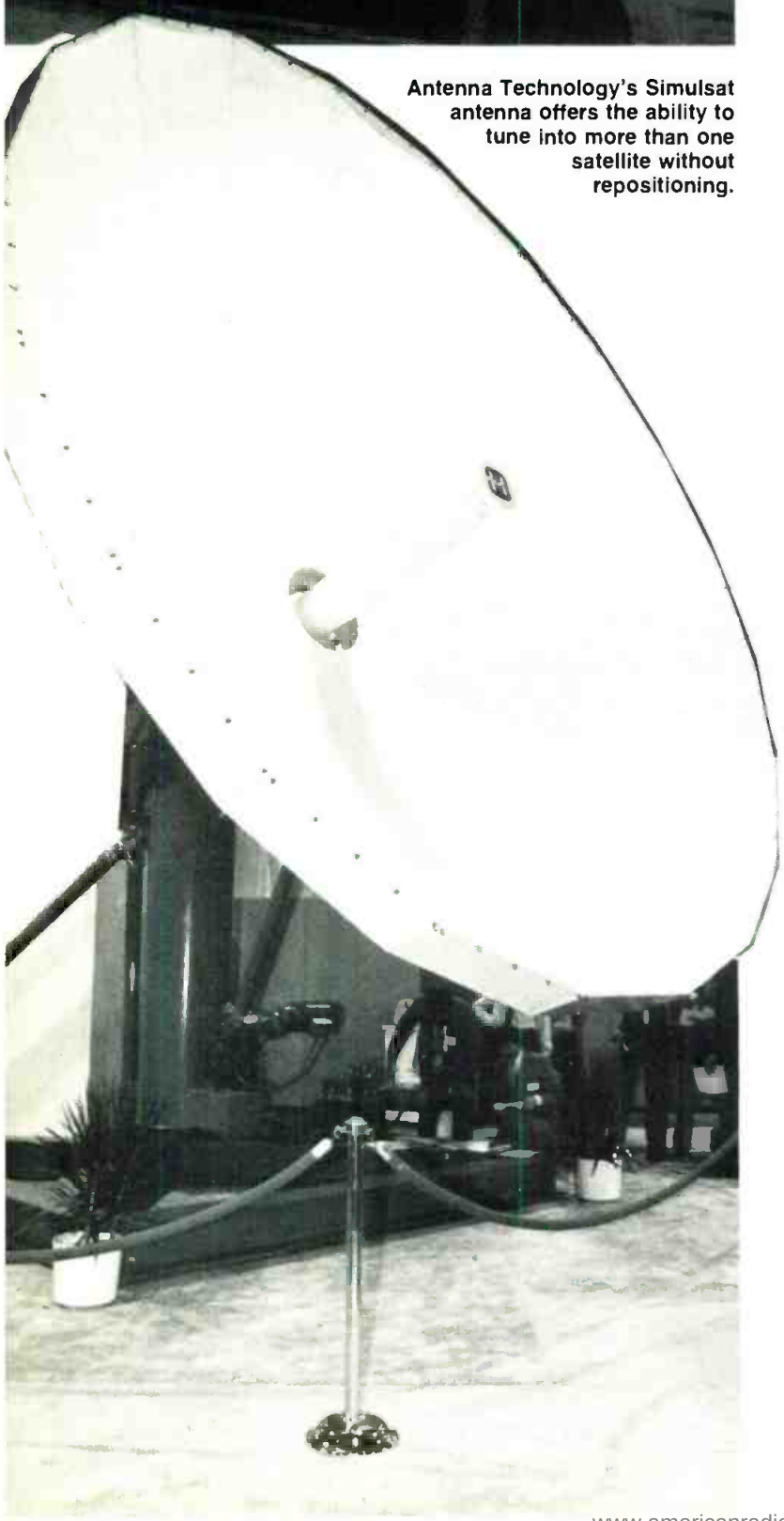
Antenna Technology's Simulsat antenna offers the ability to tune into more than one satellite without repositioning.

Hero Communications' Super Tennas are aluminum mesh transportables which come in five sizes, from three to 7.56 meters.

The equipment setup at ATC included Modulation Associates receivers and satellite subcarrier transmission systems. The SSTS-S-AT is a solid-state video receiver with a front panel switch that brings in either a fixed designated satellite or any transponder through tuning. This is the system used by Wold for audio. Another product was the R-Sat single-channel-per-carrier (SCPC) satellite receiver optimized for state and regional radio networks. Other MA products included downconverters and a new economy S-AT receiver.

Microdyne is a source of antennas in the 10-foot, 12-foot, five-meter, and seven-meter sizes. Although it was not exhibited, certainly another unique antenna is the conical horn manufactured by its subsidiary, Antennas for Communications. Since horns are highly selective, they can be used in areas saturated with terrestrial microwave signals. Such a horn is used by at least one TV station in the Washington, DC environs. New at the NAB Show was a **5 m fiberglass-type antenna** produced in eight pieces which can be shipped by common carrier. Also by Microdyne was its new **multiple feed satellite system,** which enables simultaneous reception of up to five satellites on the same antenna. The company made news at NAB by announcing a contract with VideoStar to produce two mobile Ku-band uplinks and 30 fully redundant Ku downlinks.

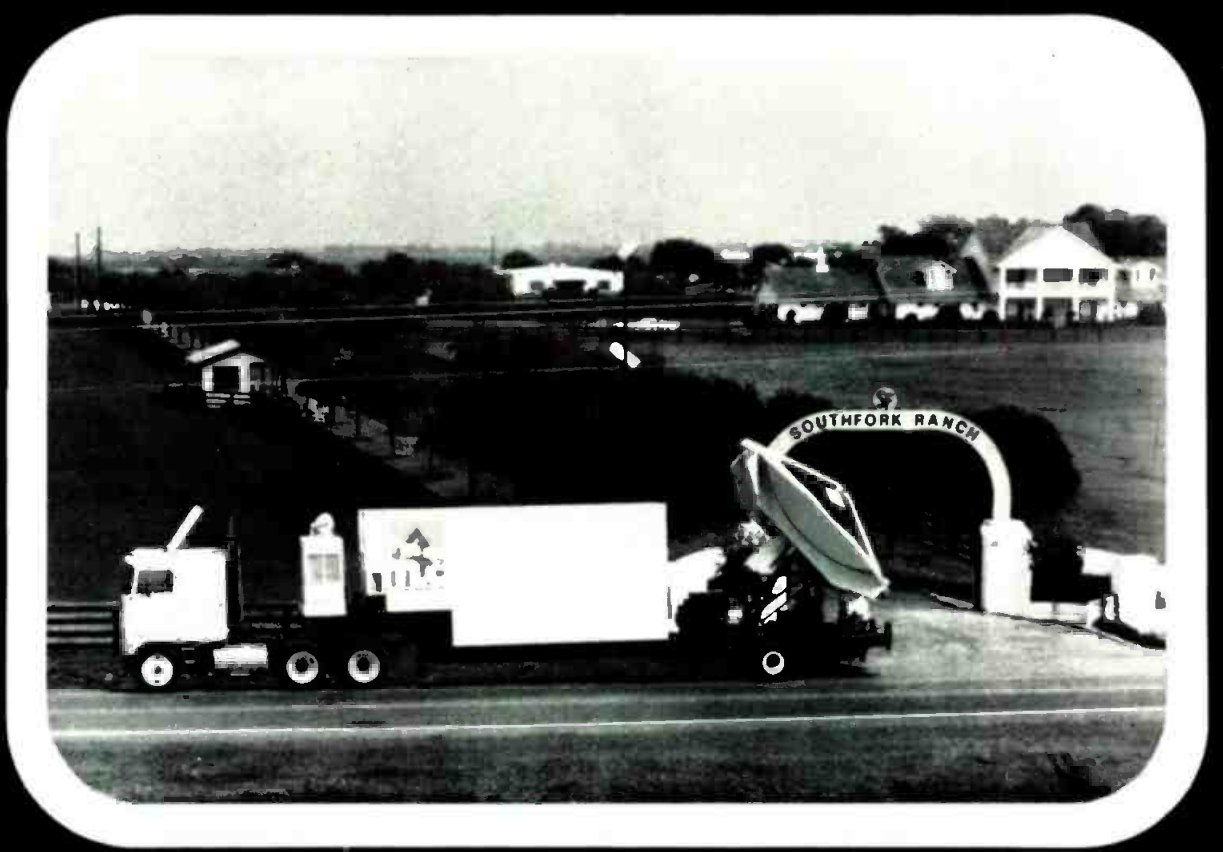
Although not unique, since similar antennas are available in small sizes, but nonetheless different, were the aluminum mesh antennas exhibited by **Hero Communications Inc.** which are lightweight and transportable. The **Super Tennas** are available in 3 m, 3.8 m, 5 m, 6 m, and 7.56 m sizes. Aluminum prefabricated trussed ribs give the antenna stability and the units are designed for wind load up to 125 mph. The 7.56 m unit has a gain of 48.4 dB, beamwidth of 0.07 degrees, and the first side lobe exceeds FCC requirements at 32-25 log 0. The company also manufactures video receivers, the HC/COM line, available in a low-cost version, a professional version, and another



The Harris 6.1-meter delta gain antenna, with its new shape, offers improved sidelobe performance for use in two- or three-degree satellite spacing.

TRANSMIT FROM ANYWHERE

(even Dallas)



D-42

The Dalsat D-42 is the ultimate transportable earth station for remote pickup.

Fully self-contained and capable of transmitting and receiving in C-band (Ku-band, option), the D-42 achieves full "network" television performance from anywhere you take it.

The D-42 can be set up and operating within 30 minutes of arrival on site, without a single tool.

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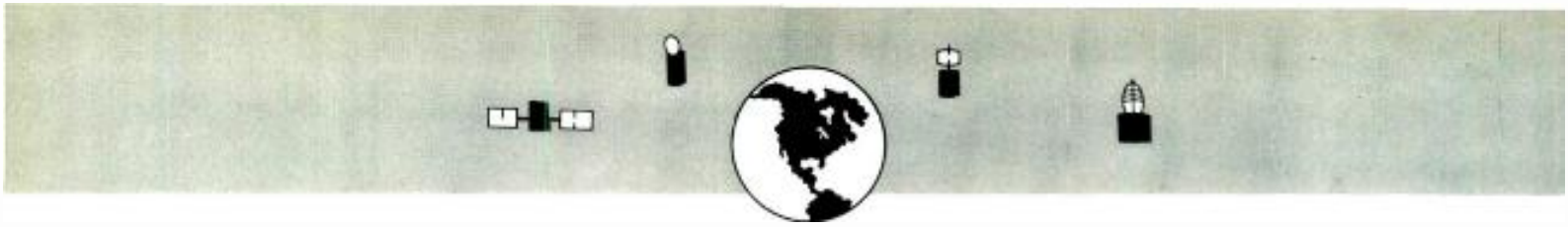

for multiple receiver applications. A new SCPC receiver for radio was also shown.

Among the other TV antennas on display was a **5 m hydraulically steerable system** from **Anixter Communications.** Using a zero-offset polar mount, a hydraulically actuated single-action control positions the dish with no changes to mount members. Manipulation of latitude angle, declination and true north is very simple. Made of 24 stamped petals, two men can contruct the system.

Pinzone showed some fiberglass **3.7 m antennas** mounted on small trailer beds made by **Miralite.** However, a wide range of other TVRO equipment was also shown by Pinzone. Among the gear was Pinzone's own **8250 satellite receiver,** designed to pull in any transponder format automatically. This receiver has a dual LNA input and threshold extension to 7 dB under full video modulation conditions. Audio subcarrier selection is automatic. Dexcell LNAs were featured.

A **receiver-retransmitter** or "broadcasting earth station" was shown by LGT in the **Thomson-CSF booth.** The receiver includes an LNA (rated at 100 degrees K) and a broad frequency range of 2 to 12 GHz. The transmitter was a multichannel unit (up to six channels) with power outputs of from 1 W to 1 kW VHF or UHF. Anticipating such usage in various parts of the globe, Thomson-CSF showed typical G/T system ratings ranging from 20 to 30.5 dB using antennas ranging in size from 3.5 to 11 meters.

Radio systems

As the sole source of digital audio earth station receiving systems specified as the standard by four radio networks, ABC, CBS, NBC, and RKO, **S-A's DAT-32** digital audio terminal got a lot of attention, especially from those affiliates who haven't yet placed their order. The DAT-32, of course, offers more than audio (either 15 kHz or 7.5 kHz channels); it has a voice cue channel at 32 kbit/second and data channels at 32 kbit/second. Receiving a single biphase shift keying (BPSK) carrier modulated by time division multiplex (TDM) digital data, the unit demodulates and demultiplexes the data into audio or data. Actually the system digitally compands the 15-bit word to 11 to reduce transponder bandwidth but as a result of a parity bit (making the total word length 12) and error concealment encoding, the bit error rate could degrade to 10^{-5} before any errors could be perceptible.

The DAT-32 system includes a Series 9000 2.8 m parabolic antenna, a 120-degree LNA, cable and the BPSK receiver (Model 7300) and a Model 7325 digital processing unit. This will bring in any combination of up to seven program, voice cue and data channels.

