BROADCAST® engineering

Satellite technology

November 1982/$3

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Compact, clean and capable

It's hard to believe that so many outstanding features could be packaged in a compact, desk-top audio console. But we did it. The new ADM 1600 Series II sets new standards for versatility and capability.

This new console is available with up to 16 discrete inputs, 4 submaster and 2 master outputs. Along with a host of optional modules, the 1600 is perfectly matched to today's production and broadcast environments. And, like all ADM consoles, it is manufactured to the highest quality standards and backed by an exclusive 5-year warranty.

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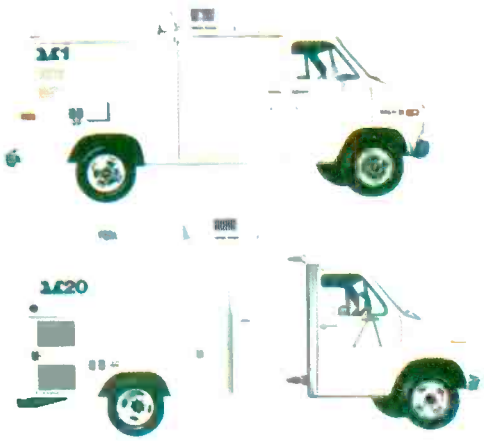
The Audio Company

1600 SERIES II

When the action's hard-hitting, Midwest and Panasonic Video Systems will put you there!



Panasonic Gives You The Performance And Reliability You Need. Midwest Gives Them To You Fast... And At A Super Price!

You can depend on Panasonic Industrial video equipment to give you the performance you want and to take the hard-hitting action of mobile unit installations. That's why so many mobile production companies choose them.

If you need a mobile unit that can take in all the action ... and take all the punishment on-location shots hand out ... you need to talk to Midwest about their complete line of Panasonic-equipped mobile units. Midwest maintains a solid inventory of the complete Panasonic Industrial video line. The new WV-777 Camera shown here is but one of a wide range of components from the Panasonic Video Systems Division.

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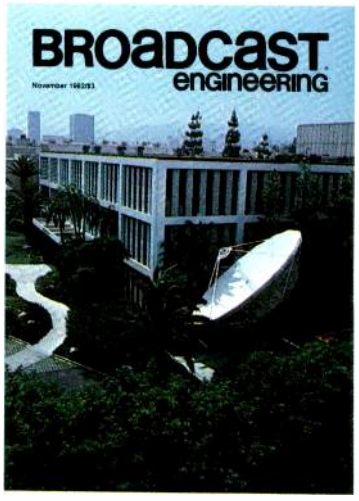
BROADCAST ENGINEERING

The journal of broadcast technology

November 1982 • Volume 24 • No. 11



THE COVER depicts an increasingly common scene in today's broadcasting business—a satellite communications earth station serving a TV company in the heart of a busy metropolis. Shown is a 9m (30-foot) steerable Harris antenna at station KTTV, located at Metromedia's corporate headquarters in Hollywood. The dish can be moved automatically under a computer program that enables it to lock onto different satellites for changes in programming—in less time than a station break. Photo by Jay Freis, courtesy of Harris Corporation's Broadcast Division, Quincy, IL.

NEXT MONTH leading authorities from the major networks; the NAB and NRBA industry associations; and consulting firms will speak out on how key issues and new technologies are reshaping the future of broadcasting. Some of these factors are imminent; others are years away. Thus, industry experts will share their thoughts on how legislation, regulation and new techniques will affect broadcasting in 1983 and the years beyond.

ISSN 0007-1994.

BROADCAST ENGINEERING (USPS 338-130) is published monthly by Intertec Publishing Corporation, 9221 Quivira Road, P.O. Box 12901, Overland Park, KS 66212-9981. Postmaster, return form 3579 to P.O. Box 12938 at the above address.

"I want the world. Consistent .05% corner registration and full auto-setup of up to 96 cameras on computer command."

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Don't want much, do you?

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You're asking for some smart camera system, networks of the world and top-drawer video production companies.

Well, Hitachi heard you, and has created an outright *genius*—the Hitachi SK-110 Camera System.

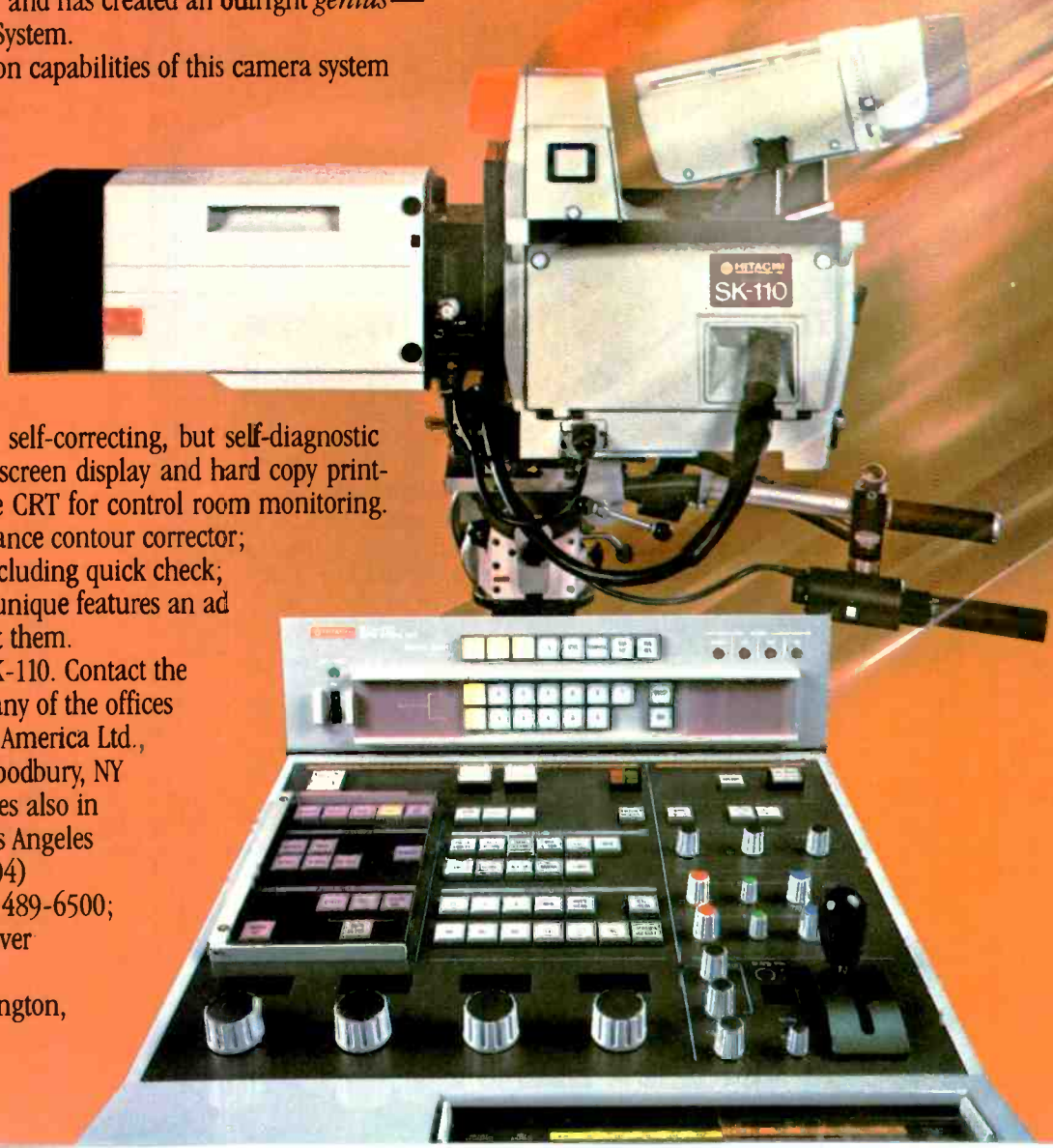
The computer registration capabilities of this camera system produce pictures of a clarity and resolution previously unheard of.

And you get auto-setup at the push of just one button, and zero reference, too, where the computer sets the green channel and compares blue and red to it with absolute precision.

The SK-110 is not only self-correcting, but self-diagnostic as well. It gives both video screen display and hard copy printout; can be hooked into the CRT for control room monitoring.

There's a high-performance contour corrector; 5 automatic setup modes including quick check; 5 data files; so many other unique features an ad can't begin to tell you about them.

The ultimate Hitachi SK-110. Contact the broadcast video division at any of the offices listed below. Hitachi Denshi America Ltd., 175 Crossways Park West, Woodbury, NY 11797 (516) 921-7200. Offices also in Chicago (312)344-4020; Los Angeles (213) 538-4880; Atlanta (404) 451-9453; Cincinnati (513) 489-6500; Dallas (214) 233-7623; Denver (303) 344-3156; Seattle, (206) 575-1690; and Washington, D.C. (301) 459-8262.



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BROADCAST engineering

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BROADCAST ENGINEERING is edited for corporate management, engineers/technicians and other station management personnel at commercial and educational radio and TV stations, teleproduction studios, recording studios, CATV and CCTV facilities and government agencies. Qualified persons also include consulting engineers and dealer/distributors of broadcast equipment.

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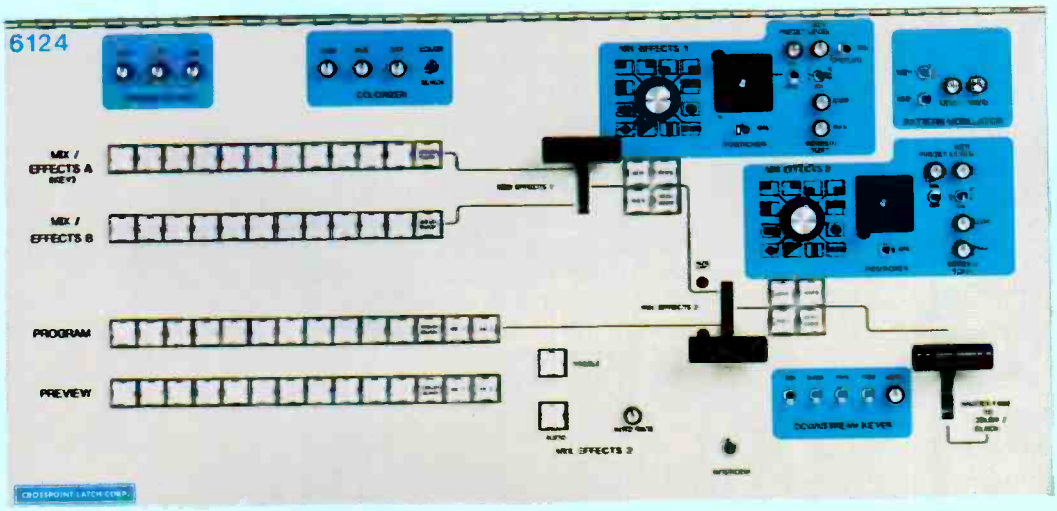
Intertec Publishing Corp.

PRODUCTION SWITCHERS

THAT INTERFACE WITH THE LARGEST RANGE OF EDITORS

Enjoy the best of both worlds. A full production switcher, with all its associated ease of operation; which is at the same time, a sophisticated post-production switcher with many levels of editor control, including control directly from the editor keyboard.



PRICES

6124	NTSC	**$13,700**
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7200		**$12,300**
6800		**$3,500**
6403		**$2,750**
Editor Module		**$995**

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- TWELVE INPUTS (including colorizer)
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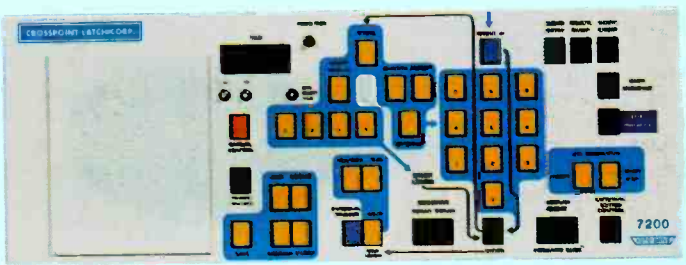
You can start with the entire package, video as well as audio. Or expand gradually as the need arises. We have designed interfaces to most editors, to give you frame accurate precision for either complete or partial transitions; either video or audio separately or both combined. Your operation is not limited or hampered. Even if you own an editor that cannot control a switcher, you can still perform programmable transitions and even delayed transitions, both with our compact **6403 Programmable Editor Switcher Interface** and the more sophisticated AUTO DRIVE™, triggered automatically at the correct 'cut-in' point by the editor.

PROGRAMMABLE AUDIO MIXER Model 6800

Seven input two channel (stereo) audio mixer with tone generator. May be controlled either directly from the keyboard of most editors, or as an audio follow switcher for the 6124 and 7200 combination. Independent gain controls for each input, with the abililty to operate either manually or remotely from editors and switchers.



AUTO DRIVE™ Model 7200

Plug compatible option for 6124 switcher. It is a computer, which requires no programming knowledge to operate. Its control panel has indicator lines to show the sequence of push-button operation. Its solid state memory stores up to 255 events which can be grouped into any number of sequences. Each event consists of the entire configuration of the switcher control panel - not just a selected few functions. Storage of events is simplicity itself. Just set up the switcher controls to produce the effect you want in the conventional way - then depress the STORE button. Events may be stored on the Preview Bus and then RUN on Program. AUTO DRIVE™ can create effects that cannot possibly be reproduced manually, because of the computers simultaneous control of all functions. AUTO DRIVE™ can even store and later reproduce manual fader arm and positioner movements. A Disc Drive option will soon be introduced.

AUTO DRIVE™ has interfaces with Editors, providing either full control from the editor keyboard, or just triggering of sequences from the editor at the precise point of edit.

For details on other switchers and editor interfaces see your local dealers or call us directly.

Delivery on most of our products is under two weeks.

Write or call for our very informative booklet "Video Post Production" which will be mailed to you, free.

CROSSPOINT LATCH CORP.

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FCC update

November 1982

Harry C. Martin, partner,
Midlen, Reddy, Begley & Martin
Washington, DC

Mass Media Bureau formed

The commission has voted to consolidate its Broadcast and Cable TV Bureaus into a new Mass Media Bureau to more efficiently administer FCC policies regarding traditional broadcasting, cable television and the emerging TV systems. The action is subject to Congressional approval.

The new bureau will be composed of four divisions: Audio Services; Video Services; Enforcement; and Policy and Rules. The Audio Services Division will be headed by Larry Eads. It will consist of the AM Branch, Auxiliary Services Branch and FM Branch, as well as the data management staff and the public reference room. The division will process applications for new AM and FM stations; modifications of existing stations; renewal and transfer requests; and FM translators. Applications will also be processed for auxiliary spectrum, including studio transmitter links, intercity relays and remote pickups.

The Video Services Division, to be headed by Roy Stewart, will consist of the Cable, Distribution Service, LPTV and TV Branches. It will house the ownership staff. This division will process applications for new TV services; modifications of existing stations; and renewal and transfer requests. Applications will also be processed for various video services authorized on the instructional TV fixed service and DBS frequencies; low power television; and cable antenna relay systems (CARS). The ownership staff will be responsible for examining ownership and supporting documents filed with the FCC for all services.

The Enforcement Division, which will be headed by Charles Kelley, will consist of the Complaints Branch, Equal Employment Opportunity Branch, Fairness/Political Broadcasting Branch, Hearing Branch and Investigations Branch. It will house the control staff. The division will combine all existing enforcement functions under a single unit.

The Policy and Rules Division, to be headed by Roderick Porter, will consist of the Allocations; Legal; Policy Analysis; and Technical and International Branches. This division will provide legal, technical and economic input into the bureau's policy and rulemaking activities.

An administrative and management staff will be established to conduct and coordinate studies of operating systems in the bureau and will coordinate bureau activities in the areas of personnel and management.

Lottery rules proposed

Responding quickly to Congressional demands, the commission has issued a rulemaking proposal for selection of new licensees in several services by lottery. The Notice of Proposed Rulemaking, adopted Sept. 23, 1982, followed closely the enactment of a bill authorizing the commission—for the second time—to adopt a lottery selection procedure. Last year the commission declined to adopt lottery rules, stating that the numerous preferences then required by Congress made any lottery system unworkable. The new statute mandates only minority and media ownership diversity preferences.

The lottery selection is proposed for LPTV, private radio, and public mobile common carrier services. Full power TV, radio and cellular mobile would not be included. Lotteries also would be used in other services in which the normal comparative process resulted in a tie.

A weighted lottery would be used for low power applicants. The commission's proposal tracks the detailed preference formula prescribed in the Congressional conference committee report.

The diversity preference would be calculated first. Applicants not in control of any other mass media outlet would receive a 2:1 preference. Those with one, two or three media outlets in other communities would receive a 1.5:1 preference. Those with more than three outlets or with an outlet in the same community as the proposed LPTV station would receive no diversity preference.

Continued on page 132

NEWSMAKER

WKRG-TV makes news in Mobile, Alabama

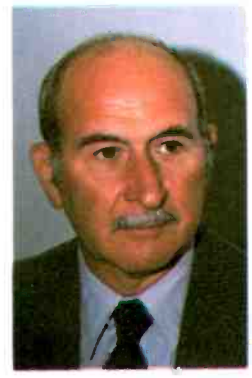
with a GVG 300/Mk II Digital Video Effects production system... tightly formatted using visually exciting digital effects.

The 300 System makes promos...with the high quality appearance of expensive outside services.

The 300 System makes commercials...at least eight hours a day for local and regional clients, who have come to WKRG because of 300/Mk II DVE capabilities.