While all other earth station receiving equipment must be classified as analog, there was a lot. **Microdyne** announced that it has contracted with the Georgia Radio News Service to deliver 103 10-foot SCPC terminals to various Georgia stations. Part of this package includes a new SCPC receiver, the **1100PCDR(3),** described as a flexible, technically advanced demodulator. A front panel switch permits the reception of three carrier formats: NPR, Mutual, and narrowband news/sports programs such as those to be provided by the News Service. Step tuning permits fast precise selection of SCPC radio channels.

Comtech Data announced that it has signed to construct 84 stations for the Arkansas Radio Network, including an uplink at the flagship station—KARN in Little Rock. This system uses Comtech's latest proprietary audio processing system and narrowband SCPC technology which permits more efficient use of the spectrum. Comtech's basic approach is to use different plug-in modules in its RCV 360 receiver (which handles SCPC, MCPC, and data). A recent improvement permits the antenna-mounted downconverter to be remotely controlled for selection of any one of six crystal-controlled satellite channels (previously only three could be controlled). At the NAB Show, Comtech showed its Series 300 satellite earth terminal complete and discussed its Series 900 narrowband uplink terminal which uses a 5 m dish.

Scientific-Atlanta demonstrated the capabilities of its earth station monitor and controller, with remote option.

At least two exhibitors at NAB promoted TVRO terminals for consumers of the forthcoming DBS services: NEC and Oki. Both showed 12 GHz systems that could be used for direct home reception, cable reception, or rebroadcast. Both use outdoor and indoor units. The outdoor portion is a small dish, one meter in diameter, and a low-noise converter. The indoor unit consists of a receiver that sits next to, or on top of, a TV set.

Oki listed specs for its Series 810 system. Antenna gain 40.5 dBi; LNA noise figure of 3.5 dB and a high image rejection ratio of 45 dB; receiver noise figure of 15 dB maximum; and a threshold level of 7 dB C/N. Such specs equal or exceed those set by Comsat's Satellite Television Corp.

Common carriers

AT&T had a large exhibit devoted to satellite transmission techniques now and in the future, such as a sidelobe cancellation system, digital transmission via lightwaves (fiber optics), and satellite audio services. The virtues of AT&T's new Telstar 3 C-band satellite, which will replace

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- Satellite technology makes it unbeatable in reliability and audio quality.

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Comstar service beginning in 1983, were touted. The satellite service meets RS-250B performance objectives, AT&T says. AT&T also promoted its transportable TV earth station for hire.

In addition, AT&T also showed its digital audio service, which while not compatible with the RCA DAS, can find use by broadcasters for back-haul service or other private transmissions. It is available on a 24-hour basis. Two channel segments can be transmitted simultaneously, such as two separate audio signals or stereo. Both channels are 15 kHz in bandwidth. Specs issued by AT&T show the service to use a sampling frequency of 32 kHz, 15 bits/sample.

RCA Americom, whose Digital Audio Transmission Service, using PCM time division multiplexing, is in operation now, and was busy playing tapes of various musical selections to show how great digitally transmitted audio can sound. As described earlier, there is a choice of 15 kHz or 7.5 kHz bands plus a 32 kbits/second channel for hard copy or voice cueing. For the RCA system, one satellite transponder can carry 20 15 kHz channels.

During NAB week RCA Americom launched Satcom IR, which became operational just last month. The satellite will have two transponders dedicated to the digital audio service used by the four networks, and a number of video transponders available on a preemptable basis at a low tariff. Ku-band satellites that RCA Americom will launch in the future were also exhibited. At 40 watts per transponder, these should offer adequate margin for rain, says RCA.

Service companies

Largest of the service companies at NAB was Wold Communications/Entertainment, subsidiary of Robert Wold Inc. Wold refers to itself as an "electronic expediter" in distributing TV and radio programs. It currently has 10 transponders on three satellites—Westar IV, Westar V, and Comstar D-3—and holds an option for two more on Westar V. It also leases capacity for radio transmission on Westar III and is part of the AP transponder earth station network.

Most NAB emphasis was on its newest service, the Satellite Subcarrier Transmission System (SSTS), which marries two technologies: SCPC for uplinks, and subcarrier diplexing for downlinks. Wold reports 39 major cities could be linked by the SSTS network.

Making a big impression at NAB was VideoStar, particularly because of its commitment to use the Ku band. As mentioned, VideoStar announced at NAB the purchase of two mobile Ku uplinks and more than 10 downlinks this summer from Microdyne. At the same time, VideoStar announced that it has contracted with Satellite Business Systems (SBS) for the lease of Ku transponder time for its new "VideoStar Express" service.

Systems for hire in the NAB parking lot included those by Intervideo Network Inc. and Tele-Link Communications. Actually, Intervideo was so proud of its video earth station package that it decided to offer them for sale—either as a trailorized mobile unit or as a permanent installation. The whole system, including a 4 m or 5 m dish, fits on a 19-foot trailer bed. With the antenna collapsed, the travel height is 10.5 feet. Weight is 3740 pounds. Set up, the dish will operate in winds of 60 mph. Sale price, including the trailer, is below $16,000.

Tele-Link was showing the Dalsat-42 transportable earth station for TV, which draws its name from the length of the trailer, 42 feet. Included, in addition to the 4.5 m dish, is a 20-foot enclosed shelter. As an uplink, the units included HPAs and a transmitter modulator. The antenna is a proprietary unit built by Dalsat.

USE CARD ON P. 91 FOR MORE INFORMATION ON THESE COMPANIES

Services

UPI used the NAB Show to promote its latest service, CustomCast. A microprocessor at the customer's station can be programmed to receive only those elements of the UPI program that a broadcaster wants. The copy selected is printed out on a high-speed (1200 words/minute) silent printer made by Siemens.

AP announced a new satellite-delivered show at NAB, the four-hour weekend Ed Busch talk show, which commenced the end of April. Carried on a separate channel from AP network news, it can be received simultaneously with the news. Broadcasters do not need to buy an earth station, since the program comes into the broadcaster's community on AP-owned receive stations.

Comsearch Inc. used the NAB Show to announce a new frequency protection service which provides a constant surveillance of all microwave activity on behalf of users in the area of C-band and Ku-band common carriers, STL/TSL microwave links, and cable television head ends.

Spectrum Planning Inc. stressed its competence in making coordination studies for earth receiving stations, as did also Compucon. **BM/E**

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The Sound Reinforcement Specialist: Ramsa WR-8716

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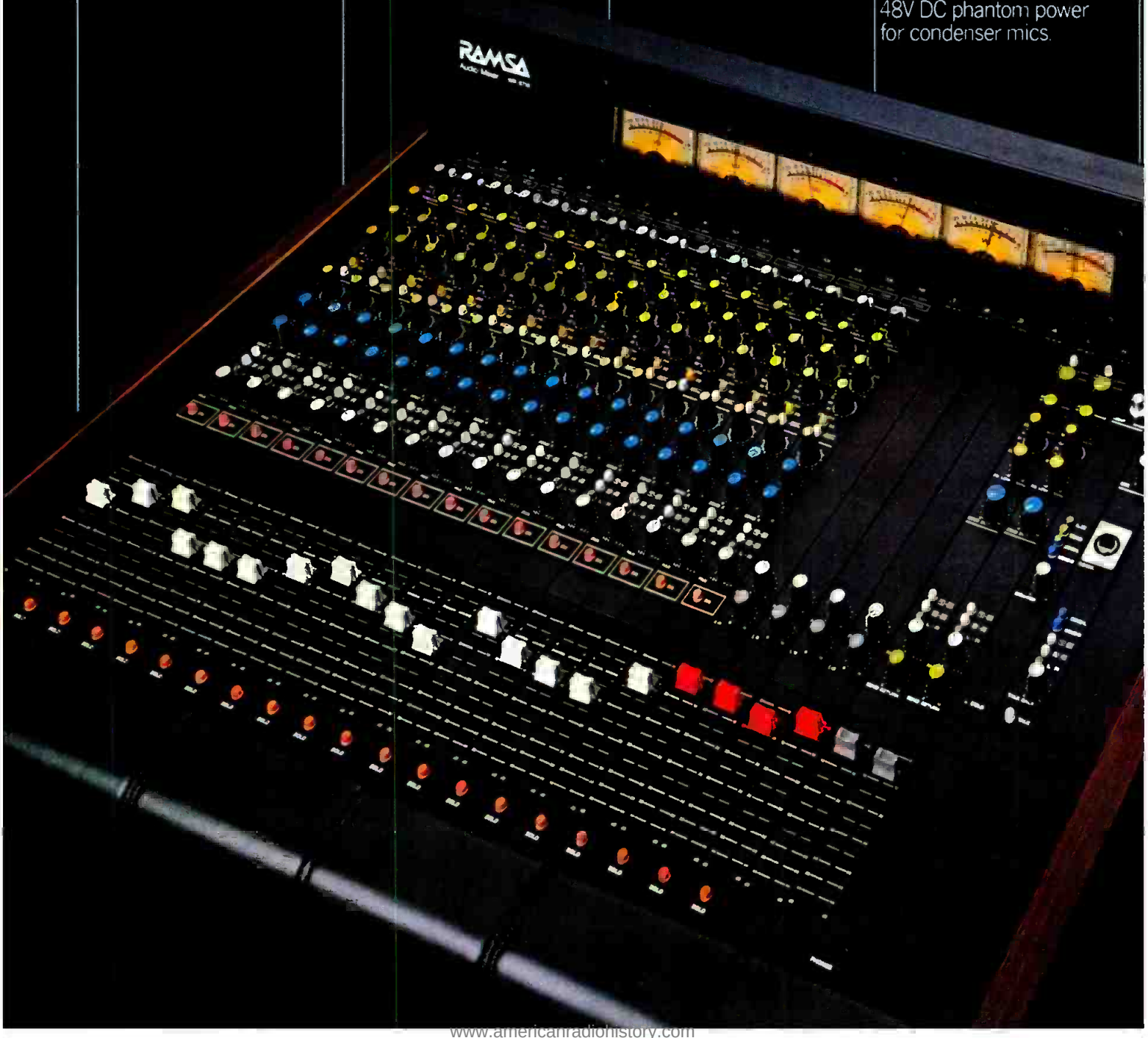
The WR-8716 is a fully modular sound reinforcement console with 16 input modules, 4 group modules, and 2 masters. It features 16 input pre-fader solo buttons, 4 group modules with pre-fader insertion patch points, and lockable post-fader solo buttons. There are 6 illuminated VU meters with peak LED's for easy outdoor reading and a separate stereo variable frequency EQ for monitor sends. Pan pot controls allow panning to the left or right masters while level controls permit 16 x 6 board operation. The left and right direct channel assign function lets you bypass the group modules for individual sources. Portable operation is a snap with easy access connectors.

And the WR-8716 features plastic conductive faders for greater reliability and smooth, low-noise operation; external power supply for light weight, and switchable 48V DC phantom power for condenser mics.



RAMSA

The Recording Specialist: Ramsa WR-8816

The WR-8816 recording console includes the same modular construction, input modules, power supplies, and faders as the WR-8716 plus many important recording advantages. Like direct outputs for 4, 8, or 16 track recording and peak-reading LED meters that let you monitor any 4 out of 24 signals with clear, quick response.

You'll command a variable frequency EQ section with 3 frequency settings for the high and low frequencies plus continuously variable midrange. Stereo echo send replaces the separate mono controls you'll find on competitive boards. And you get two independent stereo monitor controls—one for musician's headphones, one for control room monitors—a special feature for any mixer in this class. And there are other important features like low noise electronically balanced mic inputs with high-speed IC's, 16 switchable post-fader solo controls and XLR-type mic connectors.

Ramsa offers a full line of specialty mixers including the more compact WR-8210 recording mixer and WR-130 sound reinforcement mixer. So don't hold down your professional sound, call (201) 348-7470, because you're ready for Ramsa.

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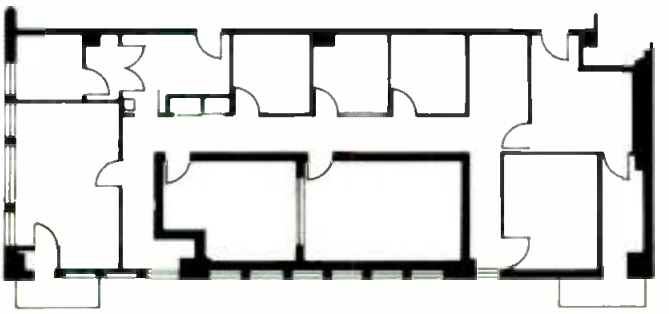
FACILITIES DESIGN AND ENGINEERING

PART 9



THE SATELLITE CONNECTION: BUILDING A RECEIVE-ONLY EARTH TERMINAL

BY WAYNE L. HETRICH

The satellite earth terminal is on the way to becoming a nearly universal adjunct of broadcasting. Most common will be the receive-only terminal, a comparatively inexpensive entry to the era of program distribution by satellite.