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

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



DON KOCH

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11 REASONS NEWS IS EASIER TO

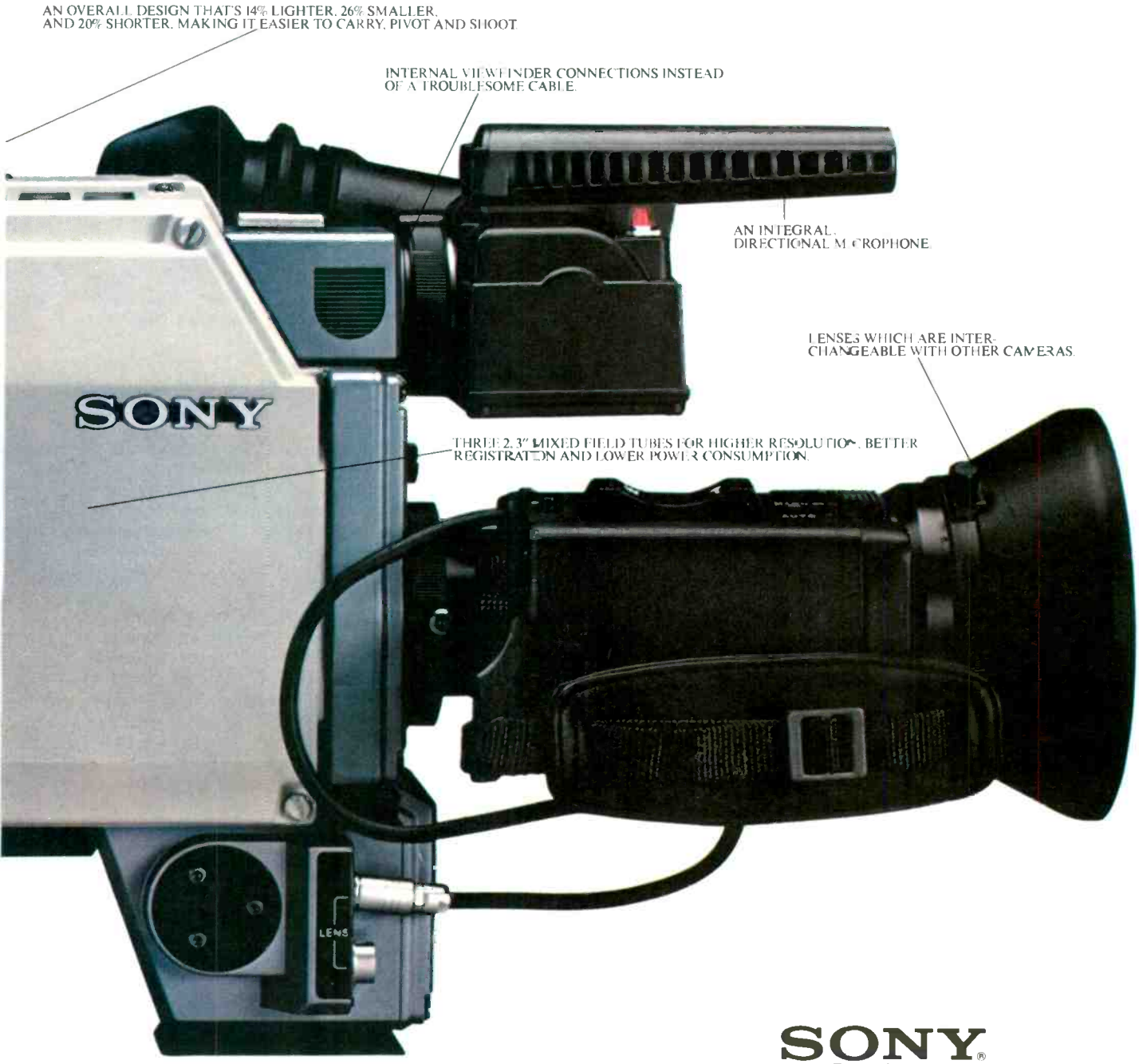
Of course, there are other reasons why ENG and EFP applications are easier and better with a complete Betacam™ system. Like three tubes for full luminance depth of modulation, wide chroma recording bandwidth for superior color resolution and linear emphasis for superior color reproduction.

In fact, Sony also offers a rugged, cost-effective one-tube version of the Betacam.

WHY THE TAKE WITH A SONY.

If you're looking for a half-inch cassette camera/recorder system that doesn't stop halfway, a system you can grow with that offers unmatched performance, flexibility and value—make it easy on yourself.

Call Sony in New York/New Jersey at (201) 368-5085; in Chicago at (312) 860-7800; in Los Angeles at (213) 537-4300; in Atlanta at (404) 451-7671; or in Dallas at (214) 659-3600.



SONY®
Broadcast

So long, Mr. Wasilewski

Outgoing NAB president Vincent T. Wasilewski, in turning over the reins to Edward O. Fritts, delivered his farewell remarks to the industry at the International Radio and Television Society meeting in New York on Sept. 22. Carrying on with the theme of his address at NAB-'82/Dallas, Wasilewski recalled highlights of his 33 years of NAB service and pinpointed some of the industry's future challenges. The most fundamental challenge is the continued struggle for the electronic media's rights under the First Amendment.

We congratulate you, Vince Wasilewski, for your dynamic leadership at the helm of NAB and applaud your years of dedicated service fighting for the advance of broadcasting. We wish you success in your position with Dow, Lohnes & Albertson.

ENG from Mount Everest

In our *News* department, we have briefly reported another courageous assault on Mount Everest and the use of modern ENG techniques to report progress of the team in its scaling effort. We praise the international cooperation involved in this attempt. We commend the Canadian Caneverex team for its willingness to test its endurance on such a climb; Hitachi Denshi (Canada) for assembling the package of portable and studio equipment; the ABC network engineers for handling the technical aspects of the communications, including more than 160 miles of microwave linkage; Schaffer Satellite Communication Corporation, subsidiary of the Ken Schaffer Group, New York, acting as agents for the project; and the International Telecommunications Satellite Organization (Intelsat). Such a display of planning and cooperation shows an exemplary spirit in the field of communications.

We hope that all goes well and that we may all be able to share, through modern communications, the excitement of this climb and marvel at the view from the 29,028-foot peak.

Progress in teletext?

A recent release from the Canadian Standards Association announced the availability of "CSA Preliminary Standard T500: Videotex/Teletext Presentation Level Protocol Syntax (North American PLPS)." The report follows the extensive efforts of the Canadian organization with the American National Standards Institute and a number of high technology manufacturers in developing a compatible text display system for North American users. Acceptance of the standard could lead to an early implementation of textual and graphic materials transmitted via the vertical interval of standard TV signals.

Acceptance of the standard is not the solution to the battle, unfortunately. Just as in the video games market, arguments as to graphics quality and resolution arise from the several proponents in the textual/graphics market. Telidon, around which the standard is based, claims superior resolution over the Ceefax technology from Britain. As Canada's broadcast teletext system, Telidon is compatible with the North American Broadcast Teletext Specification (NABTS), presented by CBS, and with the French Antiope format. The British Ceefax system, on the other hand, has been in operation since 1972 with amazingly few problems. The system, widely accepted in England, features scaled levels of sophistication to accommodate even picture quality graphics in its highest level.

Another snag to progress in teletext is also developing. Should a US system finally be selected, can a common carrier, CATV operator or individual broadcast station alter the material that has been placed on a signal being distributed nationwide? A recent court decision in Chicago ruled the text/signal lines of the vertical interval to be the property of the originating source. Controversy still rages about that decision primarily because of interest in textual usage, such as a future schedule service.

Text services, although not essential, have proved to be helpful in several means of information dissemination. Whether the purpose is for information or advertising, let us hope teletext does not become a victim of dissension. Perhaps, because each system has *attributes* of superiority, the best of each

Continued on page 133

Ampex Announces the Practical End of Video Jitters.

Video Jitters can drive you up a wall.

It happens when you've repeated an edit over and over. You want it perfect. Now, everything's cued up just right. You hit the edit button, and what do you get? A glitch. A shaky picture. A sour stomach. Video Jitters.

The culprit is stiction—friction build-up so bad that the tape actually jerks across the heads and scanner. Humid conditions can make it worse.

But not if you use Ampex 196 One-Inch Broadcast Video Tape.

Every batch of Ampex 196 has to pass the toughest test in the industry—stiction-free operation at the extreme environments of 90% RH and 90° F, to guarantee that you have consistent stiction-free operation under all conditions.

Ampex 196. Less friction, because who needs it?

Ampex 196 One-Inch Video Tape.

AMPEX

Ampex Corporation • One of The Signal Companies

I want to end the Video Jitters with Ampex 196 One-Inch Broadcast Video Tape.

Please send me more information on your 196 Video Tape.

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COMPANY _____

ADDRESS _____

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PHONE ( ) _____

Send to:
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401 Broadway MS 22-02, Redwood City, CA 94063 BE

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NATAS Emmy Awards and Citations presented

Two Emmy Awards and four Emmy Citations were presented by the National Academy of Television Arts and Sciences at its Fifth Annual Engineering Emmy Awards, held Sept. 29 in the Grand Hyatt Hotel in New York.

After cocktails and dinner, John Cannon, academy president, presented the Emmys for distinguished achievement in the science of TV engineering to the following winners:

- Eastman Kodak Company and Fuji Photo Film Company Ltd. Both companies were honored with Emmy Awards for the research and development of a new film technology that led to the introduction of the new high speed color negative film. (Fuji Photo Film is the first company to receive highest honors from both motion picture and TV academies for scientific advancement in TV technology.)
- Rank Cintel Company. An Emmy Citation honored Rank Cintel for its research and introduction of the Digiscan frame store for the flying spot telecine system.

Fuji Photo Film and Eastman Kodak
Bob Smith (center), president of Du-Art Video and chairman of the academy's Fifth Annual Engineering Dinner, congratulates Bernie Yasunaga (left), executive vice president of Fuji Photo Film Company Ltd. and Kenneth M. Mason, vice president and general manager, Motion Picture and Audiovisual Markets Division, Eastman Kodak Company.

Rank Cintel
David Fenton (right), East Coast manager for Rank Cintel Products, accepts an Emmy Citation from John Cannon, NATAS president.

HEADING BEYOND THE ORDINARY

Truth is, we're not sure how many conventional units our new LIFE+™ head will replace, but we know under normal use it's a significant number.

We are sure that your cost to value ratio has been improved from 300-500%. So sure that we have doubled the warranty period on LIFE+ heads.

We also know that the LIFE+ head produces consistently better sound with a frequency response substantially higher than previously available because head core losses are negligible from 0-25 kilohertz.

In addition to longer life and better sound, you can count on LIFE+ delivering more reliable performance with less corrective equalization and machine alignment. All of which means lower maintenance costs and less back-up equipment, and there's no retro-fit kit required.

So, if you'd like better high end response, longer head life, superior sound, reduced maintenance and a two year warranty, try the extraordinary new LIFE+ head.

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(612) 944-7660
A Subsidiary of Magnetic Technologies Inc.

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Bosch Fernseh
Hans Groll (left), director of research for Bosch Fernseh, is congratulated by Cannon.

Arthur C. Clarke
Ignatius Benedict Fonseka, ambassador and permanent representative to the United Nations from Sri Lanka, accepted the individual Emmy Citation on behalf of Clarke.

- Bosch Fernseh. An Emmy Citation was presented to this company for developing and implementing the CCD telecine technology.
- British Broadcasting Corporation. The BBC was honored with an Emmy Citation for the early development and research work on the CCD scanner telecine technology.
- Arthur C. Clarke. Clarke, famed author of *2001: A Space Odyssey* and Chancellor of the University of Moratuwa in Sri Lanka, received an Emmy Citation for his early theory studies and writings concerning the possibility of stationary satellite transmission to large areas of the earth. His award was accepted by Ignatius Benedict Fonseka, ambassador and permanent representative to the United Nations from Sri Lanka.

British Broadcasting Corporation
Cannon presents an Emmy Citation to Bryce McCrirrick (left), director of engineering for the BBC.

The engineering industry was represented at this year's ceremony by professionals from major companies including Panasonic, Ikegami, Maxwell Tapes, Thompson Laboratories, Hazeltine Corporation, RCA Engineering, CBS Engineering, Reeves Studio, JVC and Du-Art Film Laboratories.

Quality Reliability Performance

"Exceeds all my expectations. Great performance and range. Unexpected power and performance." That's three experienced broadcasters talking about the new Andrew TRASAR™ UHF-TV transmitting antennas recently installed at their stations.

Here are some important features that convinced them to buy TRASAR™: • Unique traveling-wave slotted array design • Excellent null fill • Up to 2.5° beam tilt without loss in gain • High power rating with reserve capability • Very low VSWR • Fiberglass radome for protection from the elements • And there's more! Obtain complete information in Bulletin 1083 or contact your Andrew Sales Engineer.

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Circle (11) on Reply Card

ENG from Mount Everest

As this issue is being finalized, another exciting attempt is being made to again conquer the sheer heights of Nepal's Mount Everest. If the efforts are successful by the Canadian Mount Everest Society (Caneverex), several milestones of human endeavor will have been reached. Nearly 30 years of human experience has been gained since the Hilliary expedition climbed to the peak in 1953. That experience, in part, has led the climbers in the Caneverex to spend almost two years in practice climbs on mountains around the world. The vast knowledge and resources of NASA have also been involved, in allowing members of the expedition to spend time in the NASA high altitude training facilities. Climbing equipment, designed to withstand -40° temperatures, resembles that worn during NASA lunar expeditions.

If all goes well, a breakthrough in communications is also expected from the scheduled assault on Mount Everest. Each of the four climbers making the final ascent from the 17,000-foot level to the top is equipped with a TV camera. The 3-pound cameras, including RF transmitters, will beam the signals toward the Katmandu Sheraton (Nepal). Atop the hotel is a camera equipped with a 7m reflex lens for line-of-sight pictures of the climbers. Inside the hotel is a complete editing suite, which allows integration of live pictures from the mountain and the roof-top camera, as well as taped interviews.

An uplink at the Sheraton beams the signals to the Indian Ocean Intelsat V satellite, downlinked to Madley, England, uplinked again to the Atlantic Intelsat and brought down to Mill Village, Nova Scotia. Distribution in North America to Canadian and US viewers is handled by land-line, microwave and satellite. Along with the rather involved signal path from Nepal, 2-way voice communication with the climbers is possible from the Katmandu Sheraton, Toronto and New York.

feedback

Schematic search

I read and enjoy your magazine every month. It helps me with my radio station broadcasting and consulting work. I presently own a Nems Clarke AM radio field strength meter. I bought the unit used from a gentleman who is now deceased. The problem is that there is no serial number on the unit. It must have come off. It is circa 1972 or 1973. Can you please help me with locating a schematic and a calibration manual. This unit does not function at all, and I need to repair it to use it in my field intensity measurement work. Because such units are not cheap, I don't want to buy a new one if I can avoid it. The unit measures 100μV to 10V from 540kHz-1600kHz. I would greatly appreciate your help.

Peter K. Hons P.E.
Manager
Mainline Communications

The Nems Clarke line can be serviced by Potomac Instruments of Silver Springs, MD. Perhaps some of our readers may be able to help you with the schematic and calibration booklet search. Dave Harry of Potomac suggests that the calibration requirements are a bit more involved than would usually be attempted, however. For a consultant's use, calibration requires the use of a "standard field" referred to the National Bureau of Standards. Harry also offered a warning to all that a missing name/serial plate could be a sign of a shadowy history for the instrument.

The Budget Squeezer

Precision Echo Presents The Video Compression System With One Feature All Others Lack: Affordability.

Everyone today is facing the budget squeeze one way or another. Networks, affiliates and independents. Cable companies. Production and post production houses. One curious thing about budget squeezes is that they have a way of making equipment purchase decisions both easier and harder. Easier when it's clear that a particular item costs too much for the times. But harder when you are looking at equipment you know you need, but can't find the bucks for.

The Squeezer: Meeting Your Needs With A Unique Set of Special Effects Features.

The Squeezer, from Precision Echo, is a programmable video compression and positioning system that compresses an image down to four selectable sizes, places that image anywhere within the screen on command, crops any part of it to any size, and puts a variable-sized border of any color around it on request. It can even flip the image horizontally or freeze the action. Exclusive dual joy stick controls make image manipulation simple. And the utility of its design makes The Squeezer a versatile tool whether rack mounted in a production facility or used in mobile applications.

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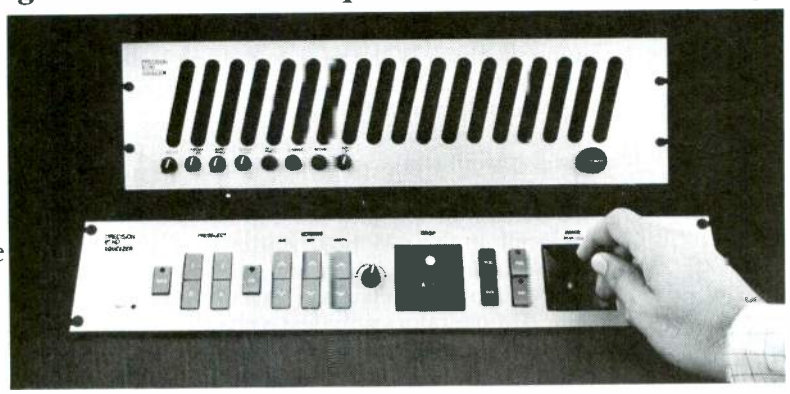
There's very little that you'll find on The Squeezer that you couldn't find on an ADDA, Vital, or a Quantel system. Except the price tag. Those other systems cost anywhere from $40,000 to $200,000. The Squeezer costs under $19,000. For broadcast programming, news and sports production, cable TV, educational and industrial applications, nothing comes close to the cost efficiency of The Squeezer.

The Squeezer from Precision Echo. High on quality and cost efficiency.



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associations

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Classical music growing

The following is based on opening remarks by Robert Conrad, CMBA president, at the 18th Annual Conference of the CMBA in August.

Economically, classical music radio appears to have never been in better shape, in spite of the general gloomy character of the national economic climate. In an informal survey taken of some two dozen stations, every classical music station contacted, with the exception of one, indicated that their business for the first six months of 1982 was ahead of the same period in 1981. Increases ranged from 1% to 60%, with most in the 15% to 30% range.

New stations are entering the format. Last fall the first new commercial classical music station in many years appeared; KCMA, Tulsa, OK. Since then, KBOQ, Marina, CA, a Class A small market AM station, once one of the top AOR stations in Portland, OR, has switched to concert music. Also, rumors mention Tampa, FL, and Anchorage, AK, for new classical stations.

As we all know, FM is the dominant audio medium. With the shoe now on the AM foot, AM operators are beginning to look at new formats. After all, there can only be so many news, talk and big band stations. So the spirit of experimentation that brought about the success of FM may start to make itself felt on the AM band. Perhaps in some of the major and minor markets where there is no classical music station, AM operators will take a chance on classical music. Why not classical music on AM? One of radio's largest audiences is not in the home, it's in the car, on the beaches and in the parks, listening to car radios and transistors, in which stereo and extreme high fidelity is not imperative.

What will new classical music operators find? A format where you don't live and die by ratings. A format that offers stability in revenue, not so affected by economic downturns, because the audience, with the most enviable demographics of any (high income, high education, professional executive), is less affected by recessions.

Concert music radio will benefit from the fragmentation of the TV audience that the technological revolution (cable, DBS and VTRs) is bringing about. Major advertisers, who are used to thinking in terms of mass audiences on television, are now going to be thinking about smaller specific and targeted audiences. Classical music radio will probably be the least affected of radio formats by diversified cable programming, because it is difficult to translate successfully serious music—an audio medium—to visual terms. CBS Cable tried it and found that it doesn't work very well, which may be the reason why CBS has put its culturally oriented cable service on hold.

We may have to contend with cable-distributed classical music audio services, but these services will not have the local involvement and resulting audience sense of proprietorship that our stations have fostered. Cable audio services will not be able to raise the more than $12 million for American orchestras that commercial classical music radio stations have been able to do.

Our success is the direct result of the fierce loyalty that public service has engendered in our listeners. Let us not lose sight of our traditional concern for the artistic integrity of our program material. But, ladies and gentlemen, the sun is peaking over the horizon. There's a soft warm breeze blowing, an excitement in the air and the prospect for a great day ahead. Let's get to work.

NRBA
National Radio
Broadcasters' Association

1705 De Sales Street, NW
Washington, DC 20036
1-202-466-2030

Marketplace regulation supported

The NRBA has filed comments on the FCC's Notice of Proposed Rulemaking (Docket 82-374), which proposed changes in multicity station identification. The NRBA said that it supports the FCC's proposal that a certification procedure be substituted

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for the informal application procedure the stations currently must go through to obtain authority to use a dual-city identification. It also endorses the FCC's suggestions that stations should be permitted to identify, at will, with any community they choose and that the FCC should stop regulating broadcast stations for the purpose of protecting advertisers.

Proposed rules supported, officers elected

In two resolutions passed unanimously, the NRBA board of directors recently voted to support the proposed rulemaking portion of the FCC's Docket 82-370, which would grant relief to daytimers; and to establish a fund to support NRBA's general legislative deregulation efforts over the next two years.

The board also elected association officers for 1-year terms. They include the following: Bill Clark, chairman; Sis Kaplan, president; Bernie Mann, vice president/East; Jim Wychor, vice president/Midwest; Bob Duffy, vice president/West; Larry Keene, secretary; Ted Dorf, treasurer; and Bob Herpe, assistant treasurer.

Board commends NRBA VP

The NRBA board of directors recently passed unanimously a resolution commending Jack Christian, NRBA vice president, for his management of the association's membership development campaign. Under Christian, who is vice president for membership development, NRBA's membership has doubled in the past three years, with more than 1900 members now on the rolls.

In July of this year, a new 1-month record for new members was established, when 70 radio stations and radio-related companies joined. The previous record was 61 in October 1981.

SMPTE

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VRRT Committee reports

The SMPTE Committee on Video Recording and Reproduction Technology has announced that the ½-inch cassette format submitted by Sony and those submitted by RCA, Matsushita Electric, and others should meet User Requirements, except for the requirement for a single standard. The committee, in its August meeting, said that it was unable to reach agreement on a single standard.

Because of its inability to agree on a standard, the group decided to disband, and no further action will be taken in this area at this time. The committee then voted to organize a working group to develop an interface standard for analog component TV signals.

NARTE

P.O. Box 12725
Salem, OR 97309
1-503-581-4031

NARTE formed

The Ad Hoc Committee to form a National Association of Radio and Telecommunications Engineers filed Articles of Incorporation for the organization in September. The purpose of the organization is to promote the professionalism of radio and telecommunications engineers in the telephone, microwave, satellite, broadcast, high frequency radio, multiplex industries and related fields.

The association will enable engineering members of the industry to speak with a single, unfragmented voice; to develop standards of ethics, competence and education; and to devise a means of certification.

The Performance of a World-Class Studio Console.

With a Four Year Warranty & a Price That Makes Sense.

You're looking at our DC-38-8S. Built tough & engineered to perform like big, expensive boards you'll find in world-class recording studios. Its flexibility and features give you the ultimate broadcast production and on-air board.

Its price keeps you (and your accountant) smiling.

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While a lot of imitators are still playing catch-up, we're moving ahead: by subtly improving upon a design we pioneered in 1975; by maintaining our reputation for reliability; by realistic and affordable pricing. We figure we're still way ahead. Which means you can be too.

The Ramko DC-38 Series consoles are known to be highly interference free because we don't let RF and scratchy pots and switches attack the audio. All audio functions, from switching through attenuation are done via D.C. control.

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CLEANER AND MORE ACCURATE.

All inputs/outputs have the benefits of solid-state, transformerless design. We discarded the problems that come with bulky, unforgiving and expensive transformers. Like distortion due to impedance mismatching and compromised frequency response. Not to mention hum that sticks to a transformer like a magnet.

We give you a solid-state, L.E.D. metering for much greater accuracy. A cleaner, tighter sound can be yours too because the slower responding, mechanical V.U. meter belongs to another era—not on a Ramko console.

FEATURES FOR THE REAL WORLD.

There's a dual cue mode that works by normal "potting-down" or by pushing a button so you don't have to change the mixer setting. All the pushbuttons are super-quiet. They route audio through error-free, solid-state logic without program-killing pops, clicks or momentary feedback associated with loud, clanking, short-lived mechanical switches.

Our exclusive electronic patch panels make selection of input gain extraordinarily flexible. From mic through line levels, and anywhere in between on each and every input. You have over four million combinations to accommodate any channel.

THE SECRET TO A FOUR YEAR WARRANTY WITH PARTS AND LABOR.

In the DC-38 you get three power supplies. L.E.D.s and lamps with an 11 year life expectancy. Pushbuttons spec'd at 20 million operations. Wear-resistant, crud-forgiving conductive plastic mixer pots that also take the heaviest of hands. In addition, all the critical electronic circuitry is burned-in so it doesn't burn-out.

And, no console made is easier to service.

THERE'S MORE.

Like over a dozen specific models in addition to our DC-38-8S. With spec's that compare to the ones on your left. Mono-Stereo, 5 inputs to 12, dual. Optional solid-state clock/timers and remote machine control interface.

We also have a free, two-week trial. So you can put our claims, and our reputation to the test.

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DC-38 Series' Numbers

Output:	+21dBm max.
Signal-To-Noise Ratio:	−70dB
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Distortion:	0.3% or less
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Inputs:	Up to 4 per mixer, balanced bridging
Price:	Single channel 5 mixer mono (SC-5R) thru dual channel 8 mixer stereo (DC-8Ms). $1808* to $3509*
	Dual channel 5 mixer mono thru 10 mixer stereo (DC-38 series shown). $3632* to $6762.*
	Dual channel 12 mixer, slide atten., remote control. Mono $6432.* Stereo $7998*
	*Prices subject to change without notice.

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1-202-293-3570

Majority of radio stations report no program log change

Seventy-eight percent of the radio stations responding to a survey said no changes have been made on their program logs since the FCC dropped its requirement that such logs be maintained. The survey of the NAB's member radio stations was conducted by the Radio Department.

Of the 22% of the stations that have made changes, 48% said the changes they made were very minor, 22% said they made moderate changes, and 24% said they made extensive changes. The most often repeated reason for not making changes (80%) was that "the current system works just fine." Another 10% said they decided to "wait and see"—indicating somewhat less than a complete belief that the changes are permanent.

NAB briefs

The NAB recently filed comments with the FCC urging the establishment of frequency assignment databases, particularly in undeveloped bands, as essential to intelligent frequency coordination and sound spectrum management. These databases should be equally accessible to the public and the government, according to the NAB.

The NAB is accepting applications for its 1-year Legal Fellowship Program, which is open to all graduating or recently graduated minority law students who have a demonstrated interest in communications.

Edmund A. Williams joined the NAB in October as staff engineer. Formerly, Williams was associate director, Engineering Technical Services, Public Broadcasting Service, Washington.

The NAB recently filed comments on a petition for rulemaking that would allow a low power wireless video system to operate in the frequency spectrum allocated to UHF TV Channels 14-20. NAB opposed the petition on the grounds that the proposal creates a potential for radio-frequency interference with TV reception.

IRTS
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Reagan receives IRTS Special Gold Medal

President Reagan recently received a Special Golf Medal from the IRTS. The award recognized Reagan as "America's most accomplished communicator."

"Mr. President, we are here because we owe you something," Ave Butensky, IRTS president, said at the presentation. "I cannot tell you how often—especially in our work with young poeple—we have used you as an example of how to communicate effectively. As a former broadcaster, you hold a distinctive place in our thoughts. For these reasons, we are privileged to thank you and hope you will let us continue to point to your example."

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Taft Broadcasting is an immensely successful communication company with TV stations in seven major markets. Their quality standards are tough. Their business standards are demanding. And that's why, for the past three years, Taft has been sold on 3M Routing Switchers.

We lived up to their standards by saving them time and money. We saved them installation costs by setting up quickly and easily. We saved them equipment costs by doing more with less. And we saved them manpower and modification costs by expanding the system as their needs expanded. With 3M Routing Switchers, Taft was faced with add-ons, but never with obsolescence. They know our system will be as state-of-the-art tomorrow as it is today.

Our system can be as simple as a 10x1 or as sophisticated as a computer interfaced system controlling tape and film machines, printing logs, or connecting any combination of inputs to any combination of outputs. All at the touch of a button or the pulse of a computer command.

Virtually all 3M switching equipment is microprocessor-based, so you can delegate control to individual stations, yet lock out other stations to prevent operational interference. You can route audio and video separately. And all controls are connected by one coaxial cable.

We offer five series of switchers, with your choice of control panels. And each one is designed to stay on the job for years.

For a firsthand impression of 3M Routing Switchers, check with John Owen, V.P. Television Engineering at Taft Broadcasting. So far, he's only had one complaint: "I wish we would have had them in '76, '77 and '78".

If you'd like more information about 3M Routing Switchers, call us collect at 1-612-733-8132. Or write us on your letterhead at 3M Professional Audio/Video Equipment, Bldg. 223-5E, 3M Center, St. Paul, MN 55144. For inquiries from outside the continental U.S., call or write, International Operations, 3M, Bldg. 220-5E, 3M Center, St. Paul, MN 55133. 1-612-736-2549.

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At the heart of the new, fully integrated, plug-compatible Sony editing system is the BVU-820 videocassette recorder.

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But there's one brilliant addition—Dynamic Tracking. Which means U-matic users now have the ability to broadcast special effects—something which, until now, has only been associated with more expensive reel-to-reel broadcast VTR's.

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If the BVU-820 is the heart of the system, then the BVE-800 is most assuredly the brain. Not merely because of its 128 multi-event edit memory, but because of the way it gives you total motion control of three VTR's.

The BVE-800 is expandable and upgradeable and includes full A/B sync roll capability; time code or CTL editing; built-in BVS-500 Audio/Video switcher control logic and something else only Sony can offer:

A price that's at least $5,000 less than its nearest competitor.

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The Sony U-matic editing system features another marvel of Sony technology, the BVT-800 Digital Timebase Corrector.

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With it, it's capable of up to 40x play speed fully viewable, and full play speed in reverse to 3x forward with broadcast quality.

For all the facts on the state of the art, from the people who invented it, call Sony Broadcast in New York/New Jersey at (201) 368-5085; in Chicago at (312) 860-7800; in Los Angeles at (213) 537-4300; in Atlanta at (404) 451-7671; or in Dallas at (214) 659-3600.

SONY
Broadcast

Satellite facilities for radio and TV

By Dennis Ciapura, group vice president, telecommunications, Greater Media, East Brunswick, NJ

Many broadcasters have come to realize that a flexible earth station facility can be an invaluable programming asset. This is as true for radio as it is for television, and a new movement to patch into the space connection is sweeping the industry.

Syndicated TV and radio programming as well as regular radio network distribution is now available in abundance, and satellite distribution offers absolute studio quality. For decades, TV operations and engineering personnel have longed for the ability to pick up special programming and news feeds on short notice, while radio engineers and program directors (PDs) have bemoaned the poor quality of their telco network feeds. Now both situations can be satisfied easily at low cost.

Although some broadcasters tend to think of an earth station as a single function terminal, a way to get a program or network feed that the program director is interested in, for instance, many others are taking a much more *strategic* approach. The real key to an earth station's value and cost effectiveness lies in the opportunity to access *all* present and future sources and not just the single proposed feed.

Although the price of an earth station to pick up *Entertainment Tonight* or one of the ABC radio networks may seem excessive in some cases, the broadcaster with an earth station gains entrée into a whole new world of programming flexibility, and it is the value of this long-term strategic advantage that makes the go decision so reasonable in terms of return on investment. Obviously, the absolute value of this long-term benefit will vary from market to market and format to format, but with digital radio terminals available for about $10,000 and good basic TVROs selling for $25,000, you don't have to see much increase in market share gained by better programming quality or flexibility over a 7-year period to make the numbers work.

Once this go decision is made, the real fun begins. Although there is a seemingly endless array of equipment to choose from and the technical terms may be unfamiliar at first, the engineering considerations are actually simple. As a matter of fact, daily, broadcast engineers are getting their feet wet in satellite technology and thoroughly enjoying it.

Understanding a few simple functions is all that is required to intelligently work with an equipment vender to get the ball rolling. Actually, most venders are happy to handle all of the engineering, but broadcast engineers worth their salt will want to know how the darned thing works. So, let's take a look at some of the most important points of theory.

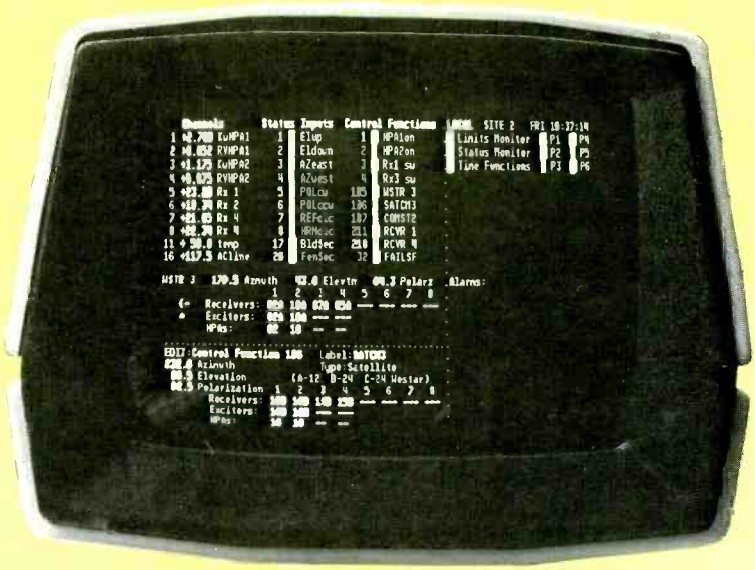
Gain/temperature

The most important earth station performance parameter is G/T, verbally expressed as "G over T," for gain over temperature. This spec describes the capability of the system to pick up the extremely weak signal from the satellite. In fact, the signals are so weak that the noise generated by the molecular motion of the materials in and surrounding the antenna can actually exceed the strength of the signal! Because this molecular motion varies as a function of temperature, it is convenient to express the system in its temperature equivalent.

The Kelvin temperature scale starts at absolute zero where molecular motion stops. So, the lower the noise temperature in degrees Kelvin, the lower the noise. An 80° low noise amplifier (LNA) is better than a 150° LNA.

The gain of the system is a function of the antenna gain and amplifier gain, but the real figure of merit is the gain available above the noise, or G/T in decibels.

All other things being equal, the G/T improves as the antenna size increases and as the noise temperature



The Harris 9165 remote-controlled advanced earth station controller is an example of the flexible antenna and electronics control equipment that has been developed for broadcast applications. The system may be expanded to meet future needs.

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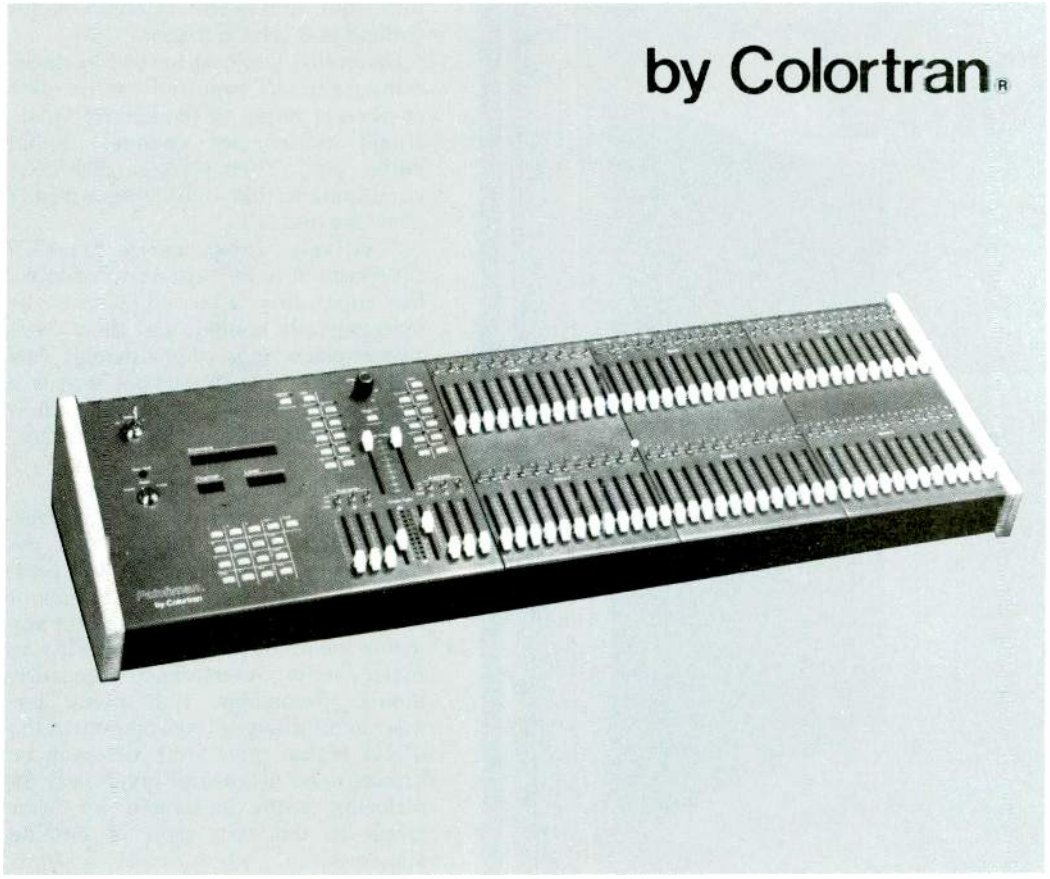

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Table I.
Several antenna/LNA combinations that will produce about the same G/T (network quality). Note how installed cost dictates selection.

ANTENNA SIZE	LNA	INSTALLED COST
5.5m	40°K	High because of parametric LNA requirement. Total cost: about $65,000.
7m	80°K	Lower because GasFET LNA can be employed, greatly offsetting higher antenna cost. Total cost: about $40,000.
9m	140°K	Very inexpensive LNA offsets even higher antenna cost. Total cost still under $50,000.
10m	180°K	Expensive installation and antenna push cost up again. Total cost: about $60,000.

of the LNA decreases. These two variables may be juggled to achieve equivalent results with component cost generally steering the direction.

The geographic latitude affects the angle of the dish aiming at the satellite's orbital arc. This also affects system noise because, as the dish aims at angles closer to the earth's surface, the ambient noise pickup is greater. Obviously, the elevation angle as well as the strength of the satellite's antenna pattern, or *footprint*, at the proposed receiving location must be taken into account.

Receiving satellite signals involves a threshold effect, because there is a G/T below which the signal is lost in the noise. The system G/T should embody a few decibels of margin above threshold, and 4-5dB is common for C-Band (4-6GHz) systems.

Generally, it is best to start by determining the G/T required for the class of service required (wideband video, single carrier per channel, digital audio, etc.). Then select a dish/LNA combination that most economically provides that G/T.