Although simple in main function, the receive-only terminal has many basic characteristics and requirements that are well outside the presatellite experience of the broadcast engineer. In this ninth part of *BM/E*'s series on facilities design and engineering, one of the main architects of satellite net technology tells what is required in equipment and design to bring in, with top quality, the signals from those relay stations 22,000 miles in space. — *Ed.*

THE RECOMMENDATIONS IN THIS ARTICLE are intended as guidelines for the broadcast engineering executive who must plan a receive-only radio or television earth terminal. Whether he will design the terminal himself or turn the design in whole or in part over to a "turn-key" supplier or an engineering consultant, he must have a good understanding of the requirements for each main part of the system. He must know why the system is designed the way it is, and what he should expect from each part of it.

No two satellite earth terminals are exactly the same. Although common equipment is used, different antenna pointing angles, different locations with respect to the satellite, different radio frequency interference conditions and different relations between the antenna site and the studio make each earth station unique.

The recommendations divide into three main sections: getting an approved and frequency-coordinated site; choosing and installing equipment for each part of the system; applying for the FCC license. The three parts of the job may in practice be chronologically intermingled, but they are logically separate.

Wayne L. Hetrich is senior engineer, research and development, National Public Radio, Washington, DC. He has been the principal technical architect of the NPR radio satellite net. In 1980 he was given a Major Armstrong Award for technical excellence in FM broadcasting, in recognition of his work on the NPR satellite system.

FINDING A GOOD SITE

Start with a list of "best site" criteria. Here are the most important:

- The most convenient site should be "colocated," that is, the cable run to the studio will be 600 meters (1968 feet) or less. Allow for cable footage in manholes, up walls, and for potential control room moves.
- The cable run should be confined to the station's own contiguous property.
- The site should be reachable by trucks bringing concrete for the foundation, and for delivery of the antenna itself.
- There should be negligible interference from the terrestrial facilities of common carriers operating in the 4 GHz band. This part of the evaluation is covered in detail in the next section.
- The ground terminal antenna should have an unrestricted view of the satellite orbital arc the station wants to reach now, or may want in the future.
- The site should be secured from vandalism and tampering, and protected from falling ice from nearby towers or buildings.
- The ground terminal installation should conform to local zoning and environmental ordinances and the site should be free of restrictions which would prohibit construction of a terminal.
- The use of the site should be within control of the station for at least five years (10 is preferable), and allow construction to proceed without an inordinate amount of site preparation.
- Future building or other construction plans should not create an obstruction to the satellite "look-angle" within the foreseeable future.

If the earth terminal cannot be located within 600 meters of the studio, the terminal is said to be "noncollocated." Except for the first two points above, a noncollocated site must meet the criteria already listed, plus these:

- You should be able to get suitable cable path rights for the entrance cable link. An alternative to the long cable run is the use of a telco interconnect, but it should be

used only in extremely difficult situations.

- There should be access to the proposed site, or it can be provided by the station.
- There should be power at the proposed site, or it can be provided by the station.

CAN INTERFERENCE BE MANAGED?

If the legal and access aspects of the site look favorable, your first big hurdle in rating the performance of the site is the "frequency coordination," the detailed examination of potential radio-frequency interference to the 4 GHz downlink signal from the satellite. As explained in more detail below, the frequency coordination check can also be expanded to give you a useful preliminary rating of the overall system sensitivity you will need.

The process begins with your choosing a site and one or two alternates. Then buy a U.S. Geological Survey (USGS) 7½ minute quadrangle map of the area in which the proposed sites, and your studio, are located. On the map, mark all the locations clearly—the proposed sites and the studio. This map will be the main location instrument of the frequency coordination company you engage to supply you with a detailed report on interference conditions. It will be a good idea to have two copies of the map, so you can keep one for the information you'll need later in your license application.

ROOFTOP ANTENNAS

You may be thinking of putting the earth station antenna on the roof of a building. This will involve additional steps: determining if the building is strong enough to hold the antenna, even under strong wind load conditions; reinforcing the building if ncessary; designing and building an interface structure between the frame of the building and the antenna base; hoisting the antenna base and the antenna itself; and installing both on the roof.

Rooftop antennas are not generally recommended. The additional cost averages $10,000, but can run as high as $30,000. Moreover, being up on a roof tends to expose the antenna to more radio frequency interference (RFI) than is normally experienced on the ground. On the ground, trees, land contours, and buildings provide RFI shielding. Sometimes, if a ground site is susceptible to RFI, just moving the antenna a short distance will correct the problem; this is rarely possible on a rooftop.

If you choose a rooftop as your prime site, choose at least two alternate on-the-ground sites in case the RFI level at the rooftop makes that location unuseable. Leases for sites have terms of at least 10 years are recommended, with options for renewal. There is a risk in a shorter lease of a costly move and future unavailability of an RFI-free site.

FREQUENCY COORDINATION

The professional frequency coordination firm, if competent and experienced, can get you through this difficult part of the process in an authoritative way. The firm is likely to have a computerized database covering all sources in the area of microwave interference, and computer programs for using this information.

Send them your marked-up USGS 7½ minute quadrangle. They will do a computer cull for your location, which will identify all potential interfering stations within a radius of several hundred kilometers. Examination of the cull by experts will give you your first indication of how your site looks in terms of radio frequency interference. Some stations get a clean bill of health right away; they can then go immediately into frequency coordination.

This means that the coordinator will address all microwave users in the area telling them that your station is seeking coordination, and asking for any objections. If there are none within 35 days, the firm prepares a full report on the interference situation, a copy of which must be forwarded to the FCC along with your application for a license (this is covered in detail below).

If the cull reveals high RFI, an RFI density plot of the area may show close-by locations that are better off than the chosen one. A number of satellite equipment makers

NPR dish at KOTZ in Kotzebue, AK has nearly zero elevation angle to point to satellite, far south.

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Get it out of your system.

Television is an electronic medium. Yet TV graphics still involve messy paints, glue, air brushes, razors, and other paraphernalia.

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So you can get all the messy paraphernalia out of your system. Digitally.

The Paint Box lets you do a lot more than you can do with traditional art materials. A lot faster. And with typical Quantel picture quality.

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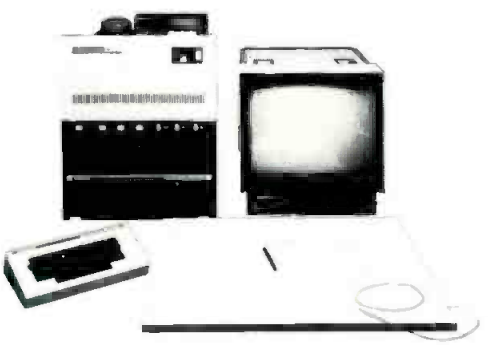
It's incredibly versatile. You can produce the look of oils, watercolors, chalk, pencil. You can make stencils. Air brush. Cut and paste. Even animate.

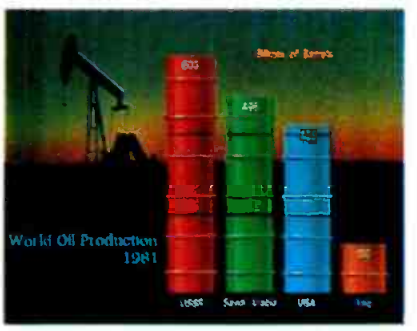
You can grab TV frames off the air, resize them, retouch them, mix them with graphics.

You can set type from a large variety of the highest quality fonts.

And you can interface the Paint Box to Quantel's DLS 6000 Library System for a totally digital still-picture system. It's awesome.



Call your local MCI/Quantel office. They'll be glad to show you a demonstration tape. Or get in touch with us directly at 415/856-6226. Micro Consultants, Inc., P.O. Box 50810. Palo Alto, California 94303.



Graphics like this are easy on the Paint Box.

MCI/QUANTEL
The digital video people.

Circle 139 on Reader Service Card

have transportable earth stations that can be brought in to test conditions at various sites. This can be expensive, so be sure to check costs before you order it.

For more precision, actual measurement of RFI levels can be made with van-carried RF measuring equipment. This can confirm what the computer cull only predicts. It can also evaluate alternate sites exactly for comparative interference levels.

When the source of interference is precisely known, the site may be moved to get a building, a fence, a clump of trees, a wall, or a hill as a barrier to the RF. Or the antenna can be put in an excavation (see photo). Another recourse is a horn antenna (see photo), which has much better sidelobe performance than a parabolic dish.

Before actually starting work (see below) you should be sure that all legal and zoning regulations will be satisfied, and all local permits obtained. You should also have all rights of way you may need for the cable run. Photographs of the site will be useful, one with a person pointing north, and others showing the view to south, east and west. Another should point toward the satellite arc, and one toward the studio building to show the cable route.

OVERALL SYSTEM REQUIREMENTS

The frequency coordination process, and the test reception at the site, if you use it, are valuable in the determination of overall system requirements, as noted in the foregoing. The main factors will be the angle of elevation of the antenna necessary to reach the wanted satellite, the strength of the satellite signal at the site, and the RFI found to be present.

The report should make it clear whether you need a very high performance dish, or can use something of lesser quality. A very low antenna elevation angle, below 30 degrees, which means that the satellite is far around the arc from the station's location, will generally belong to the most difficult site, needing the highest system performance. In the following sections each of the main functional units in the system will be discussed, and then the characteristics will be put together into a system "figure of merit" which indicates in a practical way how to get what you need.

ANTENNAS

There are two main characteristics: the gain and the noise figure. Both are primarily functions of antenna diameter and the first amplifier in the system, called the "LNA." Gain figures for the most used receive antennas are as follows:

3.00 meter diameter—39.5 dB
3.66 meter diameter—41 dB
5.00 meter diameter—44 dB
7.00 meter diameter—46.7 dB
10.00 meter diameter—50 dB

The antenna noise temperature, which will be supplied by the antenna maker, tells you how much sky noise the antenna will pick up, in relation to signal, at various angles of elevation. The larger antennas have lower noise figures at any given elevation angle than smaller antennas. The net effect is that if your angle of elevation is very low, you are likely to need a large antenna to reach the system performance level you need.

Showing one way to reduce interference from terrestrial signals, antenna at WEKU, Richmond, KY was installed in pit.

When we turn to the main electronics units, it is important to note that the characteristics listed are not "ideals" but are the real working performance levels that are essential to satisfactory handling of a satellite signal. The main electronics sections of a receive-only terminal are the low-noise amplifier (LNA), the downconverter, and the demodulator/expander for audio services or the video receiver (which may include the downconverter) for television.

LOW-NOISE AMPLIFIER

The LNA, mounted right at the output of the antenna, typically supplies 50 to 52 dB of gain at the carrier in the 4 GHz range. A main characteristic of choice is the noise temperature figure. As the formula at the end of this sec-

tion shows, the LNA noise figure is a main factor in the system performance.

The figure is ordinarily expressed in degrees Kelvin, referred to as the "noise temperature." Typical noise figures for LNAs now available range from about 95 degrees to about 145 degrees. Cost is generally in inverse proportion to the noise figure, everything else being equal.

Other specifications of a satisfactory LNA define a rigorous quality standard, but one that is necessary to proper handling of a satellite signal. The most important are:

Gain variation versus frequency: With reference to the highest gain at any frequency, that at any other frequency to be no more than 1dB lower.

Gain slope: Not to exceed ± 0.1 dB in any 10 MHz segment of the band.

Gain linearity with input: Within ± 0.5 dB for any input signal from −110 dBm to −55 dBm.

Overdrive: The amplifier to withstand, without damage, an input of 0 dBm at any frequency in the 4 GHz band.

Intermodulation: Third-order products at least 50 dB below any two inband equal signals at −5 dBm, spaced 5 MHz apart.

DOWNCONVERTER

This has two functions: using bandpass filters to select the particular 40 MHz signal segment carrying the program wanted; converting the 4 GHz carrier down to an intermediate frequency (IF) around 70 MHz. The downconverter is also mounted on the antenna, no more than a few feet from the LNA. The most important specifications are:

Return loss: At least 23 dB over the band 3.7 to 4.2 GHz.

Nominal gain: 22 dB.

Minimum input: −85 dBm.

Gain versus frequency: ±12 MHz of center channel, not more than 1 dB peak-to-peak; ±18 MHz of center, not more than 3 dB peak-to-peak; at ±58.5 MHz of center, at least 60 dB down.

Gain slope: Not more than 0.1 dB per 500 KHz, over ±12 MHz of center frequency.

Noise figures: 13 dB typical, 15 dB maximum, 10 dB design goal.

Image attenuation: At least 70 dB.

Frequency stability: Better than five parts in 10^6 in thirty days.

Intermodulation: Third-order distortion at least 50 dB below each of equal carriers at the RF input with a power sum equal to −30 dBm.

DEMODULATOR·EXPANDER

The demodulator recovers the audio baseband signal from the 70 MHz IF, and the expander reverses the compression applied at the transmitter in the noise reduction system. Virtually all satellite systems for audio transmission will use some form of noise reduction, so an expander will be a usual part of the downlink electronics.

Important characteristics are:

C/KT ratio: 67 dB nominal.

Deviation: Up to 75 KHz peak.

Modulation bandwidth: 50 Hz to 15 KHz for audio; DC to 10 MHz for video.

Energy dispersal: Up to 40 KHz peak energy dispersal modulation on the carriers, with a sinusoidal waveform at 3.75 Hz, ±0.075 Hz.