Relatively inexpensive GasFET LNAs down to 80° are now available, but super low noise amps must be cyrogenically cooled, and these have super price tags. Fortunately, few broadcast applications require parametric LNAs and redundant GasFET units are the order of the day.

Location and footprint

To review the factors that will determine earth station performance requirements, let's start with the location. Before even thinking about locating a C-band video station at any given location, it is a good idea to make some interference measurements. Remember that many terrestrial microwave links operate in the 4GHz region, and your site may be crisscrossed by several potentially interfering paths generated by prior users. In the early days of satellite transmission, when most stations were operated by common carriers, even TVROs were required to be formally frequency coordinated. This quickly became an impractical process as the number of TVROs proliferated. The requirement was eventually dropped for receive-only sites.

If interference does exist, it is not the end of the world. The broadcaster may opt for either shielding the site or filtering the sidebands, depending on the type of interference. Fortunately, many types of terrestrial link interference can be notched out of the sidebands at the receiver with negligible loss of signal quality.

The smaller radio program distribution systems often lend themselves to the *try it and see if it works* approach, particularly the digitally encoded

Varian GEN II KPA. Pushing earth terminal technology through the 80's.

Designed specifically for today's modern world of earth terminal communications, the new Varian GEN II KPA simplifies complex communications problems with its advanced computer interface options. Easily adaptable, GEN II can be programmed to IEEE 488, RS-232 and RS-422 data busses.

Smaller, more modern design. Modular construction includes a proprietary,* digitally-controlled, all solid-state, low noise regulated power supply.

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Controls/Monitors/Logic section circuits use C-MOS high noise immunity digital techniques to energize, protect, control and monitor KPA performance. The modern front panel features all-LED indicators and digital meter displays.

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*Patent applied

More information on the new GEN II KPA for the 80's is available from Varian Microwave Components and Subsystems Division. Or the nearest Electron Device Group sales office. Call or write today.

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varian

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systems, which are rather interference resistant. Many sheet metal vents or air conditioners have served as shielding for small roof-top earth stations. By the same token, be aware of which direction satellite signals will come from when considering new or renewal studio site leases. Nothing is worse than finding that the entire orbital arc is blocked by some structure. Local zoning should also be checked, but in most cities, if it does not show from the street it is okay, and certainly most small radio dishes can be positioned on a roof to meet this requirement.

Once an interference- and bureaucrat-proof location has been selected, the rest is a function of the numbers. The site location defines the position on the satellite's footprint and, thus, its EIRP, as well as the elevation angle. The rest falls into place nicely. In the old days, almost every system was a custom design, but now equipment venders tend to market low cost standard packages that work at most locations and offer upgrades to handle the exceptions.

For instance, a 7m antenna and 80° LNA combination may provide adequate margin above threshold and G/T for most installations with a little overkill in some areas. Another vender may offer a 9m dish and 140° LNA with equivalent system performance as a standard TVRO package. In either case, it is a simple matter to substitute a 10m or 11m dish for operation in South Florida or some other location with an attenuated footprint. So, don't feel slighted if your friendly local earth station salesperson walks in the door and immediately spouts off appropriate G/T and margin figures.

Antenna selection

After determining the basic system performance parameters, it is time to decide on a fixed or movable antenna and to select receivers and other options. As satellite feeds become more a part of routine broadcast practice, the trend at TV stations seems to be toward movable systems with auto-positioning and multiple receivers for the obvious flexibility that such a system provides. Program directors at independents can have a field day pulling specials off the birds, and network affiliates have found their TVROs opening the door to lots of attractive programming options, such as local color from major sports events. Fixed and portable uplink facilities are available in most cities to complete the loop.

Radio broadcasters frequently prefer to start with fixed dishes and only the receiving equipment required to bring in the program service that caused the earth station to be there in the first place. After all, a 3m dish is easy enough to re-position, and additional receivers and decoders are easy to install. So, even a basic installation affords opportunities for future options once the initial site is complete.

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Even if a suitable location cannot be found on the station's premises, a remote location with a short microwave or telco hop is usually easy to arrange. Remote microwave facilities are an everyday broadcast engineering event, and remote earth station sites are not much more difficult to implement and manage. As a matter of fact, some engineering managers have been downright creative in this area. Al Martin at WKBD-TV in Detroit could not find an interference-free site that he liked, so he negotiated a space within the shielding berm of Greater Star Link, a local common carrier, and leased the unused time to the carrier to cover the rent. The 7m Scientific-Atlanta system is remote-controlled from WKBD and locally controlled at Greater Star Link, which also operates two 10m systems, including redundant uplink facilities.

A couple of years ago, Harris began calling its broadcast earth station package the SSL, or *Satellite-to-Studio-Link*, apparently looking forward to the day when the SSL would become as common at broadcast stations as the STL is today. If we step back and take a look at all of the new programming available via satellite, it's easy to predict that an SSL at almost every station will become reality in a few years.

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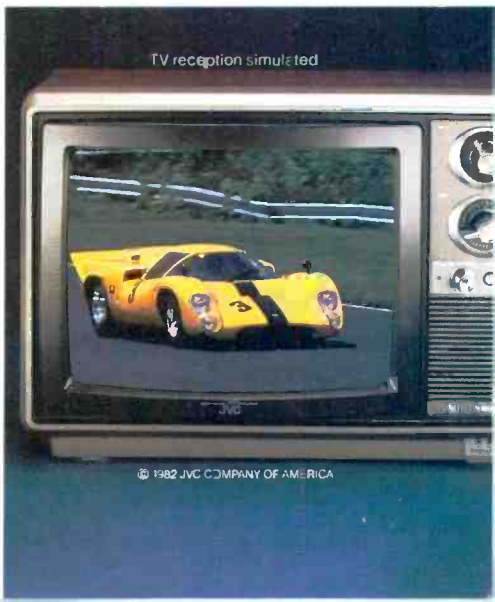

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Fundamentals of earth station frequency coordination

By Harry Stemple, Comsearch, Reston, VA

Frequency coordination, a term native to satellite communications technology, is a 3-phase process designed to avoid RF interference conflicts and to ensure timely system engineering and efficient spectrum usage. This process can be used to help find the best locations for earth stations.

The first step in frequency coordination is interference analysis. This usually involves a computer study of interference aspects of a site with inputs from terrain databases, which may be augmented by some field verification of interference levels. This phase should identify all potential interference sources. Then it must find reasons that the problem should not affect operation or determine methods to mitigate any interference.

Once a site is cleared, that is, all potential interference problems have been resolved to the satisfaction of the user, the frequency coordination notice is issued. Technical data on the proposed operation of the earth station are sent to users of terrestrial microwave within the coordination contour of the earth station. Each microwave user makes an independent study and calculates interference involving its facilities. If microwave users find cases of potential interference from the proposed earth station, they report their objections.

The earth station applicant or his frequency coordinator must reply to any objections raised; present arguments as to why no interference will result; convince the user of this; and finally get the user to state, in writing, that he agrees with the analysis. Once all carriers agree that no interference will result from the operation of the earth station, an FCC application can be filed.

The FCC requires frequency coordination to be undertaken and completed before applying for an earth station license. For requirements and procedures, see the FCC Rules, Parts 21.100 and 25.203.

The FCC routinely grants licenses for earth stations with 9m or larger transmit antennas or 4.5m or larger receive-only earth stations. The FCC will not accept applications for transmit earth stations smaller than 9m if broadband transmissions are proposed. These include typical video, high speed data, and other modulations that would use nearly a full transponder. If narrowband transmission is proposed, there is no apparent limit to antenna size. This is not meant to imply that there are no restrictions, however. There must be *no* terrestrial interference with other systems, and an appropriate showing of non-interference to adjacent satellites must be made with the application.

Antennas smaller than 4.5m for receive stations can be licensed under the provisions of FCC Rule 25.209(b). Although you can get licensed, you can only maintain protection from interference to the same level of exposure you would experience if a 4.5m antenna meeting a minimum quantity radiation pattern was used.

Need for frequency coordination

The satellite communication bands are shared with terrestrial microwave systems. The first users of this band were point-to-point microwave users such as AT&T, specialized common carriers, video common carriers and miscellaneous other users qualifying as common carriers. Since the late 1950s when the first microwave systems were implemented, the use of 4GHz and 6GHz bands have grown to more than 10,000 paths in the United States. In some parts of the country, it is difficult to engineer terrestrial systems to avoid interference. Because satellite earth stations need to be coordinated for more spectrum than terrestrial radio relay systems, their coordination is difficult, too.

The nature of the terrestrial usage of the 4GHz and 6GHz bands can provide useful insight into potential interference problems. 4GHz, for example, is shared with the receive function of an earth station and is used predominantly by the AT&T and Bell systems. Non-Bell usage constitutes a small percentage, but is increasing as the specialized common carriers (MCI, etc.) exhaust their 6GHz capacity.

The Bell system antennas are mostly horn reflector types. Their most important feature is their good radiation pattern characteristics. They reduce the energy escaping, in other than the desired direction, to a minimum. Even though Bell paths are numerous, unless the earth station is close to a 4GHz site or directly under a path, interference is unlikely. But, as

Continued on page 36

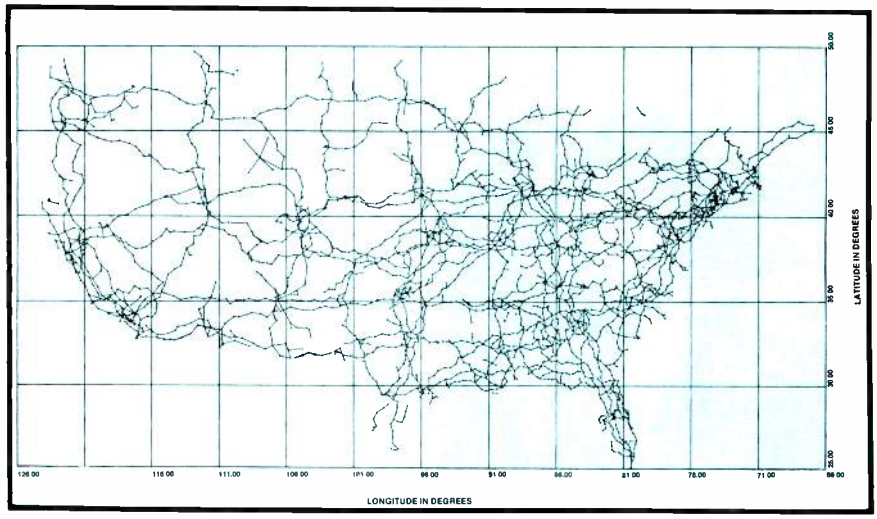

Figure 1. 4GHz microwave route map.

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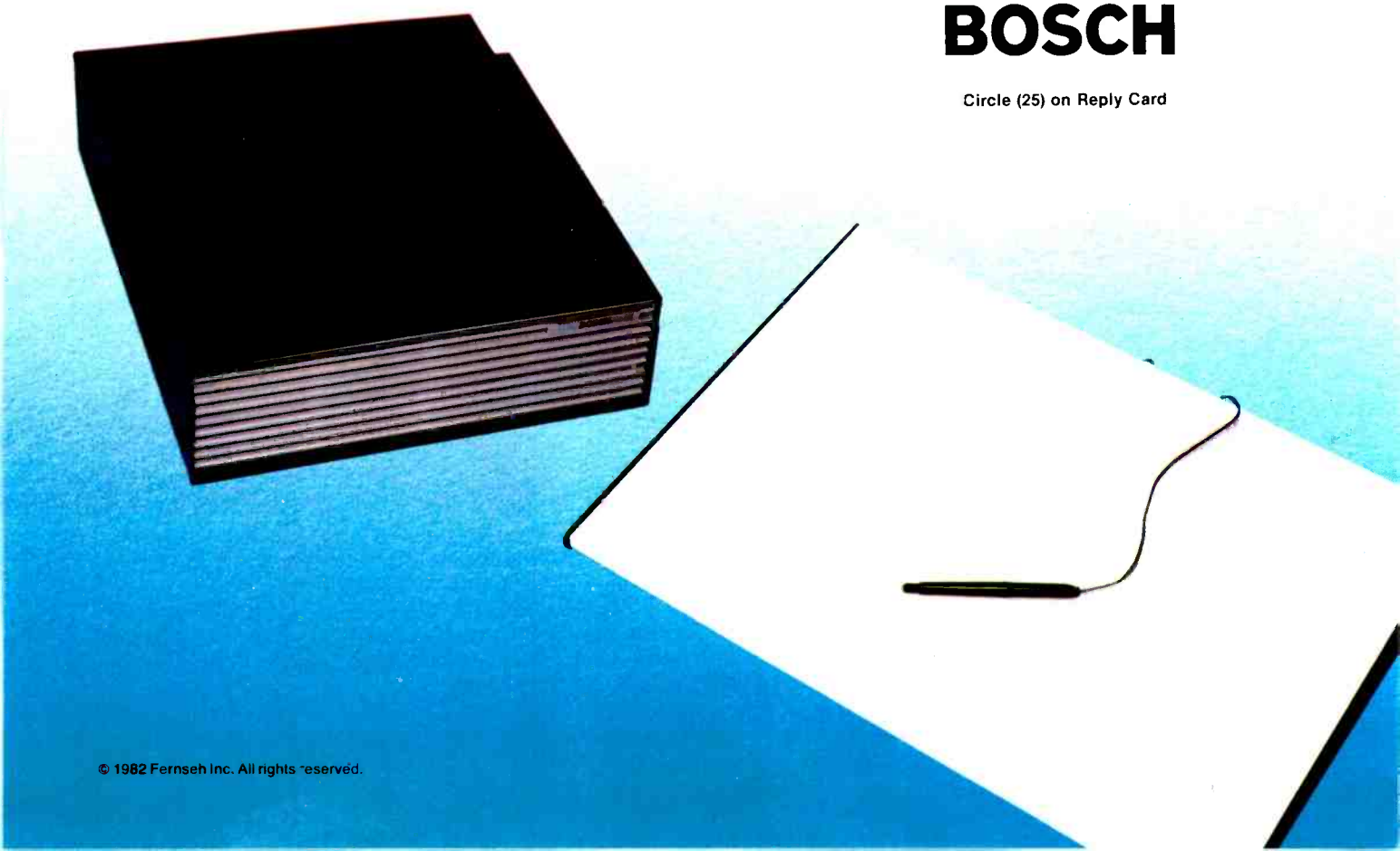

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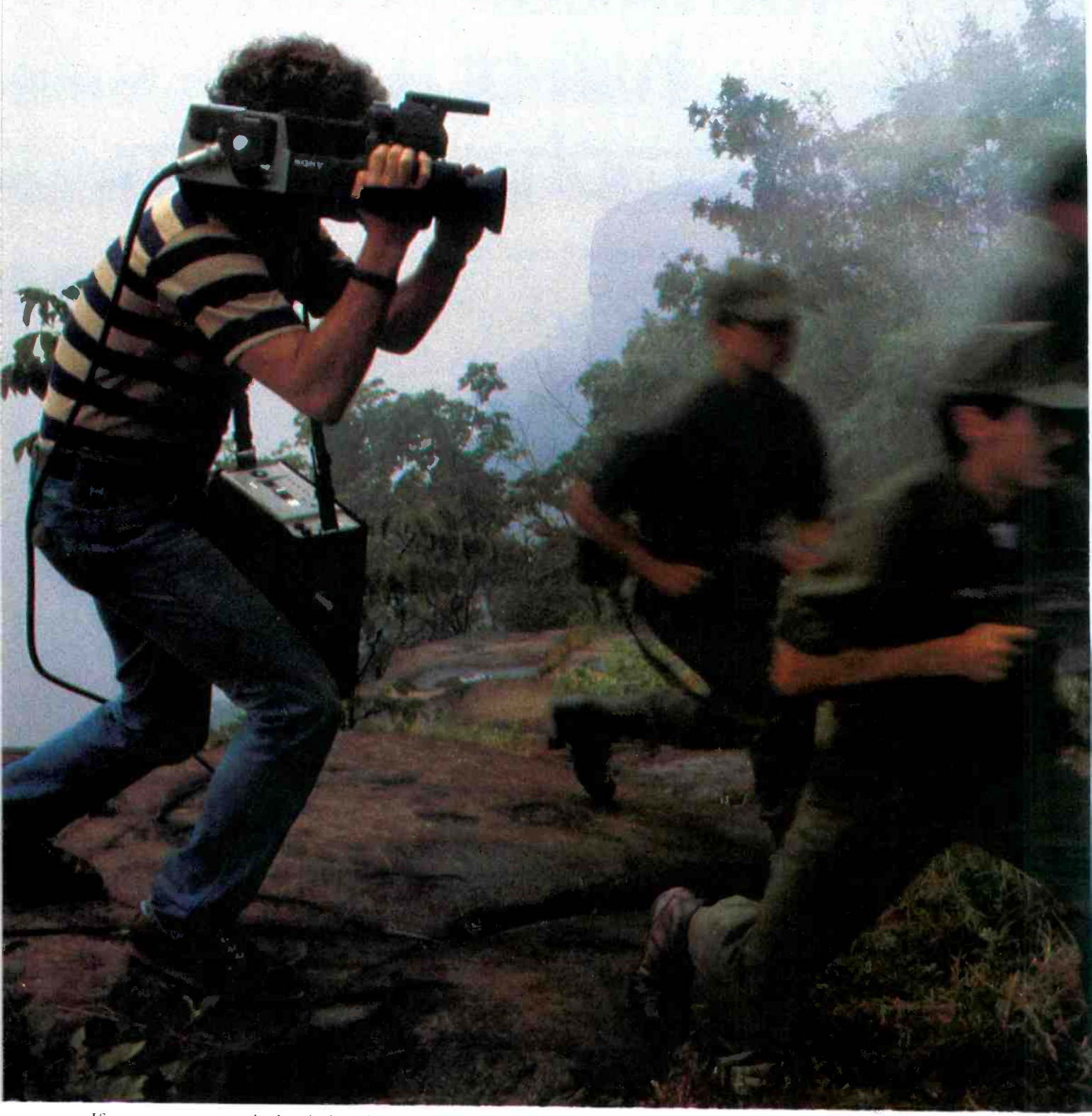

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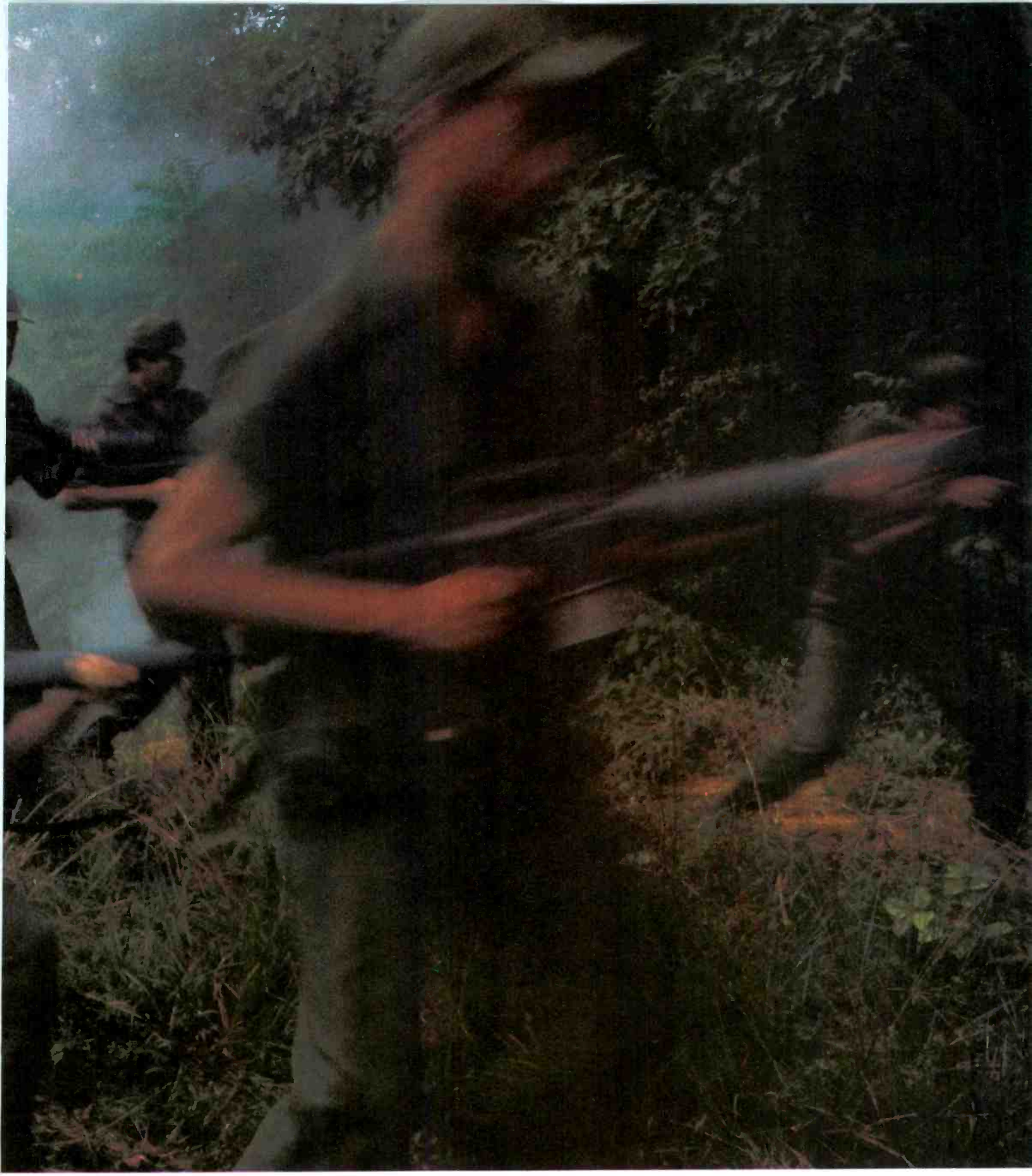

toting around loads of extra batteries. This rugged, dependable camera has the lowest power consumption of any broadcast-quality camera in the industry. It'll operate for more than two hours on a single battery pack.

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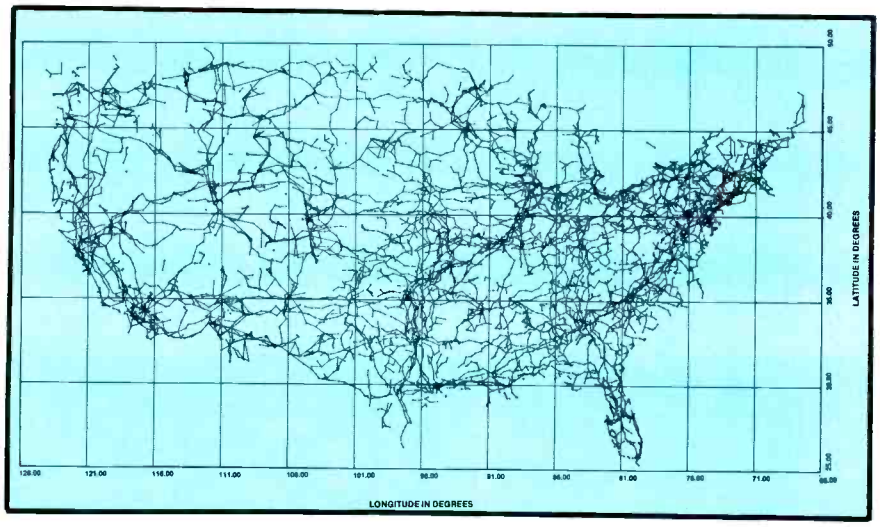

Figure 2. 6GHz microwave route map.

Continued from page 32

you can see in Figure 1, there is a pretty good possibility of this happening.

Earth stations transmit in the 6GHz band. The Bell system uses this band as much as it uses 4GHz. But here the usage by other entities is just as great. In general, the antennas used at 6GHz do not have as good of radiation patterns as the horn reflector. Considering there are 1) more than twice the paths in 6GHz than at 4GHz; 2) the less discriminate antennas for 6GHz than for 4GHz; and 3) the protection required by terrestrial systems is 10-16db more than a video earth station, the difficulty in coordinating an uplink compared to a receive-only is greater. Figure 2 shows the 6GHz microwave environment.

In light of the congestion in the microwave spectrum, the main reason for frequency coordination is to determine whether or not the earth station will perform satisfactorily in its environment.

Interference factors

Once an interference objective has been established, the received signal levels for each potential interference case must be computed and compared to the objective. The antenna systems and propagation path are major factors affecting the interference transfer from the interfering transmitter to the victim receiver.

There are two general propagation modes (or interference mechanisms) by which terrestrial relay facilities and earth stations interact—*great circle propagation* and *precipitation scatter propagation*. Precipitation scatter interference alone does not make or break an earth station site. Propagation accounts for one term in the interference transfer function. For the great circle mechanism, the propagation loss between the interference source and the victim receiver has a great effect on the levels received. On unobstructed paths (for example, line-of-sight conditions), free space loss calculations are used. Here the separation distance is the only factor of importance; the loss increasing as the square of the distance. For obstructed paths, separation distance still affects the loss by the same relationship, but terrain features add to the loss. Local earth station site shielding has a substantial effect on the loss, with more distant obstacles

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contributing as well. Generally speaking, on short paths that are obstructed, the interference propagates by the diffraction mode, bending over the blockage. On paths with a single obstacle, the amount of loss realized is dependent on the percentage of blocking relative to the first Fresnel zone radius and on the character of the obstacle. Rounded obstacles produce significantly more loss than those producing knife-edge blocking.

For longer interfering paths, each site sees a different horizon point. Generally, forward scatter of the signal from the troposphere is the predominant cause of interference. In this case, the factor that influences the loss is the angular separation of the terrestrial and earth stations. The angular distance is composed of a simple distance component plus additions for the horizon elevation angles. Large median losses relative to free space are possible for this propagation mode, but are subject to wide variation with time. For short periods of time under certain atmospheric conditions, much of the loss diminishes and the isolation nears that of free space.

An ideal microwave antenna would radiate all of its energy in a narrow beam, with none escaping in any other direction. In practical antenna systems, most of the energy is in the main beam, but significant levels of radiation are emitted (or accepted) at angles off the main beam. The angle at which one considers this radiation is called the *discrimination angle*, the level of radiation relative to the main beam is termed the *antenna discrimination*. This effect is applicable to earth station and terrestrial station antennas and accounts for two terms in Equation 1.

Horizon gain function

For the great circle mechanism, the interference comes from the horizon in the direction of the terrestrial station. In the interference calculations, then, it is the antenna gain toward the horizon that is used. Calculating the horizon antenna gain for the terrestrial microwave stations in the direction of the earth station is a straightforward procedure. Determine the discrimination angle for the terrestrial station and obtain the discrimination value from the appropriate radiation pattern envelope. The antenna gain is the difference between the main beam gain and the discrimination.

Calculating the earth station horizon antenna gain in the direction of the terrestrial station is not quite as simple. The earth station antenna can be oriented to view a range of satellites. It is not directed horizontally, and often the horizon it sees is ele-

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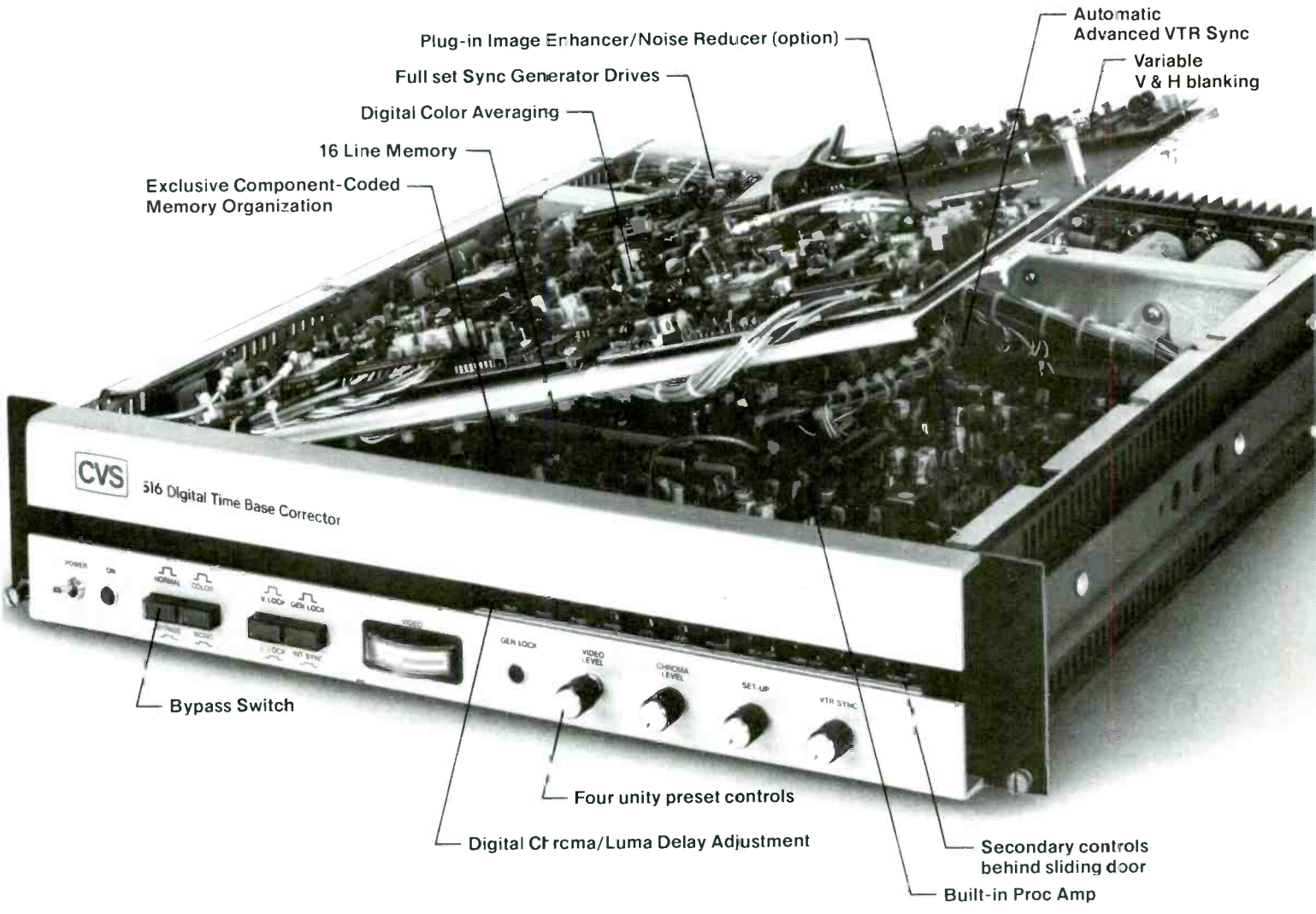

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vated. To provide the earth station horizon gain for the interference calculations, a gain curve must be developed, such as the one shown in Figure 3. This graph gives the earth station antenna gain toward the horizon as a function of azimuth. It considers the horizon elevation angles, the various pointing angles of the antenna, and its radiation pattern envelope. After the plot has been developed, the bearing from the earth station to the terrestrial station must be determined. Enter the curve at that azimuth and read the value of gain to be used for the interference calculations.

Figure 4 illustrates how the earth station horizon gain plot can be derived graphically. The computerized method is adapted directly from the technique to be illustrated, except that analytical expressions are used to determine satellite position. The curved solid lines show the arc of the geostationary orbit visible from the earth station at latitude λ and the longitude difference between the satellite and the earth station. The heavy solid line in Figure 4 shows the locations of satellites from 70-136° west longitude as they would appear in the sky for an earth station near Atlanta. Toward the bottom of the graph, the horizon elevation as viewed from the earth station is depicted. For any particular azimuth, the earth station discrimination angle is defined as the smallest angle between that point on the horizon and the geostationary arc. Figure 4 also shows an example for an azimuth of 210°, in which the discrimination angle is seen to be 32°. Now that the angle has been determined, the gain can be read from the earth station radiation pattern envelope. This process continues for the full 360° to generate a complete horizon gain plot.

Received signal level calculations

The relationship between the factors discussed previously and the received interfering signal level is given by:

$$P_r = P_t + G_t - L + G_r$$

Where:
- P_r = received signal level (dBW)
- P_t = transmitter power (dBW)
- G_t = gain of the transmit antenna toward the earth station (dB)
- L = basic transmission loss (dB)
- G_r = gain of the earth station antenna toward the transmitter (dB)

Equation 1. Interference transfer equation.

Equation 1 applies to interference propagated via great circle mechanisms as differentiated from the precipitation scatter mode of interference, even though the equation is basically the same with some of the terms combined and redefined.

Coordination contours

Great circle coordination contours are another required data element of a frequency coordination package. The purpose of the coordination contour is to define an area outside of which the potential for interference is so remote that stations beyond this limit need not be considered. The procedure establishes the amount of loss required to reduce the interfering signal levels below the objective and then relate the loss to a distance. The basic relation for the loss required is obtained by solving Equation 1 for L, as follows:

$$L_{req} = P_t + G_t + G_r - P_o - H$$

Where:
- L_{req} = loss required to meet objective (dB)
- P_o = interference objective (dBW)
- H = correction factor for earth station horizon (dB)

Equation 2. Solving for L.

Other terms are previously defined.

To obtain the loss required, one must make some worst case assumptions. Maximum legal values are assumed for P_t and G_t with no antenna discrimination for the terrestrial systems.

The FCC rules prescribe the relationship between loss required and distance that is a function of radio climate and frequency. The relationships are valid for distances of 100km or more and follow approximately an 80 log distance relationship as compared to the 20 log distance slope for free space propagation. A typical coordination contour is shown in Figure 5. The jagged nature of the contour shown in Figure 5 is due to horizon effects. These are reflected in the horizon gain on H factor terms. The correction factor H of Equation 2 is by FCC rules.

Basic site requirements

Before the great explosion of satellite communications for all types of uses, earth station sites were carefully selected with protection from interference being the primary consideration. Most locations were many miles from the cities that they were serving. The ideal earth station site was naturally shielded by terrain at a spot that was calculated to be virtually free of interfering signals. For most types of communication, this type of isolation is not required, although it is still true that the most important aspect of a site is its shielding. Because of the dedicated use of most earth stations, it is desirable to have the antenna close to the user interface. Using the concepts just covered, broadcasters can get a qualitative idea of how well their sites will coordinate by considering a few possible sites.

If any microwave towers are visible from your site, there is a high probability of unresolvable interference problems. The separation distance is small, and with free space propagation, the interfering signal levels will be high. If you have a choice between a location high on a hill or down in a valley, take the valley for its natural shielding benefits. A site surrounded with dense trees can be good for reducing interference levels into the earth station, but consideration must be given to the trees' effectiveness if they lose their leaves. The entire domestic geostationary satellite arc should be visible, also.

Extended analysis

What has been presented thus far is the normal procedure for the interference analysis of a potential earth station site, involving access to a computerized database of terrestrial microwave systems; use of a computational procedure outlined by FCC rules; and extraction of data from topographic maps to consider effects of terrain shielding. In most instances,

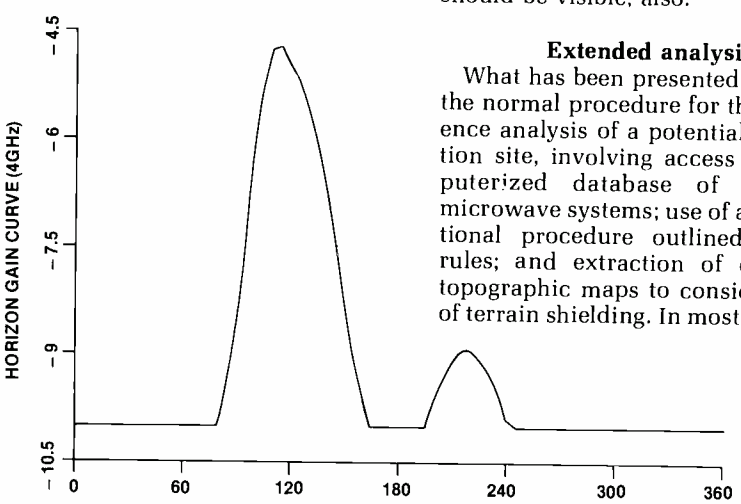

Figure 3. Horizon gain curve (4GHz).