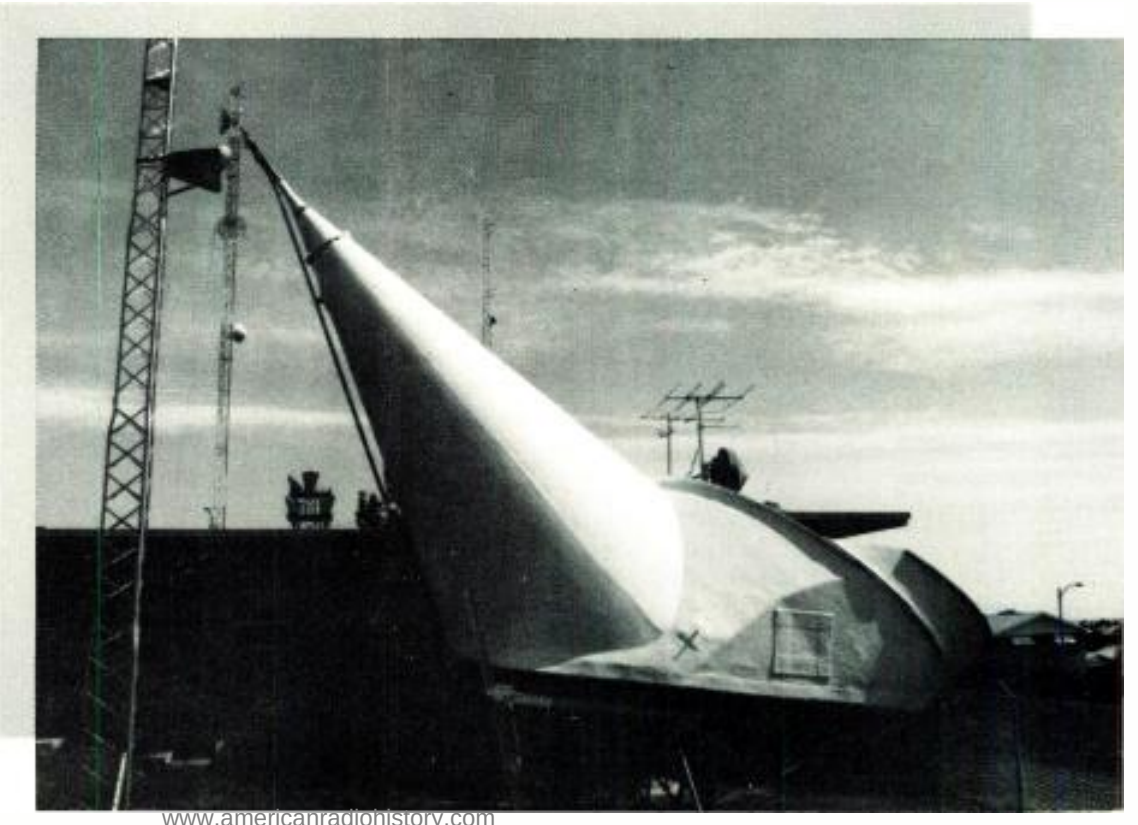
Audio response: +0.5 to −1.0 dB, 50 Hz to 15 KHz.

Insertion gain: Adjustable 0 to ±0.25 dB.

Noise with compandor improvement: With carrier at −65 dBm and C/KT at least 67 dB, ratio of peak test tone plus noise to noise at the expander output is at least 70 dB.

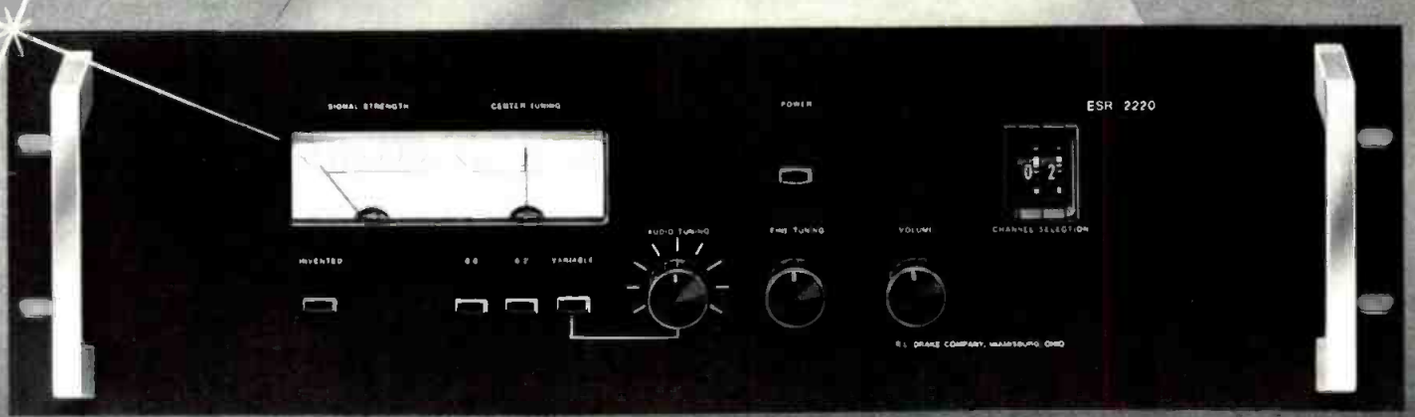
Cross talk: Cross talk in output of "quiet" demodulator is at least 85 dB below the peak modulation tone in an adjacent channel.

The demodulator needs special protection against microwave interference on 60 and 80 MHz, where signals may be far stronger than the design signal input to the unit. These interfering signals are picked up by the feed cable



Some locations need a horn antenna like this at KCND, Bismark, ND, far superior to an open dish in interference rejection.

PROFESSIONAL EARTH STATION RECEIVER



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or input wiring. The frequency assignment plan for the system assures that no satellite IF carrier will be closer than 2 MHz to the main interfering frequencies. The filtering in the demodulator unit must be adequate to keep the interfering signals below a troublesome level.

An important adjunct of the demodulator-expander or video receiver is a circuit allowing the incoming carrier level to be read on a remote meter. The meter circuit should be adjustable so that a one-volt reading can cover any 20 dB of the input signal range. Such a meter can be used at the antenna-pointing controls to optimize the antenna pointing direction.

THE DIGITAL DIFFERENCE

The foregoing applies in an overall sense to receive systems for either analog or digital transmission. The same equipment can be used for both, at least through the antenna and LNA. Theoretically, the downconverter too could handle either analog or digital signals, but the equipment makers for digital receive equipment have so far chosen to sell only complete downconverter-demodulator subsystems, designed to work together.

Obviously the major differences will come in the demodulator (receiver) section. For digital transmission this unit must include a demodulator specially designed for digital signals and a digital-to-analog converter.

However, as a unit in the system, the digital downconverter/receiver must produce results parallel to those of the analog units. In either case the performance level can be summed up in the most used figure of merit, G/T, arrived at in the following equation:

$$\frac{G}{T} = G_A - 10 \log (T_C + T_{LNA} + T_{Sky})$$

where:

G_A = antenna gain
T_C = 14K
T_{LNA} = LNA noise temperature
T_{Sky} = Sky noise temperature

Representative figures of merit or G/T with the best equipment available today range from about 13 dB to about 30 dB. For a rough idea of how this applies in practical cases, consider a broadcaster in the eastern part of Maine who wants to reach a satellite in the western part of the orbital arc. He will almost surely need the top part of the G/T range, especially if he wants high-grade service. Or he may not be able to get good service from a westend satellite at all.

The broadcaster in Utah, say, is far better off. He may be nearly under the satellite he wants, and will not need a low antenna angle in any case. Good service will be far less expensive for him than for the broadcaster in the northeast corner of the U.S.

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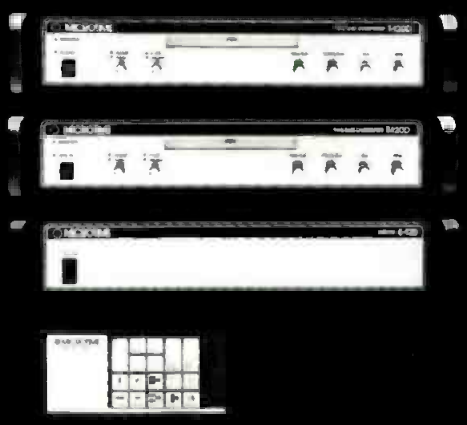

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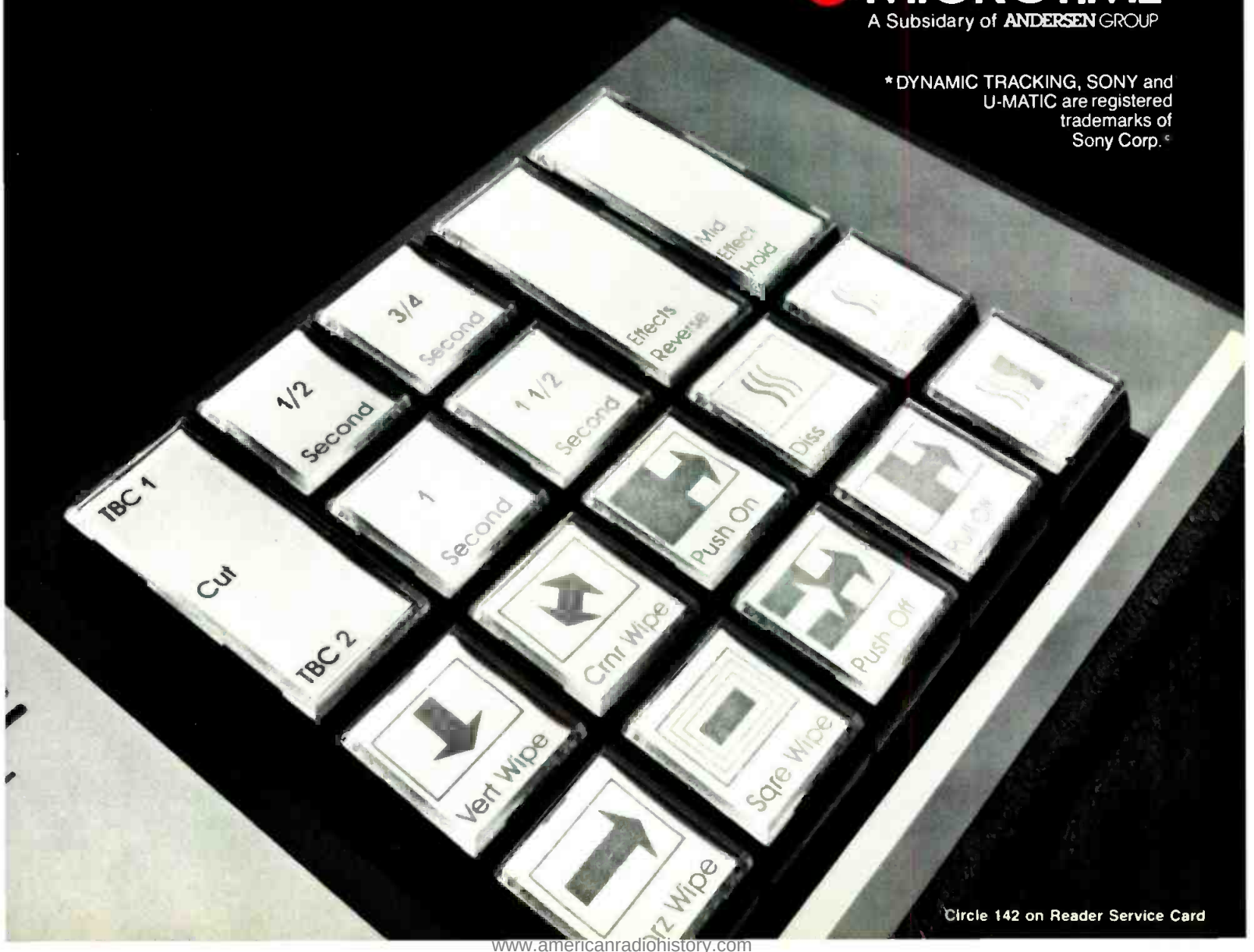

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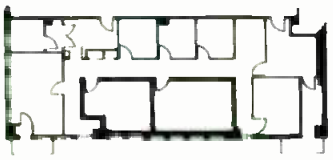

FACILITIES DESIGN AND ENGINEERING

CONSTRUCTION

With your system completely planned, with frequency coordination complete and access to the site assured, you can build the station—FCC approval is not needed to start construction.

Upon receipt of your order for an antenna, the manufacturer will send you a drawing of the antenna footing and a set of bolts. With these you can build, or have built, the foundation for the antenna. Construction is simple and the orientation of the foundation is usually not critical. When the footing is built and the concrete has had time to cure, notify the manufacturer that you are ready for delivery of the antenna.

If you are planning on using an underground cable from the antenna to the studio, it's a good idea to have the trench dug a the same time that the excavation is made for the antenna foundation. Lay the conduit (PVC pipe) in the trench before the concrete is poured for the foundation.

A nylon rope or pull wire should be placed in the conduit when the conduit is laid. Then put the signal and control cables into the conduit after the concrete has been poured for the antenna foundation.