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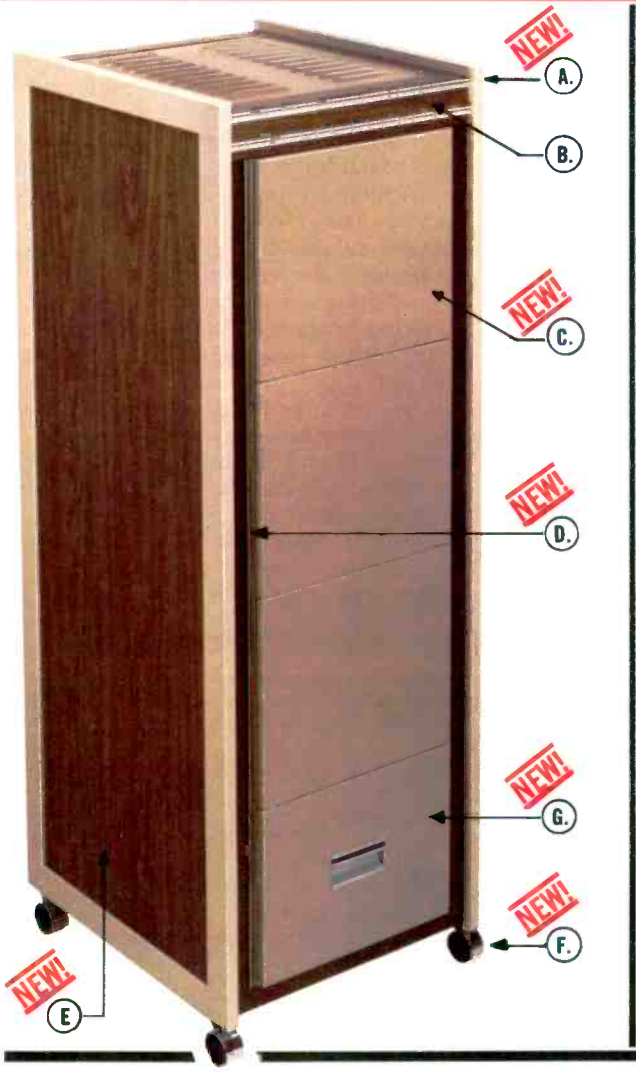

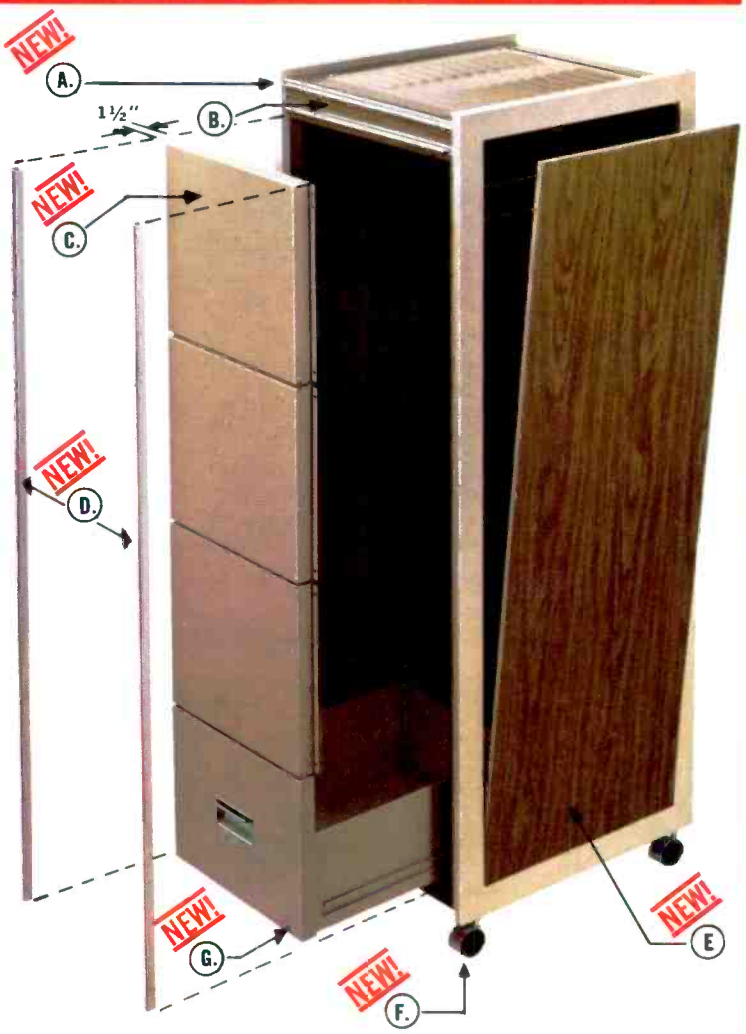

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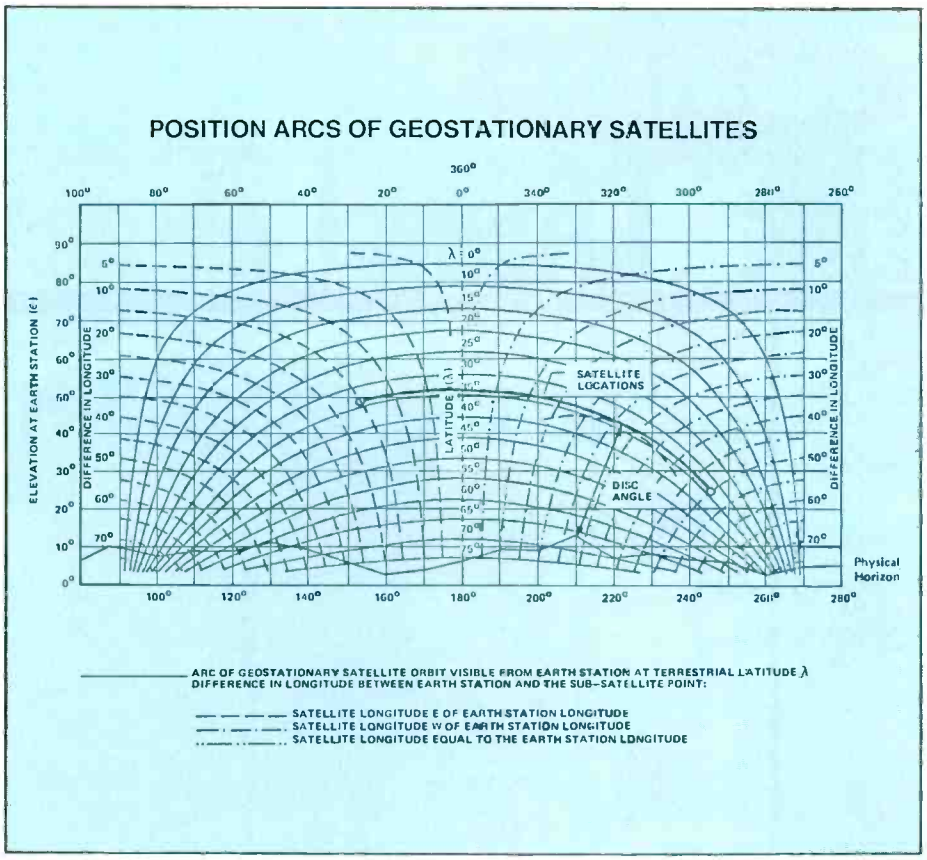
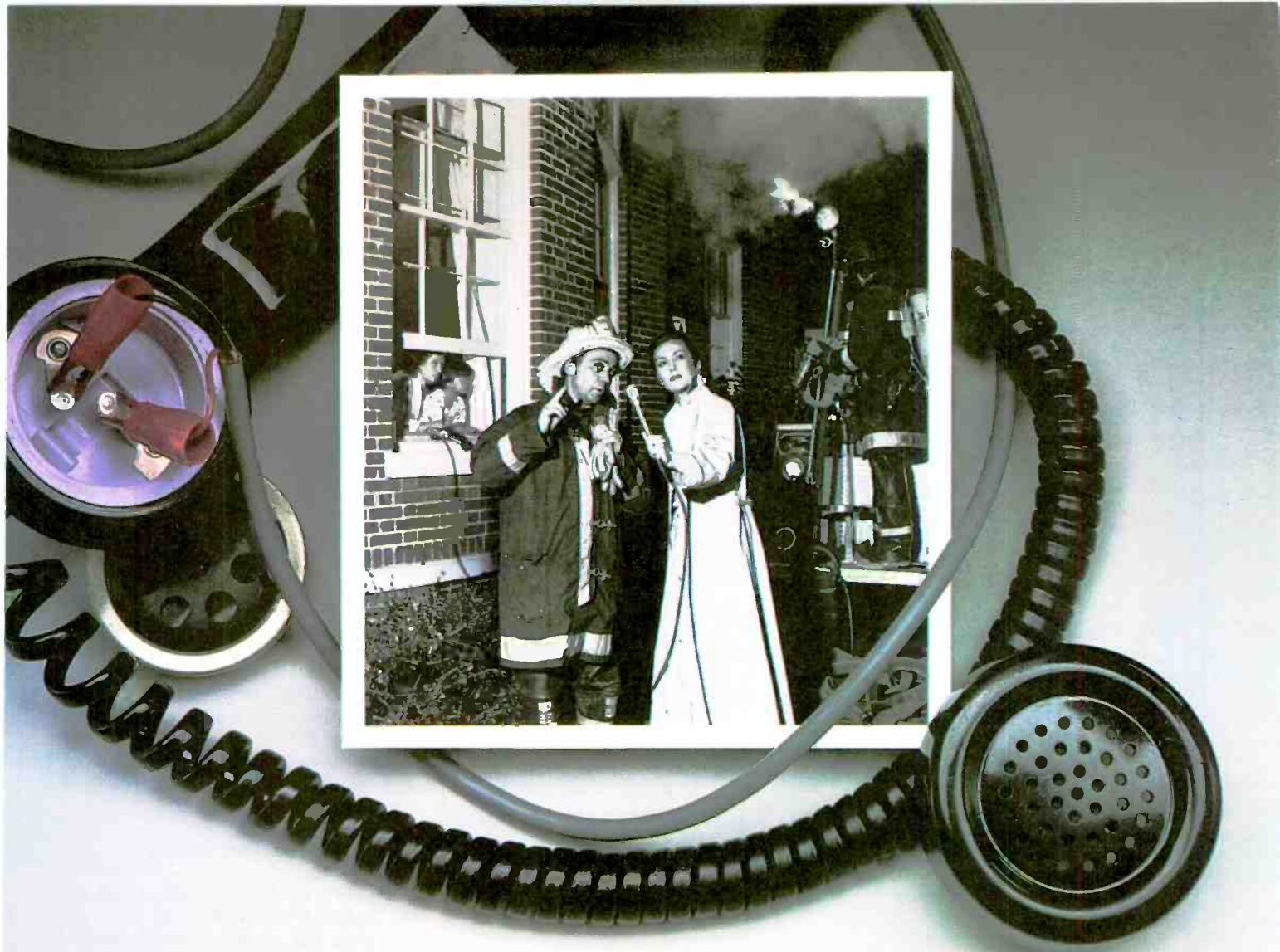


Figure 4. Graphical derivation of horizon gain curve.

analysis to this extent is sufficient to demonstrate that the earth station is compatible with the microwave environment. It is generally accepted that the procedures used in office studies are conservative, as they should be, because of the many unknown parameters that come into play.

If the office study shows that the earth station site will clear, it will be good with a high degree of confidence. If the office study shows the location to be subject to severe interference, degradation of performance is to be expected. For those sites that are shown to fail marginally to meet the interfering standards, further refinement of the analysis may be in order. The extended analysis discussed in this paper is confined to defining and correcting the great circle interference cases only, because little can be done to mitigate precipitation scatter cases except relocating the site.

Depending on the prospective earth station operator's situation, he may be justified in abandoning his initial site in favor of another if the office analysis indicates substantial interference problems. A frequency coordination agent will help you select and coordinate new sites. For



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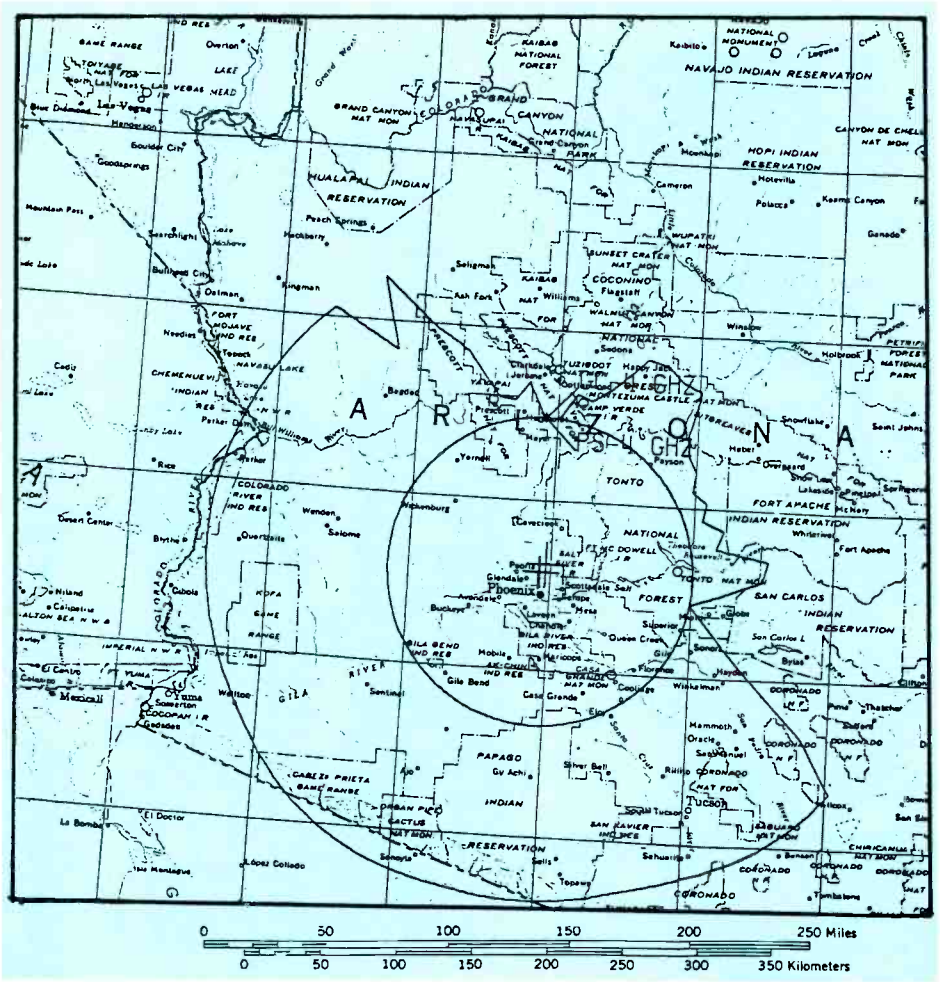

Figure 5. Coordination contour.

others, a more detailed analysis should be initiated to better define the magnitude of the problem so that the viability of corrective measures may be evaluated more intelligently. To further refine the office study, some analysis beyond that which is normally done is required. Extended analysis most often means on-site field work either by the prospective earth station operator or by consultants.

Local shielding

One of the first improvements to the office study is to provide better input for the propagation loss prediction routines. Normally input data is taken from USGS topographic maps. This provides terrain heights along the path, but many other obstacles could be present that would offer additional isolation between the earth station and the terrestrial microwave tower. Particularly with small diameter antennas, buildings and dense groves of trees are types of obstruction normally considered in better path definition.

Slight antenna relocation can provide improved electromagnetic compatibility. With potential interference problems identified, the final position of the earth station antenna can be chosen to take maximum advantage of near-in obstacles along the azimuth where the interference is expected.

Field intensity measurements

RFI measurements have proved themselves valuable in determining more precisely the extent of an interference problem predicted by the office study. The results of the measurements normally show the interference problems to be less severe than predicted, and occasionally point out unpredictable problems, such as reflections.

The RFI measurements quantify the interfering signal levels arriving at the site. At 4GHz, the earth station receive band, the measurements give direct evaluation of expected interfering signal levels. At 6GHz, the earth station transmit band, the levels measured at the earth station site are used to compute isolation between it and the terrestrial receiver. From the isolation, the expected interference level at the terrestrial receiver can be predicted.

Figure 6, which has elements similar to an earth station system, shows a typical measurement block diagram. This configuration uses a CAS horn antenna, the output of which goes to a low noise amplifier that establishes the maximum measurement system sensitivity. A spectrum analyzer is used as a detector and photographs of its display provide a record of the measurements. Normally, the sweep width of the spectrum analyzer is set to display the full 500MHz of either the 4GHz or 6GHz common carrier bands. The test antenna is scanned 360° to detect any interference sources, with scans being made for vertical and horizontal polarizations. Figure 7 shows a spectrum analyzer display photograph with several terrestrial interfering signals visible.

Normally, over a 24-hour period, the best microwave propagation conditions and thus the worst interference situation, occur after midnight and continue until sunrise when air temperature begins to increase. Typically measurements are made during the daytime to allow for easy setup and a preliminary look at the site. The tests are then repeated at night to get a feel for the fluctuation in signal levels that might be expected. Using statistical information from the propagation loss prediction models, one can extend the results of the measurements to the worst season of the year and short-term levels of interference.

Diffraction screens

Diffraction fences constructed of hardware cloth, expanded metal or chain link fence with metal strips inserted in the mesh, could be used to reduce interfering signal levels. Analytical methods for computing loss due to a diffraction fence are from classical optics models for knife-edge diffraction. This method supposes that the knife edge is in the far field of the earth station antenna (1.5 miles at 4GHz and 2.2 miles at 6GHz). A fence constructed at these distances would be large and add an additional land acquisition problem. To achieve 15dB of shielding at 1.5 miles from the earth station, the screen should extend 37 feet above the antenna center line and be about 200 feet wide. One should not rely on diffraction fences for large amounts of isolation if they are constructed too close to the antenna. Losses of 20dB are maximum. 15dB is a comfortable value.

Because the diffraction fences are usually proposed to be constructed within the near field of the antenna, it is difficult to separate the effects of shield and antenna. For rigorous analysis, the shield would be considered part of the antenna for calculation of its far-field gain.