Three drawings helpful at this point are:

- A plot plan for the earth station itself showing the antenna base, AC outlet, cable runs, fence, equipment shelter if used, and nearby roads, walkways, buildings, and trees.
- A cable route diagram accurately showing where the cable from the antenna to the studio will go, including enough detail so that there will be no question in the builder's mind as to what is wanted.
- One or more drawings of the building and studio, again showing precisely where the cable is routed. If the antenna elevation angle is less than 30 degrees for the desired satellite, the surface of your antenna footing should be a minimum of 12 inches above grade.

In designing the antenna site, it's a good idea to include an ac outlet with a 20-amp circuit breaker. The coax cable which will go from the site to the studio will be 50 or 75 ohm impedance. Any good-quality low-loss cable is suitable. PVC conduit is recommended with an inside diameter of three or four inches. Use large radius elbows for ease of pulling the cable. A two- or three-pair cable is also desirable for receiver AGC monitor, audio monitor, and intercom uses.

For lightning protection, we strongly recommend that you get an eight-foot commercial TV ground rod, drive it into the ground close to the footing, and connect it by heavy copper cable to any good contact point on the mount.

LICENSING

With your final frequency coordination report in hand, with the terminal design made and construction under way, it is time to get your license application in to the FCC.

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Mr. Ray McMillan
Director of Engineering
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Mr. Dave Frasier
Technical Operations Mgr.
WWBT-TV Richmond, VA

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Mr. Charles W. Myers
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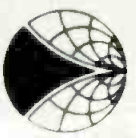

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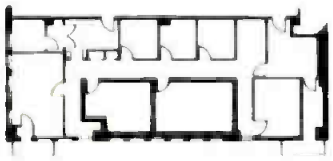

FACILITIES DESIGN AND ENGINEERING

In 1979 the FCC dropped the requirement that a receive-only satellite earth terminal be licensed, making it optional with the station. Nevertheless, we urge you to license your earth terminal because that's the best way to assure yourself continuing interference-free use of the downlink.

Look at it this way. Suppose you decide to save some money by not licensing your earth terminal. Having built your terminal and having made proper legal arrangements with program vendors you start receiving some great programming. A month later an independent communications company puts up a microwave transmitter a few blocks from your earth station and swamps you with radio frequency intereference. And there's nothing you can do about it. The cost to move your earth station to a new location could exceed the cost of licensing many times over, not to mention the loss of programming in the interim.

The frequency interference protection, which is assured by your license, is important not only for your own use of the earth station, but also for any secondary uses to which you may put your facility.

Moreover, since some forms of tampering, vandalism, and theft to a licensed facility are federal offenses, you can call in the FBI if any of these things happen to your earth station.

Licensing your earth station involves some expense and the effort of preparing and submitting your license application. Much of the expense involves the frequency clearance required by the FCC; but you have to do that anyway.

The FCC recently eased the rules for new receive-only earth terminals. Under the new regulations you do *not* have to:

- have a construction permit approved by the FCC before you build your terminal;
- prove to the FCC that you have the right to the site for an earth station;
- submit an environmental impact statement; and
- submit a financial showing, a balance sheet, or FCC Form 430 with your license application.

On the other hand, you *must:*

- comply with state and local building codes;
- go through the licensing procedure to obtain frequency protection;
- obtain rights to any program prior to using it; and
- notify the FAA if your antenna is more than 20 feet high and is close to an airport.

Unless you have an engineering consultant or contractor thoroughly familiar with the FCC procedures, you may want to get from the FCC the "Receive-Only Licensing Information Package," sent you free if you call 202-632-5930. This tells exactly how to do it. Ordinarily it takes from 60 to 90 days for the FCC to act on the application. When you get your license, and have completed a terminal carefully planned along the lines suggested here, you will know that you will have high quality access to satellite programming for a long time to come. **BM/E**

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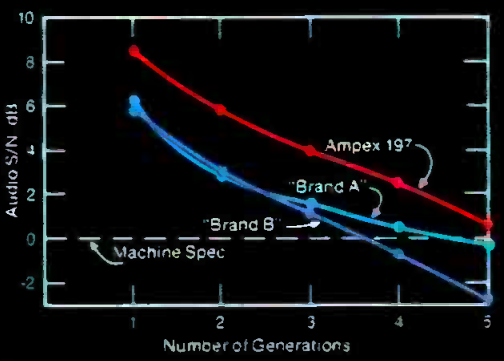

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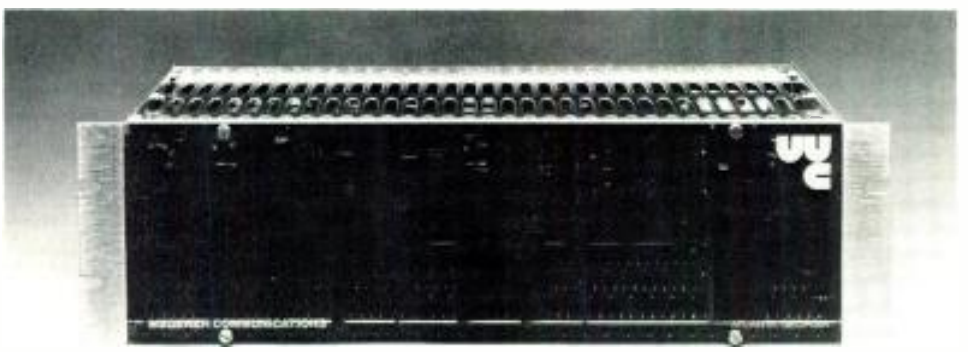
Cable Audio: Can It Deliver?

By Judith Walcutt



A rack-mountable audio converter from Wegener Communications.

The number of cable audio subscribers will more than double over the next two years, increasing from less than a million to 2.3 million. By 1986, there will be over nine million cable audio subscribers. Sixty percent of all cable subscribers, 28 million, will purchase some form of cable by the end of the decade.

"Listening to the Future: Cable Audio in the 80's," a special report from National Public Radio.

TALK TO ANYONE in the cable audio industry these days and you will find, on the one hand, a great optimism. The medium is expanding along every line, from independent program producers looking at a new distribution network for their work and services, to manufacturers coming up with the hardware to make premium audio services a viable economic reality. Add to these groups communications entrepreneurs who consider the audio component the final frontier for high-rolling ventures. On the other hand, local cable operators and multiple systems operators appear to be taking their time, regarding the medium with a cautious "wait and see" attitude that is keeping the lid on any major practical applications. Of course, everybody wants to see a success story in action before cutting loose enough capital to install and promote a true premium cable audio service. The question is, when?

The main problem with cable audio, as with many "extra service" concepts such as television's teletext, is that although the concept sounds good, no one is yet certain how many will actually be willing to pay for the premium programming service. The question was the same with cable television.

In contrast to the very big projected figures of an NPR report, conversations with experts in the field actually reveal a singular lack of any figures regarding the most basic level of cable audio support. To date, no figures exist documenting known numbers of FM drop lines running into subscriber households. When people talk about numbers in the hundreds of thousands for cable audio audiences, they are really talking about the number of cable subscribers who have the *potential* to bring cable audio into their homes, via the television hookup.

According to Dave Willis at Telecommunications Inc., the largest MSO in the country with 1.9 million subscribers nationwide, real figures can't exist until the whole method of getting cable audio into the home via the current hardware, the splitter box, is reevaluated. Furthermore, it is impossible for Telecommunications, which is primarily in the business of overseeing cable companies run by individual operators, to make company-wide policies or commitments regarding cable audio that may entail changes in local franchise agreements. Work is under way, however, to begin investigating the idea, researching security methods, and answering the problems of addressability. Willis says virtually all its systems use FM processing equipment which would allow the importation of distant signals or the insertion of additional cable channel services.

Judith Walcutt is an independent producer of programming for National Public Radio and author of numerous articles on the industry.

NEWS FEATURE

Certainly the problems of addressability and security against theft of audio services by cable subscribers has been a major stumbling block to the advancement of the industry's revenue generating power. Up to this point, it has meant only a simple trip to Radio Shack for cable subscribers to hook up their own splitter box and simply pirate what their operators offer on the FM band. The question for consumers and MSOs is: Who wants to pay for something that can be obtained free, and who wants to offer a pay service that's so easy to steal?

The major developments along these lines are now coming to a head. Both Catel, and Wegener Communications in conjunction with Pioneer, are putting the final touches on audio security hardware. In fact, Frank Genochio at Catel says that by the time this article appears, the equipment will be ready for delivery. Priced at less than $30, the hardware includes an audio converter and a splitter box.

A major feature of the system is its ability to offer tiered service by operating at both the upper and lower portions of the band. In this way, standard channels can be separated from premium offerings and the security measures applied only to the special channels. The security is provided through a scrambling system that makes listening unattractive to would-be pirates. This makes the Catel system identical to cable TV services in which the subscriber pays the basic cable charge and receives standard commercial channels plus free services such as SuperStation WTBS and CNN, then pays an additional charge for services such as HBO or Showtime. Ten thousand PAS-2000 demo units were installed by mid-May, giving Catel an early lead in this area.

The Wegener audio converter, which Pioneer is manufacturing, is perhaps less specific in its capability, but may help operators keep their records straight. Ned Mountain at Wegener, considered by many to be the foremost expert in the field of cable audio technologies, describes the unit as an "all-or-nothing proposition." The subscriber will pay one fee and receive the audio descrambling box which will provide access to any material on the FM band, but with extremely high quality. No "extra service," two-tiered approach is planned. The Wegener unit is also in the $30 bracket.

Now that the equipment exists to make the audio offering economically viable for the operators and MSOs, what should the next move be? Mountain says, "It has always been my contention that if someone develops a package

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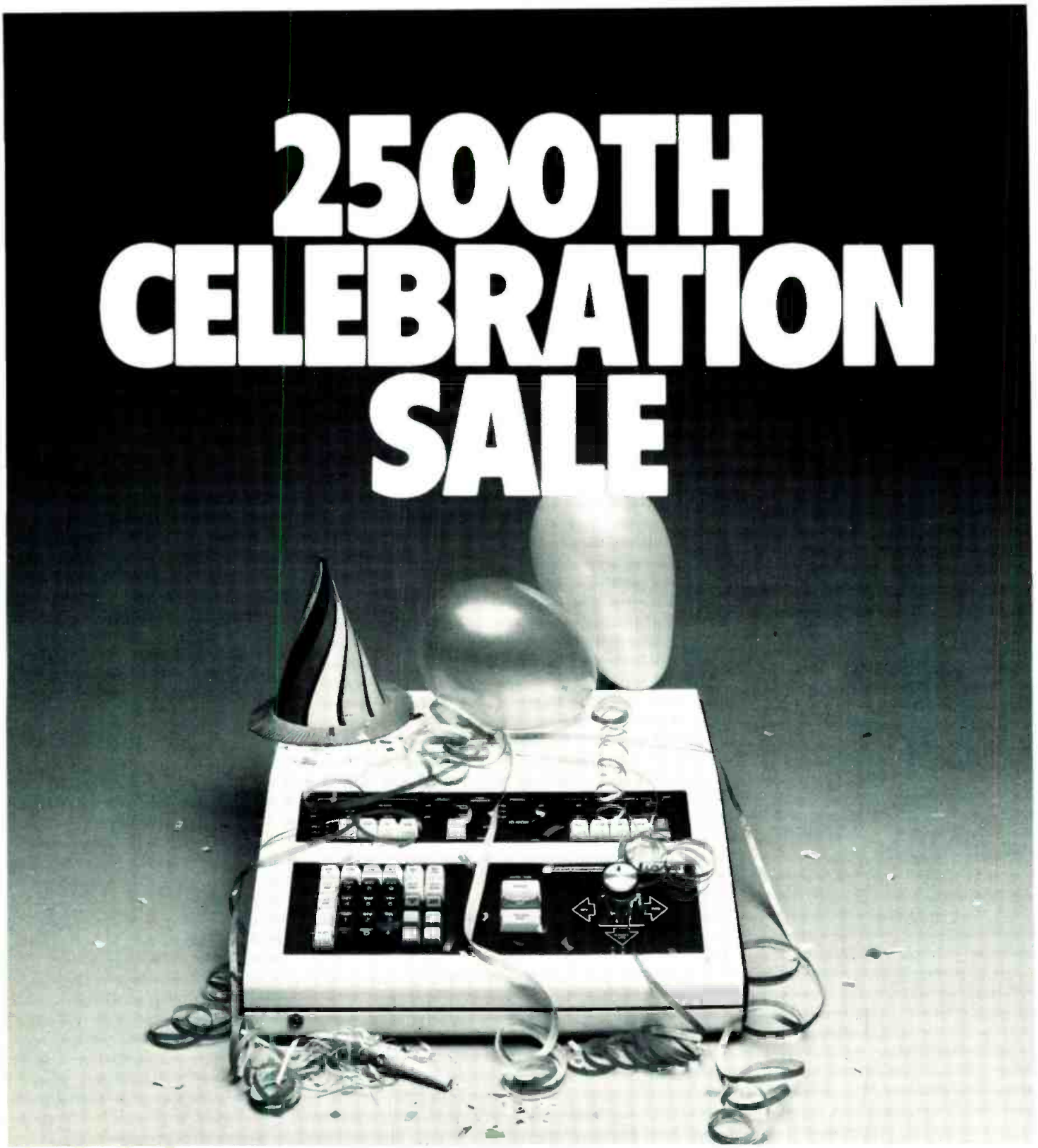

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of many channels with high-quality audio, the equivalent of HBO for radio, offering commercial-free music, information, and formats which are distinctly different from regular radio formats, subscribers will be willing to pay for that service. We are beginning to see some development in that direction now, with satellite-delivered audio cable services now available to the cable operator. The software is available, the hardware is ready, and the next step is for the MSOs to do some marketing tests, to see what kind of penetration they can achieve."

Enter the producer

This is the point at which program producers must rally and premium service offerings flourish. To test how much and what a subscriber will be willing to buy, there must be a choice available, which means a lot of private enterprise developing independent audio services.

One such outfit, which offers audio services exclusively, is Satellite Syndicated Systems of Tulsa, which has a satellite audio service called SCAN (Satellite Cable Audio Networks). As of the NCTA show in June, SSS began beaming 10 separate services nationwide; nine nonbroadcast origination and the tenth off Cleveland's Nationality Broadcast Network, which provides news, talk, and public affairs in 38 languages.

The nonbroadcast services are largely a joint endeavor with John Doremus, including his "Music in the Air" programming heard on most domestic airlines. The material offered includes two full stereo programs—a Country Western channel and a Broadway/Hollywood channel. Three mono channels carry music of the 1950s and '60s, Big Band music, and a comedy channel. The full set of "Music in the Air" channels is subcarried on Transponder 6 of Satcom III R, piggy-backed with the WTBS video signal. Two additional stereo channels—a Rhythm & Blues program and one called "Rock-a-robics" (disco)—will be piggy-backed with SPN on Satcom IV, Transponder 3.

Currently carried by systems in Alaska, Colorado, California, and Hawaii, the services are all 24-hour, commercial-free programming, offered to operators for a fee of two cents per channel, per basic subscriber, per month. In the case of individual cable operators where there are 250 or less subscribers, there is a minimum fee of $5 per channel per month. In larger systems where there are more than 18,750 subscribers, there is a maximum fee of $375 per channel, per month.

According to Phyllis Vedders of Satellite Syndicated Systems, the selling

point of these services is the packaging possibility for cable operators. For minimal cost, they can offer the SCAN channels along with movie channels and sports as a tier of stereo audio services.

Jazz superstation

The fact that sss charges for its channels may keep some operators from taking the plunge. But there is no reason why they cannot begin with importation of distant signals to provide a viable intermediate step in expanding their cable audio offerings. The most recent breakthrough on that front is the launching of KKGO Jazz Network. The 25-year-old commercial jazz station out of Los Angeles went up on Satcom IV, Transponder 7, the last week in March, piggy-backing with Trinity Broadcasting, which has dozens of feeds to stations and cable systems around the country. Saul Levine, president and general manager of KKGO, says the response has been phenomenal. As the only jazz superstation in the country and as a service offered free of charge to cable operators, it is no wonder. With Cox Cable carrying it in San Diego alone, KKGO has a potential audience of 300,000 subscribers. Because it is a commercial station that supports itself on revenues from advertisers, Levine is not concerned with the security issue plaguing other contenders in the field.

Catel's descrambling system.

The cable audio scrambling system from Catel.

In fact, to determine how far away the signal was being picked up by home satellite dishes, the station recently gave away albums to people calling in from distant locations—some as far away as Canada. As a commercial operation, KKGO can afford to be generous with its signal. The more listener response it gets, by whatever means, the more it can develop its base for national advertising. Levine promises the rates won't go up; but if all the agreements currently out to cable companies come back signed—giving KKGO access to well over a million cable subscribers—a rate increase would not come as a big surprise.

Asked his opinion of cable audio's impact on the radio broadcasting, Levine observes: "If we didn't have this unique format, I think I'd be more concerned. We're playing both sides of the fence by getting into it. But I think the greatest impact will be felt in the smaller markets. Take Las Vegas, for example. They're building their cable systems right now and plan to carry 50 FM stations! You can believe that the local market *is* going to be impacted."

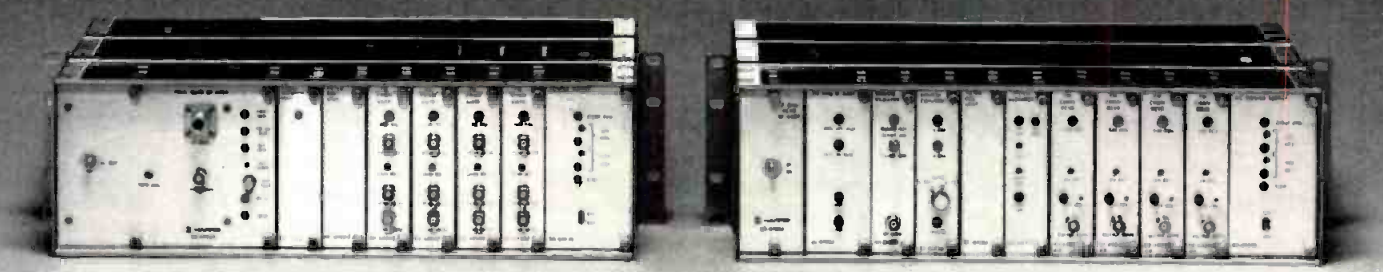
Besides national distribution of local commercial broadcasts, a likely source of new material for packaging by cable audio service developers is the community of independent radio producers. At a time when there is little money available for program development, there is an opportunity to pool programming that already exists.

In May a new organization was formed which could make acquisition of a variety of program materials for cable audio a much easier and cleaner process. USAudio is a joint venture by Audio Independents Inc., Eastern Public Radio, and the Longhorn Radio Network. They've pooled their organizational resources to provide program distribution, promotion, and marketing for producers. According to Michael Toms, executive director of Audio Independents, USAudio will go after the cable field: "We see cable audio as an opportunity for developing an entirely new audience for producers of creative programming. We are engaged now in talking to major funders. As far as launching goes, I think we're looking at early 1984. We've already had indications from some major cable operators that there is some interest in the program resources we have in our hands."

Having options to choose from is, in the long run, what is going to pay off in subscriber revenues. But in the short run, between now and 1984, this infant industry is still trying to find ways and means to get the MSOs to loosen up enough for new ventures to develop. All it takes is one entrepreneur—like a Ted Turner—and suddenly the whole field will get hot. Both the operators and the MSOs complain, however, that they have so much to worry about, what with franchises and building the systems and handling their video program choices, that they just don't have time to program cable audio. It's much easier just to throw on the all-FM band.

It is to counter this resistance that has spawned new ways to open the cable audio industry. One is being pursued by Kevin Leja, who has started an enterprise called Comlink in Minneapolis. He has researched the cable audio industry and has prepared a proposal for setting up a locally originated cable channel. He would offer a format aimed at the 25-to-40-year-old audience, offering new music, album play, targeted news and information, and entertainment. He wants to offer the service free to cable operators, and build revenue through advertiser support. The main stumbling block is how he can sell advertisers on the medium if cable systems do not promote the audio service to subscribers. (One cable system in the Minneapolis/St. Paul area is

Advanced technology in a new, compact television relay system...



Harris 7FB Solid-State Microwave for Television Relay

Designed for STL, TSL and Multi-Hop Systems

Introducing a new, compact baseband radio from Harris Broadcast Microwave. Designed for easy installation in existing equipment racks, each receiver or transmitter uses only six rack mounting spaces. Yet this compact television relay system offers superior transmission performance for single-hop STL/TSL systems and for many multi-hop intercity systems.

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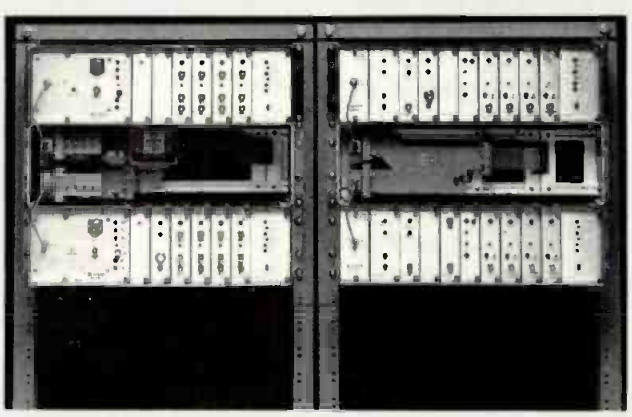

In this fully protected system, the audio and video signals automatically switch to a second system in the event of service interruption to the main receiver and transmitter.

Video Clamper is a Standard Feature

Some manufacturers call this a luxury option. We call it built-in quality. Our 7FB receiver includes a clamper which stops picture bounce, reduces low frequency noise and eliminates hum from the video signal.

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You can easily expand your 7FB system, in the field if you wish, to a fully protected version. The monitored hot standby protection arrangement is offered as a factory option or as a field installed add-on. And you can equip the system with up to four audio subcarrier channels —in the same shelf as the radio.

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To save maintenance time and cost, the 7FB is designed with modular plug-in units. This design allows each unit to be quickly and easily removed for servicing.

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HARRIS

Circle 155 on Reader Service Card

pushing its cable audio by giving small bonuses to installers for each FM drop they make.)

One possibility Leja is considering, to get beyond the "wait and see" stance, would be to contract with cable operators to handle the whole cable audio development. Working within the framework of the operators' hardware needs and specifications, the audio cable "contractor" could manage subscriber development, programming, and sales.

This option may not be feasible for some time down the road, when MSOs have finally determined cable audio policies. On a larger scale, Kevin Albin may be one of the most influential people on the cable audio scene. He was in on the primary planning and testing of MTV. Albin now works as an independent consultant with a specialty in the field of cable audio. He's one of very few individuals in the country who has in-depth experience in planning for the future of cable potential and then executing the plan. He now works with MSOs, ATC in particular, in drawing up plans for cable radio. "Oftentimes, MSOs are as confused as many others about cable audio," he says,"—what it is, and how it can be put together in a programming package which can be sold as an ancillary service. So one of my first activities with an MSO is education. Then, I try to take it from there by looking at a systems overview, determining which operations within the family of systems would be the ripest targets for developing cable audio services. From there, it's a matter of business planning and building models."

The most advanced work that Albin is developing now is in the area of digital pay audio services. Though forced to deal within the analog system for the most part, Albin looks to the day when the subscriber will have a box in the home which would receive signals from the cable headend in its digital form. Between the time when the hardware catches up with the technology, Albin and audio cable specialists like him who have the foresight to develop the right package, at the right time, for the right system, may just prove to be the shakers and movers, as Turner is in CATV.

In short, cable radio today is in much the same position as cable television was 10 years ago—a service whose actual realization is still evolving. But as hardware and technology develop, and cable operators strive to meet their subscribers' continuing demand for the newest and the best, cable audio will undoubtedly grow into its rightful place alongside cable TV. **BM/E**

BM/E READER SERVICE CARD July, 1983 Issue

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Radio Deregulation Gets a Boost

By Harry Cole, FCC Counsel

THE FCC, MOST RADIO broadcasters, and even some television broadcasters breathed a collective sigh of relief last May as the U.S. Court of Appeals for the District of Columbia Circuit upheld all but one aspect of the Commission's 1981 decision to deregulate, in large measure, the commercial radio industry. The decision not only affirms radio deregulation, but could pave the way for television deregulation and even, possibly, congressional action leading to more permanent, across-the-board deregulation.

In January 1981, the Commission, led by then-lame duck Chairman Charles Ferris, adopted a number of deregulatory proposals initially advanced by the FCC in late 1979. The action, which affected only commercial radio broadcasting, eliminated formal ascertainment procedures, program log requirements, and quantitative guidelines for nonentertainment and commercial programming. More important than the particular measures taken, though, was that the deregulation was based on the increasingly dominant theme of "regulation by the marketplace." This concept holds that the government can step away from its regulatory role when there exists in a given industry sufficient competition to assure that competitive forces will exercise essentially the same regulatory functions as were previously exercised by the government. Indeed, the theory further holds that those functions can be more economically and efficiently accomplished by the marketplace. Since modern broadcasting has never experienced these competitive forces free of governmental involvement, however, the validity of the marketplace theory in that area has yet to be conclusively established. For this reason in particular it seemed a distinct possibility that the Court of Appeals might simply reject the FCC's decision to withdraw from its active regulatory role. And the court did, in fact, express some hesitation.

As a result of the decision, three of the four primary aspects of the radio deregulation remain intact. Commercial radio broadcasters will still be free of any quantitative guidelines relative to nonentertainment and commercial matters, and they will still be free of any formal ascertainment obligations. The court couldn't accept the elimination of the program logging requirement, however. It reasoned that, if the Commission really intended to monitor the radio industry to make sure its deregulatory actions did not have any adverse effects on broadcast service to the public, it would need some records on which to base its monitoring. And, while the old program logging rules were clearly much more detailed than necessary to accomplish that goal, the court suggested that the FCC should have considered adopting some modified logging requirements designed to provide the Commission with the kind of information it and others would need to assess the performance of the deregulated industry. Accordingly, while affirming the other aspects of the Commission's decision, the court sent the logging issue back to the FCC for further consideration.