Pit shielding

Pit shielding, the erection of earthen mounds around the earth station, has been shown to provide more than

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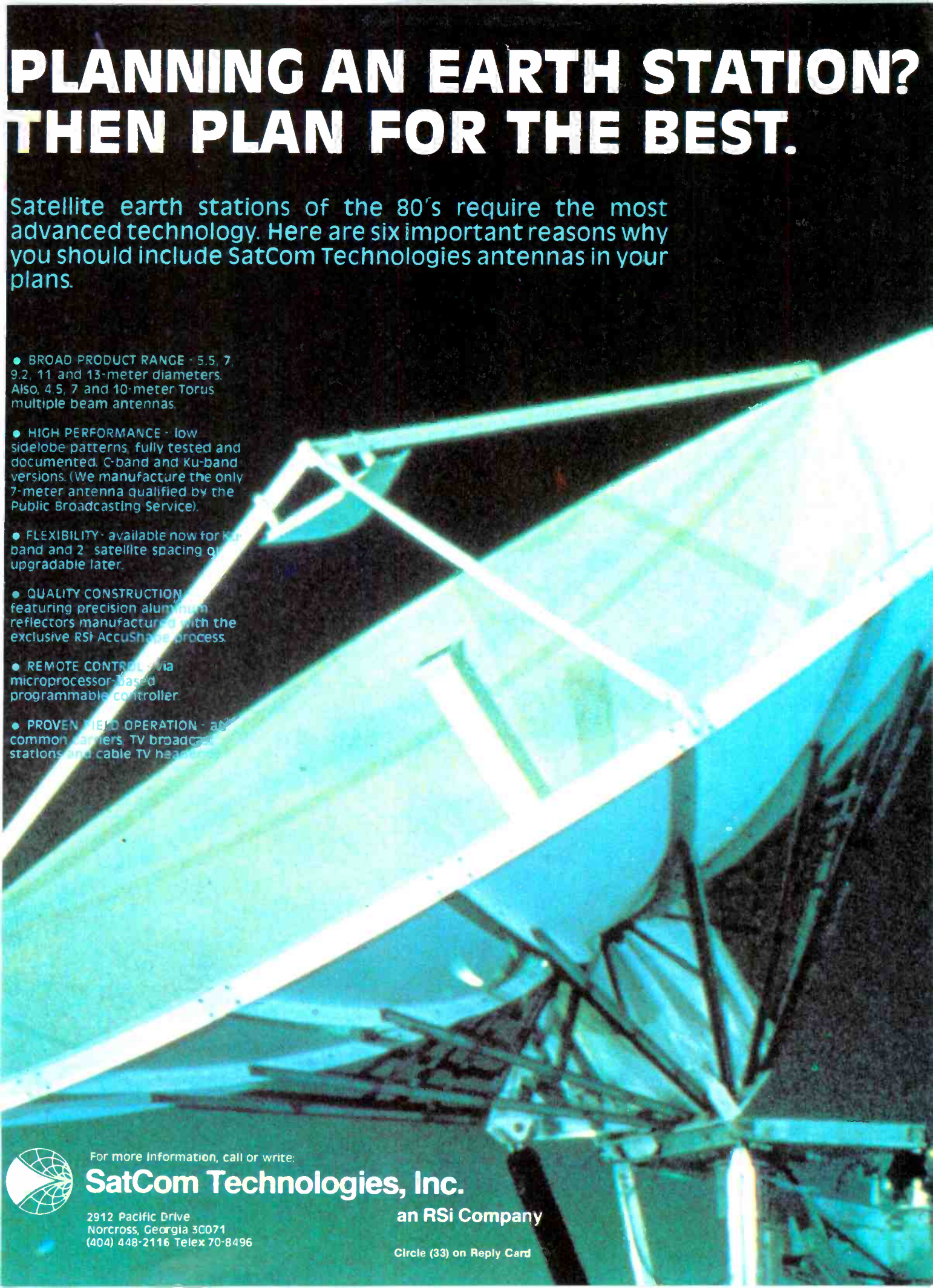

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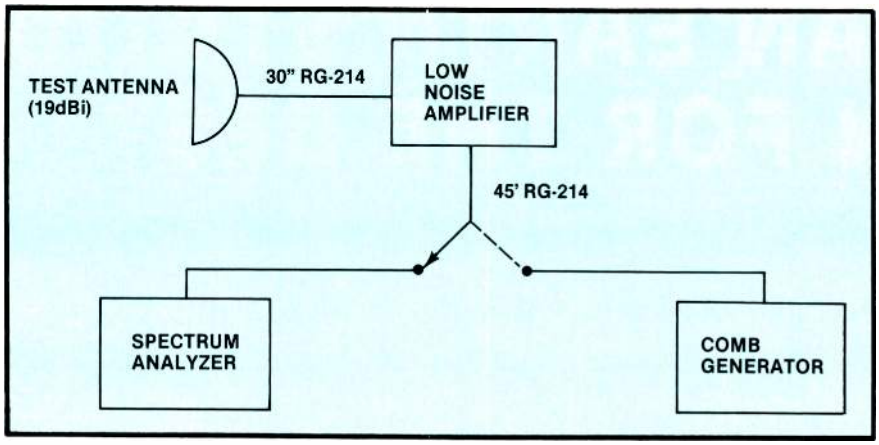

Figure 6. Measurement block diagram.

25dB of shielding. The earth station site must be large enough to accommodate the sloping sides of the pit. One must also consider the significant drainage problems if the antenna is completely surrounded by the pit. A pit large enough to hold a 10m antenna, allowing full clearance of the geostationary arc, could occupy a 200'x290' area.

High performance antennas

High performance earth station antennas are another approach to reducing interference. Shrouded antennas in the 4.5m range are now being regularly manufactured. Comparison of the vender's antenna pattern with the FCC reference curve shows improvement. This is used to advantage in frequency coordination.

Interference filtering

Filtering at RF or IF frequencies can often improve the performance of an earth station in a high interference environment. Although additional filtering may be applicable to earth stations with various uses, it is most often applied to video receive-only earth stations.

In this situation, most of the desired signal is confined to the central 20MHz portion of the transponder, although receiver IF bandwidths may be 25MHz or 30MHz wide. Because of the fixed relationship between standard 4GHz terrestrial microwave frequency plans and the transponder frequency plans, interference most often appears ± 10MHz from the center of the desired signal. For receivers with an IF frequency of 70MHz, the interfering signals fall conveniently at 60MHz or 80MHz. At these frequencies, good notch filters can be easily designed and built.

A narrow notch filter can reduce the interfering signal level before it reaches the discriminator, without removing too much of the desired signal. A problem arises if the interference is large and a deep notch is needed to reduce the levels to acceptable values. In this instance, the filter skirts can remove too much of the desired signal, causing distortion and effectively limiting the amount of interference that can be filtered. Normally a C/I of 25dB in 30MHz is considered the objective for video performance. With IF filtering, the level can be reduced 10-15dB.

Another limitation in filtering effectiveness results from the type of interfering signal modulation. If a simple FDM-FM signal is the in-

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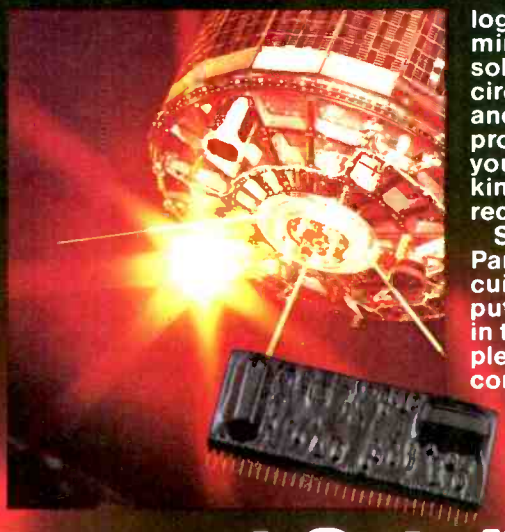

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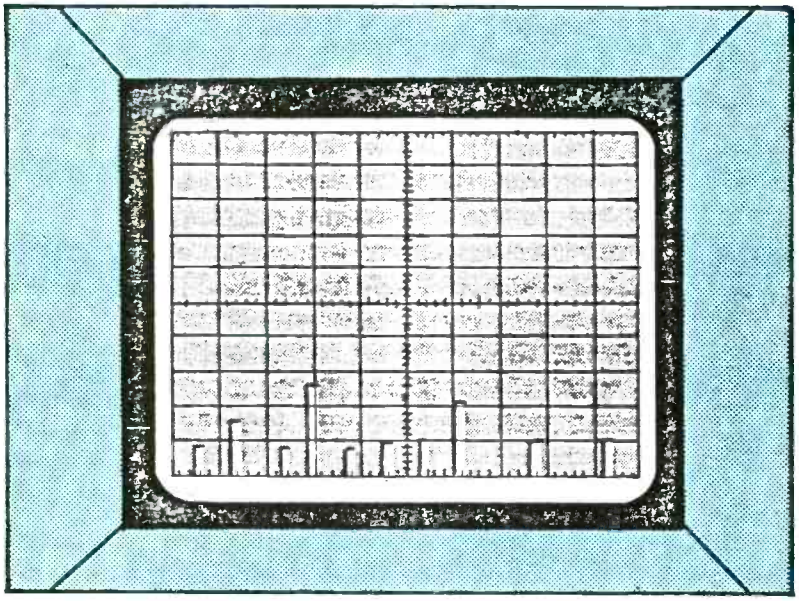

Figure 7. Spectrum analyzer display.

terference, the filtering works well, because most of the energy is narrow residual carrier component. If FM-video or digital modulation is involved, filtering is not effective, because these signals have high level broad spectra near the center of their bandwidths. A filter that would remove these signals would remove most of the desired signal as well.

Site selection process

If the site is found to have interference problems and the fixes previously discussed cannot remedy the situation, if none are viable in the particular case, or if there is no site to begin with, a site will have to be selected that is free from interference.

With the aid of interference intensity map overlap, it is relatively simple to avoid interference. An interference intensity map overlay is the equivalent of many normal earth station coordination computer runs at equally spaced points within an area. The interference value from the worst case of each run is saved and a single number is printed on a map that represents that level. In areas that have a low interference intensity, one must find a specific location that has the required topography, is available at an affordable price, and can be zoned properly. The latter two items are often more difficult to find than the engineering. Once a site has been selected in this manner, a detailed interference analysis must still be undertaken, but interference cases should clear readily.

Having some familiarity with the factors that influence frequency coordination will place you in a better position to understand what your coordination consultant is doing. This, in turn, can often help him do your job faster and more effectively. Above all, he will put your earth station where you want it.

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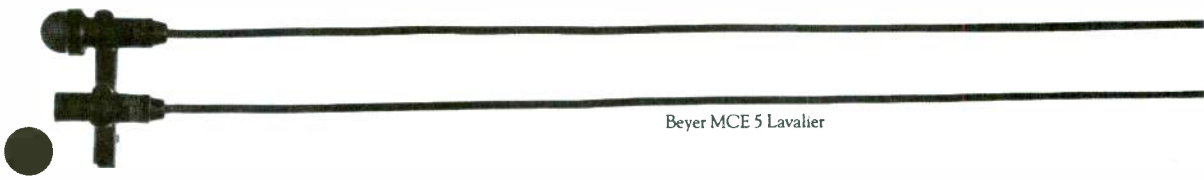

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Selecting a satellite receive terminal/system

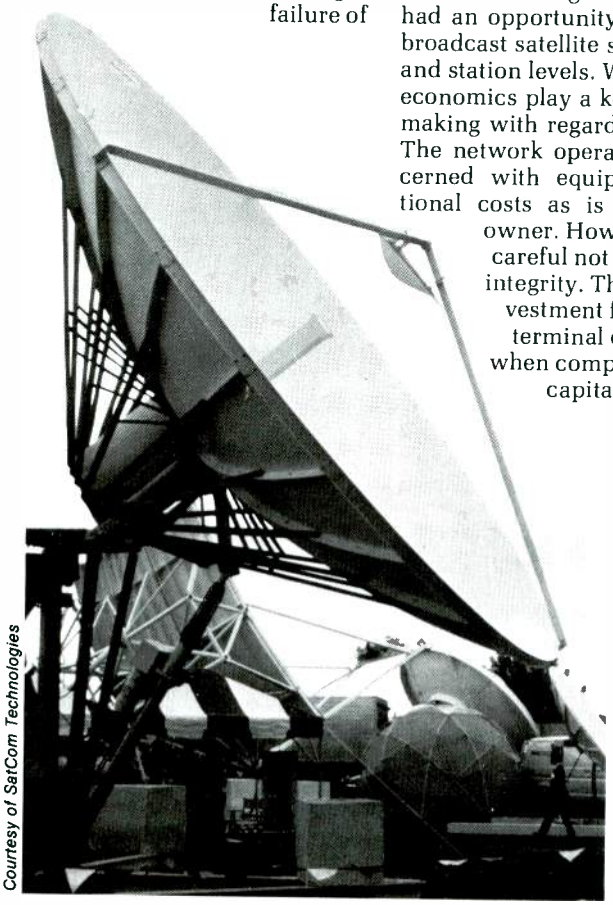
By Hugh R. Paul, Hugh R. Paul & Associates, Walnut, CA

The rapid development of satellite distribution systems, and their capability of providing the radio broadcaster with direct access to an ever-increasing variety of program resources, has been major topic at conventions and in trade magazines. The prospects of greater profits for networks and program syndicators through market expansion and for broadcasters as a result of decreased operating costs and improved audience figures have escalated this interest almost to a fever pitch.

Although the future looks bright for program distribution by satellite, realization of the promised benefits will not be without some problems. Announcements of delays in implementation by new and established networks, and the outright failure of others, are indicative of the financial risks involved. Confusion exists among station owners over the technical transmission standards proposed or in use by various satellite networks. The prospect of adverse impact on existing or proposed receive terminals resulting from possible changes in satellite spacing may also affect the growth of these systems.

Station management obviously has many other factors to consider in making decisions regarding usage of program services distributed by satellite. However, if a poll of owners and managers was conducted, it's likely that the majority would feel that a satellite terminal will be an integral component of their station in the future.

As consulting engineers, we have had an opportunity to be involved in broadcast satellite systems at network and station levels. We understand that economics play a key role in decision making with regard to system design. The network operator is just as concerned with equipment and operational costs as is the small station owner. However, both must be careful not to sacrifice system integrity. The initial capital investment for satellite receive terminal equipment is small when compared with the total capital investment in the average broadcast facility. For the station depending on the terminal to program most of its broadcast day, the capital investment vs. potential return is small. The station owner would be wise to take every precaution to ensure that performance and reliability of the terminal is as good as or better than the station's transmission system.



Courtesy of SatCom Technologies

Any station owner planning to acquire a satellite receive terminal should give consideration to future changes in technology and program service requirements. Although satellite transmission standards for television are uniform, received signal levels *do* vary depending on the satellite in use and where in the footprint the receive terminal is located.

Audio services provided by the radio networks are subject to the same variations, but also employ several different transmission modes. Of the analog modes, SCPC (single carrier per channel) is most prevalent. Digital is scheduled for the near future. The key elements of a satellite receive terminal—antenna, LNA and downconverter—are common to all modes of transmission, whether television or radio.

Based on computer and/or on-site studies, a network can make recommendations to its affiliates as to the types of equipment required to ensure acceptable satellite receive terminal performance. However, because of factors mentioned earlier, performance may not be acceptable should the affiliate attempt to use the equipment to receive satellite programming from other sources.

Unless the receive terminal is constructed in conformance with FCC licensing requirements and the terminal is actually licensed, there is no protection from interference that may result from future development of terrestrial microwave systems. At this

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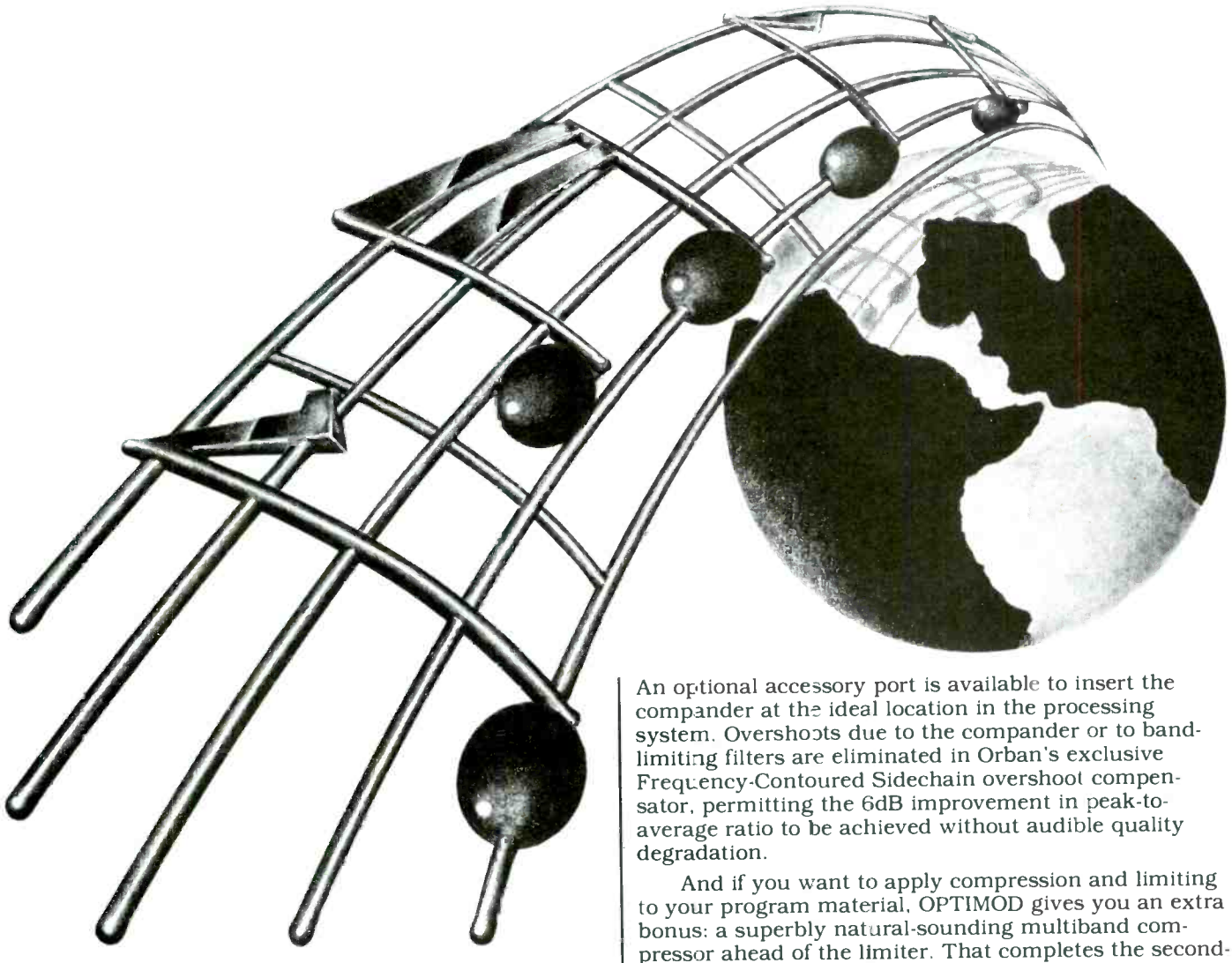

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time there are no definitive standards for determining potential interference from adjacent satellites if the FCC should adopt 2° spacing. If this happens, it may be necessary to more carefully coordinate frequency assignments and perhaps limit EIRP* levels from the satellites if the use of small aperature receive antennas is to continue.

Disagreement exists among engineers as to the effects of 2° spacing on existing systems. We believe that any antenna smaller than 4.5m may experience interference problems. The side lobe performance of a given antenna and the feedhorn design will be critical factors in limiting interference from adjacent satellites.

To illustrate how the approach to system design can impact on the long-term viability of the system, it may be worthwhile to look at how two different networks developed similar systems. National Public Radio (NPR) was the first network to construct a satellite distribution system for member stations. The design parameters included a minimum of 12 SCPC channels, and 50Hz-15kHz frequency response, resulting in an audio signal-to-noise (S/N) ratio that was superior to that achieved by member stations' broadcast transmission systems. To ensure long-term viability, it was considered mandatory that all receive terminals be licensed to protect against future interference from terrestrial microwave systems.

Because total satellite transponder power was limited, it became apparent that the EIRP of individual channels was an important factor in the operational costs for the space portion of the network. NPR thought that it was possible to achieve the design goals with a downlink EIRP from Westar 1 of 16.5dBW. This power level was considerably lower than the 19dBW being proposed for other networks. NPR selected 4.5m antennas exhibiting optimum gain for their size and side lobe performance in compliance with FCC licensing regulations. In order to achieve the design goals for resultant audio S/N ratios, it was necessary to work closely with potential suppliers to improve the performance characteristics of other key components in the receive system. Synthesized downconverters exhibited too much phasing noise, so crystal-controlled units were selected. Development of a 3:1 ratio audio compandor was a prime factor in achieving audio S/N ratios in the mid-70dB range. Subjective listening tests also pointed up the importance to overall performance of the threshold extension characteristics in the demodulators. Since the NPR system has become operational, a 3.6m antenna with side lobe performance in compliance with FCC regulations for licensing has come on the market. NPR is now using these antennas for the majority of new stations joining the network.