Overall, the court stated that there has been no change in two longstanding regulatory concepts. First, broadcasters continue to be "public trustees" who owe a substantial obligation to the public. Second, broadcasters are obligated to provide nonentertainment programming responsive to local community issues. In fact, the court maintains that this obligation is imposed on broadcasters by Congress, in the Communications Act, and not by the Commission. Thus, in the court's view, the Commission could not unilaterally eliminate the nonentertainment programming obligation without some revision of the Communications Act by Congress. These two fundamental aspects of broadcast regulation have not been eliminated. Far from it. The court in fact continues to support the notion that a licensee's "renewal expectancy" can and should be based on the nature and extent of such programming provided by that licensee. The "renewal expectancy" concept, which we discussed in this column in the February 1983 issue of *BM/E*, is (or should be) a central concern of every licensee, since the renewability of one's license could depend on it. Thus, broadcasters should still assume not only that they must continue to provide nonentertainment programming, but also that the renewability of their licenses depends on the types of such programming they air, how much they air, and when they air it.

There is likely future fallout from the court's decision. First, the decision seems to assure that the long-awaited television deregulation proceeding may be imminent. While generally interested in deregulating television along the lines of the commercial radio decision, the Commission, it appears, has been reluctant to go forward without knowing whether the court would reject radio deregulation and, thus, make any television deregulation effort futile. Now that radio deregulation has been upheld, the FCC's reluctance to get going on its television counterpart should be eliminated.

Of course, the Commission will still have to go through a full rule-making proceeding, and, as was the case with the relatively expedited radio deregulation decision, such a proceeding will probably take at least 15 to 18 months to complete. Television licensees should therefore not be holding their breath. And it should be recognized that, notwithstanding the recent court opinion, television deregulation may not be a sure thing. After all, the marketplace theory may be acceptable in the radio industry, with some 10,000 competing stations, but far less acceptable in television, where only about 1000 stations are competing.

In addition, it is likely that the Commission, taking the court's vote of confidence to heart, will move forward into other deregulation. It is considering wide-range inquiries into the possible elimination of many of its basic technical rules, including the need for operating logs, maintenance logs, and even technical rules themselves.

But against this rather rosy background it is still important to recognize a number of fundamental truths. For example, the court's opinion includes a closing reminder of one of the less publicized—but nonetheless most important—aspects of the deregula-

tion. In the words of Judge J. Skelly Wright, "Congress, and not the Commission, may be the more appropriate source of significant deregulation. It was Congress, after all, that created and oversaw the evolution of the original regulatory scheme for radio and television licensees. It should thus be Congress, and not the unrepresentative bureaucracy and judiciary, that takes the lead in grossly amending that system, thereby providing the public with a greater voice in this important process." It has long been argued by a number of interested parties—perhaps most notably the National Radio Broadcasters Association—that the wisest course would be to pursue congressional, rather than administrative, deregulation. The rationale is fairly easy to grasp. Administrative deregulation—that is, deregulation by the FCC—can be altered or completely reversed by a mere vote of a majority (i.e., three) of the now five-member Commission. If deregulation is enacted by Congress, on the other hand, any change would require a vote of the majority of the House and the Senate, an obviously greater number of votes to garner. As a result, congressional deregulation is likely to be much more permanent than any action taken by the Commission. And, as Judge Wright's opinion indicates, congressional action might be more desirable, at least to the court.

Also, the court which upheld radio deregulation is still considering what to do with the Commission's short-form renewal decision, which reduced the once lengthy renewal application for virtually all broadcasters down to a five-question post-card-sized form. Some observers think that the court is going to hold that decision in abeyance until the court gets some assurance that the Commission is not simply using the rhetoric of marketplace forces as an excuse to avoid its statutory obligation to regulate broadcasting "in the public interest." The court notes in its decision that the short-form renewal decision could eliminate effective review of licensees' performance if the complete elimination of the programming logging requirement is not tempered somewhat. The implication, obviously, is that the court will await Commission reconsideration of the program log issue before signing off on the short-form renewal decision. Indeed, one of the three judges stated for the record that he, for one, did not "take [the court's radio deregulation decision] to suggest a disposition of any other pending case."

An interesting, if somewhat enigmatic, aspect of the court's decision is at least two specific references to the fact that broadcast licenses are handed out by the government free of charge. The court seems to have been impressed by the claim that station owners are given, for "free," valuable licenses with which to make a profit. It is hard to understand whether these passing references were simply that, i.e., passing references intended to tweak the industry, or whether they might signal a belief by the court that broadcasters might be able to "trade" some kind of license or spectrum fee for further deregulation. While this question may be academic right now, it may become much less so if and when Congress decides seriously to confront the question of license fees as a quid pro quo for legislative deregulation.

In summary, the court's decision in May could signal a major step ahead for the forces of deregulation, but it would be at most a tentative step subject to a variety of ifs, ands or buts. A far less tentative step could be taken if Congress follows the FCC's deregulatory lead and does statutorily what the Commission has done administratively. The court's decision could serve as a spur for just such action. **BM/E**

GREAT IDEA CONTEST

Here's a chance to share your own personal solutions to some of broadcasting's most vexing engineering needs . . . .

Each month, *BM/E* presents two engineering problems and invites you to submit solutions complete with diagrams. *BM/E's* editors will read the entries and select the best for publication—giving readers an opportunity to vote for the idea they consider best by using the ballot area on the Reader Service Card.

We will pay $10 for each entry printed. In addition, the solution in each month's competition receiving the most votes on our Reader Service Card will win $50.00. So put on your thinking cap and submit an answer to either of the problems outlined below . . . and be sure to watch this section for the solutions.

NEW, BIGGER PRIZE: $50.00 FOR EACH CONTEST WINNER!

Problem 20: Newsroom Switching

For expanded news coverage, an AM/FM station will build two news workstations. Design a switching system so each can have two record/play cart machines, cassette record/play machine, reel-to-reel tape machine, and telephone. Each newsman should have pushbutton switching from one recording medium to another, and access to a number of sources: network news (via satellite and wire), air monitor, main studio monitor, local scanner, weather channel, and telephone. Headphones or small speakers can be used for monitoring.

Solutions to Problem 20 must be received by July 20, 1983, and will be printed in the September, 1983 issue

Problem 21: Impedance Matcher

When recording audio in the field, the engineer is often confronted with a problem of matching various mic and line impedances with the audio recorder. What is your design for a low-cost, lightweight system to allow the matching of recorder and input impedances?

Solutions to Problem 21 must be received by August 22, 1983 and will be printed in the October, 1983 issue

CONTEST RULES

1. **How to Enter:** Submit your ideas on how to solve the problems, together with any schematic diagrams, photographs, or other supporting material. Entries should be roughly 500 words long. Mail the entries to *BM/E's* Great Ideas Contest, 295 Madison Avenue, New York, NY 10017. Use the official entry form or a separate piece of paper with your name, station or facility, address, and telephone number.
2. **Voting and Prizes:** *BM/E's* editors will read all entries and select some for publication; the decision of the editors is final. Those selected for publication will receive a $10 honorarium. Each month, readers will have an opportunity to vote for the solution they consider the best by using the Reader Service Card. *BM/E* will announce the solution receiving the most votes and will award the winner of each month's competition a $50.00 check.
3. **Eligibility:** All station and production facility personnel are eligible to enter solutions based on equipment already built or on ideas of how the problem should be solved. Consultants are welcome to submit ideas if they indicate at which facility the idea is in use. Manufacturers of equipment are not eligible to enter. Those submitting solutions are urged to think through their ideas carefully to be certain ideas conform to FCC specs and are in line with manufacturers' warranty guidelines.

Mail Official Entry Form to:

BM/E's Great Ideas Contest
295 Madison Avenue, New York, NY 10017

Solution to Problem # _____

Your Name: _____

Title: _____

Station or Facility: _____

Address: _____

_____

Telephone: (____) _____

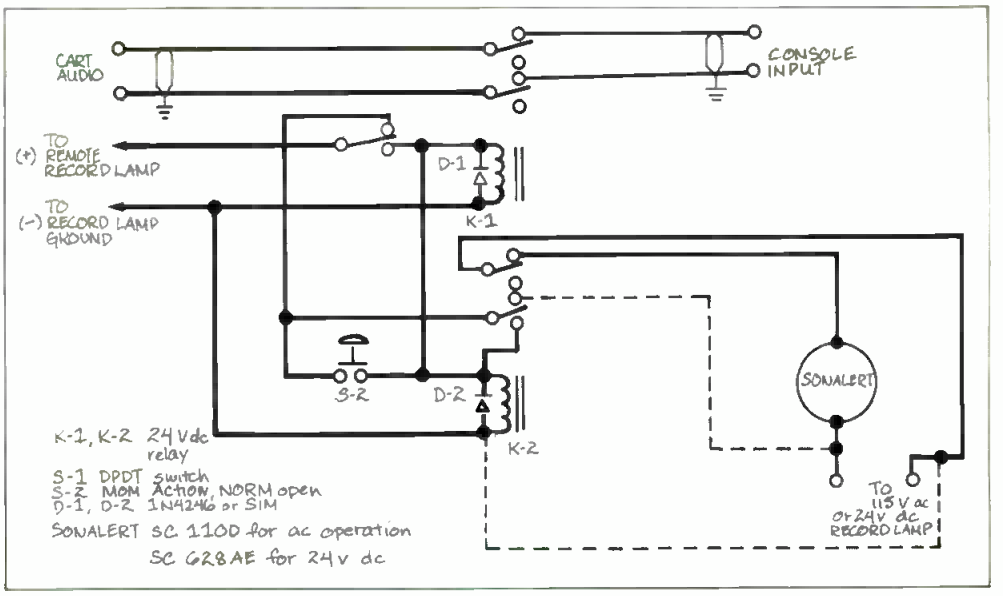
I assert that, to the best of my knowledge, the idea submitted is original with this station or facility, and I hereby give *BM/E* permission to publish the material.

Signed _____

Date _____

SOLUTIONS to problem 17: Preventing Echo in Cart Recording

Instant winner! This month's winning entry was submitted by Stephen C. Ellis, director of engineering, WGIL-AM/WAAG-FM, Galesburg, IL.



In its simplest form, my solution is a single relay operated by the record lamp circuit when the record function is "set," opening the audio circuit to the console. This solution is very inexpensive and quick to implement, and I have used a form of this circuit on cart machines of several manufacturers.

The circuit I have drawn will open the audio circuit to the console and may also be used to insert delayed audio back into the recording for a reverb-type effect if so desired. I have used this circuit with only K-1 and S-1 in the circuit, but without K-2 and its circuitry, the possibility exists of leaving S-1 in the reverb position and again getting an echo when it is not desired.

With the use of K-2 and so on: when S-1 is in the reverb position, an alarm will sound when the record function is "set." Pushing S-2 will kill the alarm until the next time the record function is "set." With S-1 in the reverb off position, the alarm will not sound and the audio to the console will be disabled. Since both K-1 and K-2 will both be drawing current from the record lamp circuit when S-1 is in the reverb off position, one should be certain that the record lamp circuit will handle this additional current. I would also recommend that the Sonalert alarm use a separate supply and not use the record lamp for power. If one is certain that the lamp circuit will handle the current, then the circuit may be wired as broken line on diagram indicates.

I have not built and used this curcuit with the alarm circuitry, but if the record lamp circuit will handle the current required it should work as drawn.

Great Idea Contest Winners

Our readers have selected the following winning solutions to recent Great Idea Contest problems.

Problem 11, "Cart Automation," solutions to which were printed in last November's issue, was won by William Howe, chief engineer at WEIV, Ithaca, NY (Solution C).

Problem 12, "Microphone Switching," solutions to which were printed in the December issue, was solved best by Glen Calderone, assistant CE at KZH-31, Long Beach, CA (Solution B).

Our congratulations to both these gentlemen, who will receive $50 prizes.

We also congratulate Stephen C. Ellis; director of engineering at WGIL/WAAG, Galesburg, IL, for the "instant winner" solution to problem 17, printed above, "Preventing Echo in Cart Recording."

broadcast EQUIPMENT

Crown Introduces Spectrum Analyzer 250

Tecron, a newly formed division of Crown International, has released the TEF System 10 microprocessor-based, two-port test system. The TEF System is an implementation of the research in swept-spectrum technology at Jet Propulsion Laboratories, and incorporates the principles of time delay spectrometry.

The System 10 is portable and offers spectral analysis in the dc to 31 kHz range. Complete in its 22x18x7.5-inch metal case, the unit weighs forty pounds. It performs complete spectral analysis of structures, components, and materials for studios and live recording.

The TEF machine includes a 92-character keyboard on a hinged cover, a seven-inch green phosphor CRT, 5¼-inch floppy disk drive (dual drive is optional), three Z80 microprocessors, and sealed lead acid batteries which float on the dc bus. This provides emergency power to complete tests in progress.

A 96K RAM computer, the System 10 is capable of performing all types of standard digital computation. It is also a hybrid, making use of both analog and digital signal processing. Software-based and menu-driven, the computer has all instructions built into the software, which includes data recording programs and a "scratchpad" for entering job descriptions.

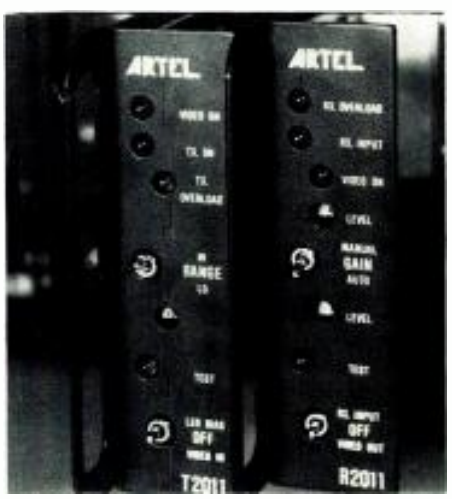
When in use, the TEF output sweep signal is fed to a system under investigation (for example, a room, a component). A transducer picks up the signal coming from that system and feeds it to the TEF tracking filter whose sweep exactly matches that of the output signal. The machine also provides for adjustable delay to be programmed into the filter.

Artel Develops Fiber Optics Computer Graphics 251

A new fiber optics computer graphics communication system, the T/R-2011, transmits and receives ultra-high-resolution computer-generated video up to 100 times further than conventional coaxial cable. The transmit module (T-2011) transmits high-resolution RS-170 video up to 10,000 feet over fiber optic cable. The bandwidth accommodates either 640X512 or 512X512 pixel resolution.

The modules permit long-distance interconnection of the workstation monitor and the computer video display generator without loss of resolution. The fiber optic cable also eliminates electromagnetic noise, hum, and ground faults. Both RGB and monochrome video signals can be handled and dual BNC input/output connectors are plug-compatible to all monitors and display generators.

The T/R-2011 modules are automatically self-monitoring, self-testing and alarming, and perform on-line without program interruption and without test equipment. Automatic gain control and dc clamping features help stabilize color and picture levels.



PEL Unveils Digital Picture Computer 252

Picture Element Limited (PEL), a new company in Palo Alto, CA, released its first product, the Video Sequence Processor, or VSP. The unit offers a combination of real-time digital recording and display, support for a variety of video formats, and computing capability in one system.

For the first time, according to the company, one system can digitally record up to eight minutes of moving-image sequences on computer-accessible media in real time. In addition, the system provides computer-process-stored sequences or computer-generated image sequences frame by frame, as well as displaying these stored sequences in real time, slow motion, or still frame.

The VSP records and plays back a variety of video and graphics formats such as: 525 or 625 lines per frame at 25, 30, 50, and 60 frames per second; 1125 lines per frame at 25 and 30 fps; 512x512 and 1024x1024 at 25, 30, 50, and 60 fps. All of these formats can be monochrome, composite (NSTSC, PAL, and SECAM), component (Y, I, Q, and Y, U, V), or full color RGB.

The VSP computer allows up to four workstations, and each has a dedicated 32-bit processor with direct access to the on-line video sequence data base. Fortran and C compilers and extensive support tools enhance the user's own software development.

The VSP is suitable for applications in video animation, television post-production, video special effects, and previewing film animation. With the system, each frame of an animated sequence can be created and stored, and at any point in the creating process can be viewed in real time, slow motion, or still frame.

■ FOR MORE INFORMATION ■

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Dexcel Announces Satellite Receiver 253

Dexcel, a division of Gould, has added the DCR-4000 system to its line of products. The system is designed for cable television satellite receiving and consists of a low-noise block converter and a commercial grade receiver. Each of the receivers in a rack of the 4000 system can act as a master or a slave receiver, making use of loop-through technology to minimize cabling.

The DCB-4000 block converter converts the signal using a frequency synthesizer at the antenna site. The reference frequency is sent up the cable to the LNB by the first receiver in the rack, which contains a 3.5 MHz reference crystal oscillator.

A 510 MHz PLL demodulator and a saw filter are incorporated into the DCR-4000 to improve frequency response, phase response, linearity, and S/N ratio. The demodulator output is filtered at 5 MHz to remove subcarriers and is amplified in a 15 MHz video amplifier. Clamping is front panel switchable to sync-tip or backporch and can be switched off as well.

All local oscillators for video and audio are under crystal reference and drift in less than ± 30 kHz for the entire system. Measured threshold is 7.5 dB. Receiver system circuits operate at 12 volts and an optional backup battery protection for power outages or remote locations is provided.

RCA Announces New Weatherwriter 254

The RCA Service Company is marketing the Weatherwriter, an advanced receive-only printer capable of providing enhanced weather information reception. The unit is a compact desktop device that offers higher speed, more flexibility, and quieter operation than most currently used terminals, according to RCA.

With the recent upgrading of information delivery speed from the National Weather Service to 300 baud, most weather reception devices will not meet the standard. The RCA unit features switch-selectable five or eight level operation, 30 characters per second print speed, Baudot or ASCII code flexibility, and audible and visual alarms generated upon receipt of severe weather alert.

A message selector option allows the operator to print only those weather messages of interest to his location. Lease/service starts as low as $93/month.

CAT Splicer from Soundsplice 255

This new machine is small enough to fit onto any studio tape deck and an easy fit is guaranteed by the manufacturer. The unit is made of the base assembly and the joining tab assembly.

The base performs the cutting operation and consists of a tray with two cutting plates. The plates are hinged to the base tray, moving independently in a scissor-like action. The plates are precision machined of antimagnetic steel with self-sharpening cutting edges.

A channel a quarter of an inch wide across the top surface of both plates provides an angle cut of 45 degrees, with a new unit soon to be available providing a 60-degree cutting angle. The joining tab assembly dispenses a precut splicing tab over the two ends of the tape, with the tab automatically centered and aligned.

The CAT Splicer uses precut adhesive tabs mounted on a continuous strip, housed within a cassette which is replaceable. Each cassette contains 350 tabs.

BUSINESS BRIEFS

A.F. Associates recently completed this 29-foot mobile unit for ABC-TV. The van includes two Ampex one-inch VTRs, GVG switcher, and Yamaha console.

Widergren Communications, a research and development company engaged in the application of data compression technology to computer and video products, has been awarded a $770,500 contract from the U.S. Department of Defense for a video telephone transmission unit that the company says will reduce teleconferencing costs by almost 95 percent.

Matsushita has revealed that it granted **3M** a license to use Matsushita patents and technology to make a new generation of thin-film, high-density video recording tape . . . . **M/A-COM Omni Spectra** has increased its sales support in Canada by joining forces with **MA Electronics** with offices in Mississauga, Ontario and St. Laurent, Quebec.

An agreement has been signed between **Data Communications Corp.** of Memphis and the **Tribune Companies** of Chicago for DCC to automate three TV stations owned by the Tribune . . . . **Control Data** and **ADR/Cadre** have formed a partnership to offer computer-based services to broadcasters and cablers through a new company called **Magnicom Systems.**

Midwest Corp. has provided a new nine-meter **Harris** earth station to the **American Network** for satellite-delivered entertainment . . . . **Hernreich Broadcast** has ordered broadcast equipment, including antenna and microwave systems, from Harris valued at $1.4 million . . . . **Interstate Communications** will provide analysis to **Telecommunications Transmission Systems** for its two regional radio network satellite transmit facilities for Ku-band operation.

The **Texas State Radio Network** is obtaining satellite downlink equipment from **Modulation Associates** for reception of national and regional networks on Westar III.

National Video Center recently installed the **Bosch Fernseh** FDL 60B CCD film transfer system 60XL color corrector . . . . **Matrix Video** has added an **Ampex** ADO effects generator to its CMX editing systems . . . . **Positive Video,** a California-based post-production facility, has also added the ADO to its services. Another ADO has been placed on line at **Continental Productions,** based at WYAH-TV.

Global Video has opened its new Atlanta office in addition to those in Hollywood, CA and Orlando, FL . . . . **Hy James Audio** recently celebrated a grand opening of new offices at Farmington Hills, MI . . . . **M/A-COM** has relocated personnel and moved to a new facility in Merrimack, NH.

Management changes have taken place at **3M**'s Magnetic A/V Division and its new Broadcasting and Related Products Division, and they include: Edoardo Pieruzzi as new VP of Magnetic A/V, succeeding Alfred Smith, who becomes VP of Broadcasting and Related Products. Jack Hanks is the new GM of ITC, a 3M subsidiary.

At **For-A,** two new announcements: Tedd Jacoby was named national sales manager, and Risshi Morioka was appointed as GM of the home office.

Harris Corp. has selected a new GM for its Satellite Communications Division, namely James Lakin . . . . **CMX/Orrox** appointed George Cotroneio to the position of sales manager . . . . Kathryn Pelgrift was named by **RCA** as the new staff VP, strategic planning . . . . A new president and CEO has been named at **Ampex,** and he is Roy Ekrom.

At **Ikegami,** Frank Heyer has been named as manager of sales and engineering for graphic displays and broadcast monitors . . . . **Scientific-Atlanta** announced that its new senior VP is John Levergood . . . . **Acrodyne** revealed that the position of national sales manager has been filled by Joseph Wozniak . . . . Gary Schmidt has recently joined **Artel Communications** as manager of broadcast sales . . . . **Minolta** announced that John McCasland is the new Industrial Meters sales manager.

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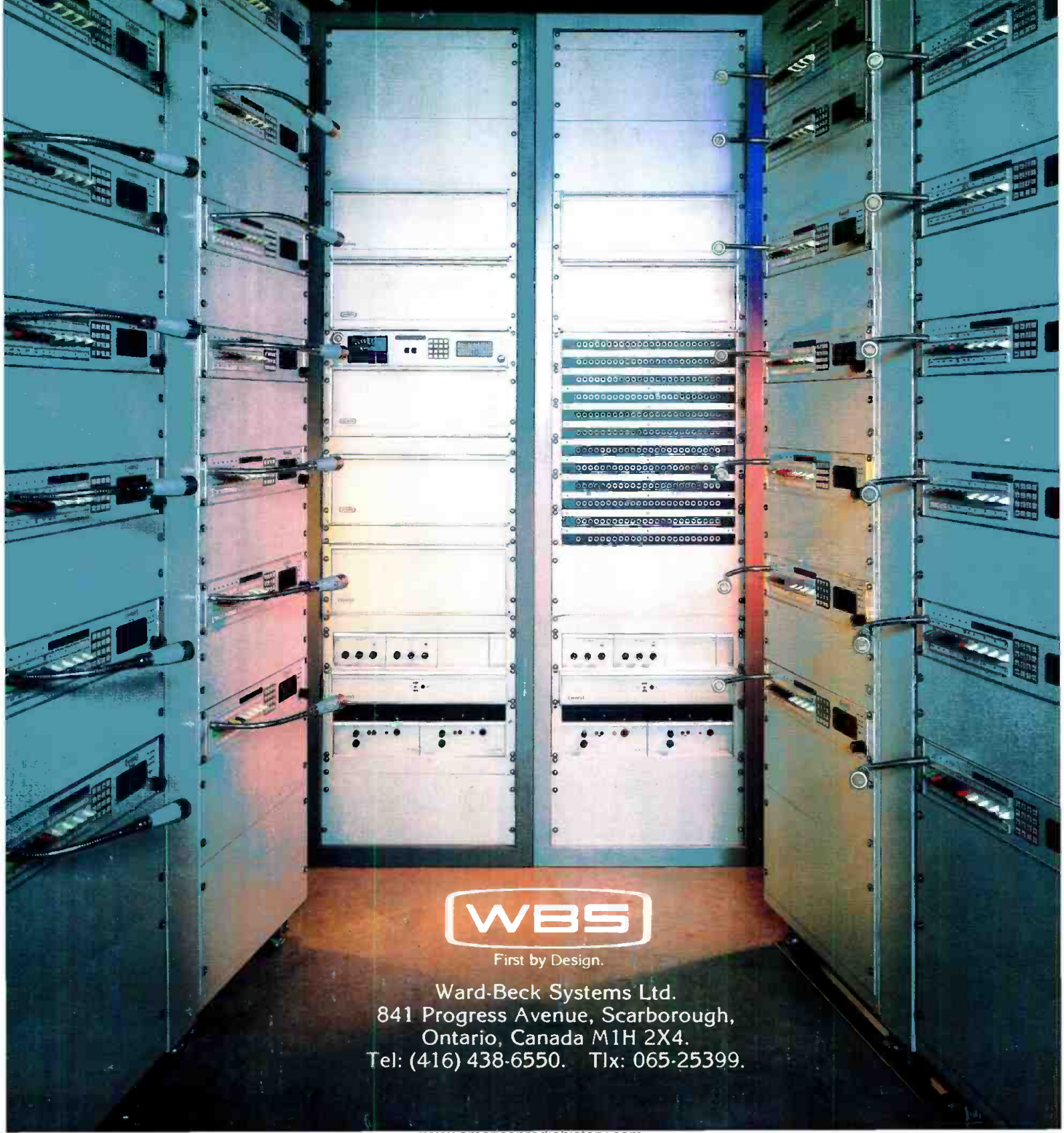

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