The Mutual Radio Network is operational with a multiple channel SCPC system on the same transponder as NPR (now on Westar IV), but with a downlink EIRP of 19dBw and a companding ratio of 2:1. This higher EIRP has allowed Mutual to employ receive antennas smaller than 3.6m in diameter. Overall performance is excellent, but the receive terminals cannot be licensed. There would appear to be considerable risk involved with regard to future interference from terrestrial sources, as well as that resulting from decreased satellite spacing.

From the description of these two systems, one can note a distinct difference in design approach. NPR realized considerable cost savings on the space portion by opting for 16.5dBW downlink power on each of its 12 channels. Although this cost savings was offset somewhat by the

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increased cost for the larger 4.5m receive antennas for more than 200 stations, there are other benefits to be derived from use of the larger antennas. In addition to being protected from terrestrial microwave interference, the terminals could also be licensed for uplink transmission. As of now, some 15 member stations are uplinking program material to the network. The terminal design also lends itself to providing *hand off* services such as video, data, etc.

Mutual Broadcasting System, with a greater number of affiliates, opted for higher costs on the space portion in order to reduce the cost of their receive terminals. Although we have been made aware of some interference problems to Mutual stations, only time will tell to what extent their design approach may prove to be a problem.

We recently concluded a contract for the design of a new commercial satellite radio network. Network management wanted all the facts and figures concerning the various existing and proposed satellite distribution technologies. When all the cards were on the table, it was concluded that an SCPC system operating with a downlink EIRP of 16.5dBW and larger receive antennas offered the greatest long-term advantages for the network and its affiliates. Capital investment for the terminals would be increased by up to 20%, but this would seem to be reasonable when one considers the benefits derived.

There are additional factors affecting terminal costs, many of which are optional. The majority of these options are related to flexibility of operation and not to performance. For instance, the type of antenna mount can affect the cost of the antenna considerably. A polar mount, when aligned with true north, will accurately track the entire satellite arc with a single azimuth adjustment. If rapid repointing to another satellite is desired, then a motorized azimuth drive is required, but at a considerably increased cost.

A less costly type of mount requires adjustment of both the azimuth and elevation angles. Although motorized adjustment is also available, it is not recommended. This mount does lend itself to reasonably fast manual repointing if a benchmark for each satellite desired to receive has been etched on the elevation strut. To repoint the antenna, it is only necessary to adjust elevation to the desired mark and then rotate the antenna until a signal is received from the satellite.

If the receive terminal is to be used primarily on one transponder, it is less costly to use a crystal-controlled downconverter rather than a synthesized one. The latter can be retuned remotely in a matter of seconds as compared to having to install crystals for optional band segments and then re-peak the downconverter. As of this date, there is not a synthesized downconverter that we consider acceptable for use with a satellite downlink EIRP of 16.5dBW. However, several manufacturers are working to develop a unit with an acceptable phasing noise figure.

Probably the greatest savings can be realized in the selection of the demodulators. These are available in crystal-controlled versions providing selection of one to three channels or in synthesized versions capable of selecting up to 300 channels. If a high level of frequency agility is not required, cost savings of as much as 80% per unit can be realized without sacrificing performance quality.

It is not our intention to sell a particular technology. We are instead trying to acquaint the radio station owner with some of the factors that should be given careful consideration before purchasing a satellite receive terminal. By doing so, you will ensure that your capital investment is a long-term asset rather than a liability.

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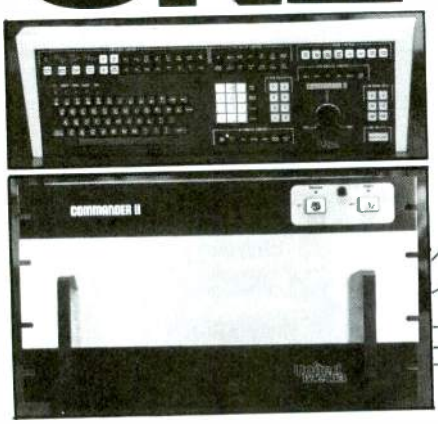

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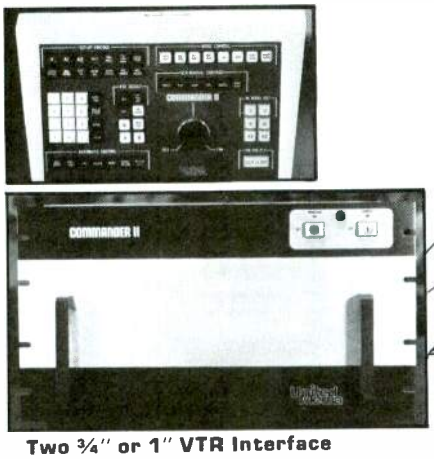

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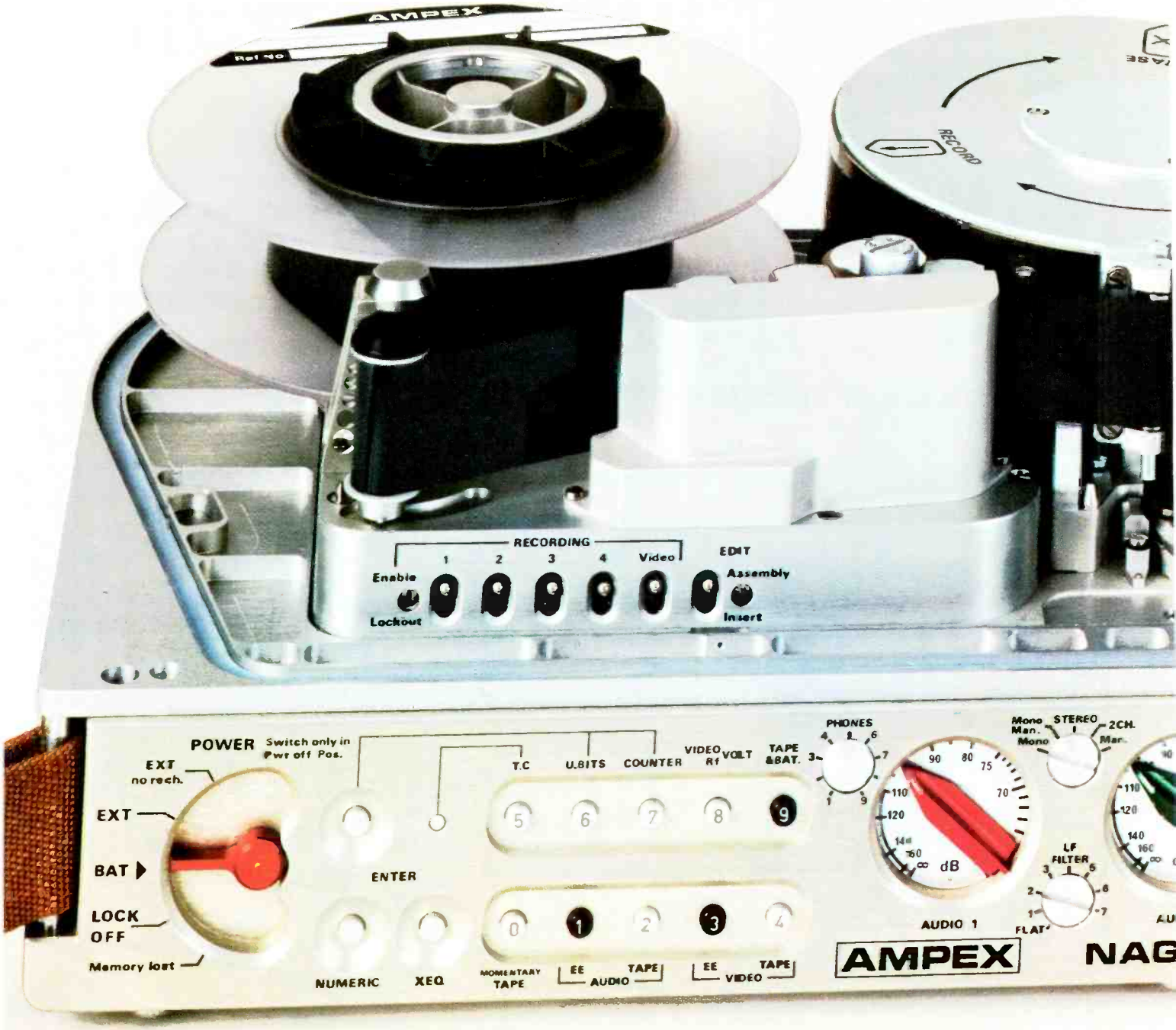

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Satellite antennas and LNAs

By Elmer Smalling III, president, Jenel Corporation, Dallas, TX; and Paul R. Michaelis, Dallas, TX

The state of communications was permanently altered by the first satellite launched into space. That state is still changing today, touching almost every person on earth. The authors offer a few comments on satellite receiving equipment and survey the vast number of equipment sources available.

If you are 20 miles from a 100,000W TV transmitter, you can probably get satisfactory reception using a bent clothes hanger as an antenna. But, what if you are 20,000 miles from a 100W transmitter? That is the problem you face when you want to receive a TV signal transmitted to earth by a satellite. Clearly, the design of your antenna system is critical Let's take a look at the basics of satellite receiving antenna systems.

The antenna used to receive satellite signals is commonly called a *reflecting antenna*, because that is how it works, or a *dish*, because that is what it looks like. The large "dish" portion of the reflecting antenna is concave. From its entire surface, it reflects the received satellite signal into one small spot. The signal is therefore concentrated, in much the same way that a magnifying glass can concentrate the sun's rays. Located at the point of con-

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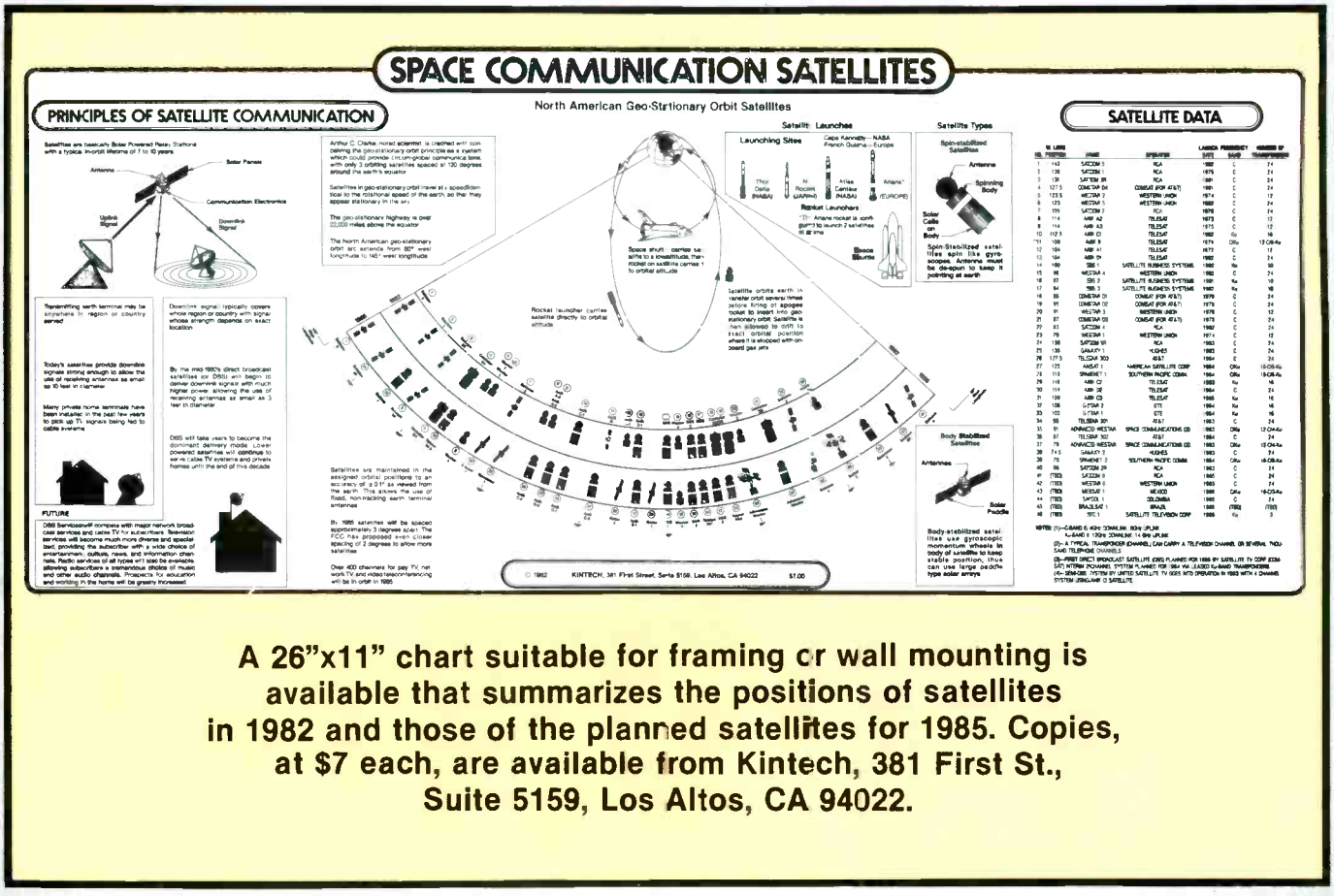

A 26"x11" chart suitable for framing or wall mounting is available that summarizes the positions of satellites in 1982 and those of the planned satellites for 1985. Copies, at $7 each, are available from Kintech, 381 First St., Suite 5159, Los Altos, CA 94022.

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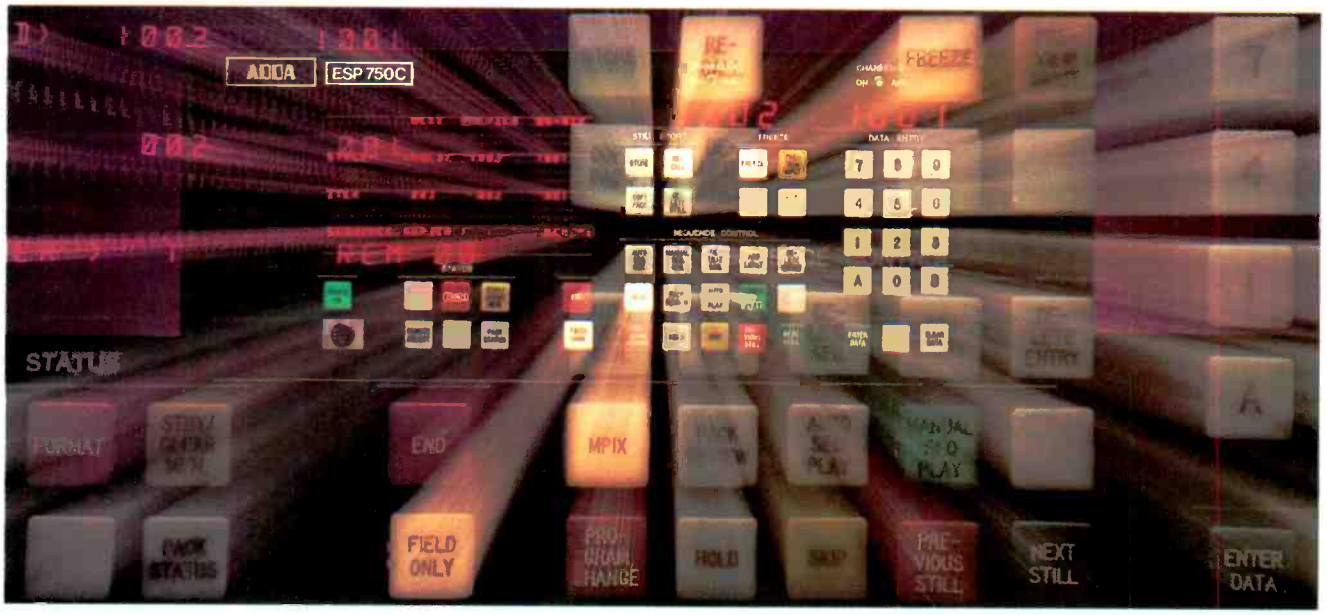

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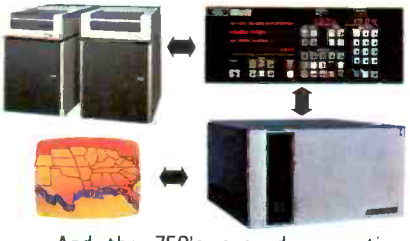

And the 750's second generation digital electronics give you a production-oriented sequence and memory system that lets you perform last minute editing. Add or delete within a sequence. Create multiple generation graphics with virtually no degradation in the quality of your original image.

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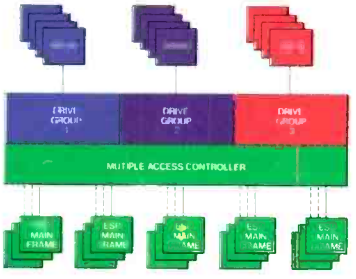

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centrated signal is the dish's *feed port*.

A receiver without a dish is still theoretically capable of receiving a signal. Obviously, if this receiver is placed in the feed port of a properly aimed dish, the signal strength will increase. The increase in signal strength attributable to the dish is called *gain*. Gain is measured in units called *decibels*. (Decibels can be tricky units to work with because they cannot be added or subtracted in the usual way. An increase of 10dB means that the signal strength has increased tenfold. However, a 20dB increase corresponds to a thousandfold increase; and so on. Thus, a dish with a gain of 40dB increases the signal strength at the feed port by a factor of 10,000.

All other factors being equal, an antenna with a larger dish will have higher gain because it will reflect more signal to the feed port. An excellent antenna for present day satellite reception would have an exceptionally smooth surface and a diameter of about 33 feet. Unfortunately, the price and bulk of such an antenna put it out of reach for most satellite users. Manufacturers have therefore developed smaller, more portable, less expensive antennas. With 13- to 15-foot diameters, they have less gain, but may nevertheless be satisfactory for many applications. Some of these smaller antennas are made of a plastic material similar to the type used in hot tubs. The plastic is impregnated with metal, providing performance comparable to that of a solid metal dish, but without the extra weight.

Great care must be taken when installing a satellite receiving antenna. The antenna must be firmly attached to a steel or concrete base or slab. This is done to prevent movement or sway caused by wind-borne or ground-based vibration. Once mounted, but before it is locked in place, the antenna must be carefully *boresighted*, or aimed, at the particular satellite to be received. Coarse boresighting can be done by peering through the bottom of the dish, past the feed port, while pointing the antenna at the proper azimuth (reference point on the horizon) and elevation.

Once the antenna is roughly boresighted, a low noise amplifier (LNA) and receiver are attached. The antenna's positioning is then fine tuned while viewing a signal from the desired satellite. A word of caution is in order here: Satellites tend to drift slightly in their orbits, so it is wise to check with the satellite's owner to find the best day to boresight your antenna. If you do your boresighting when the satellite is at one extreme of its drift, you might not receive a satisfac-

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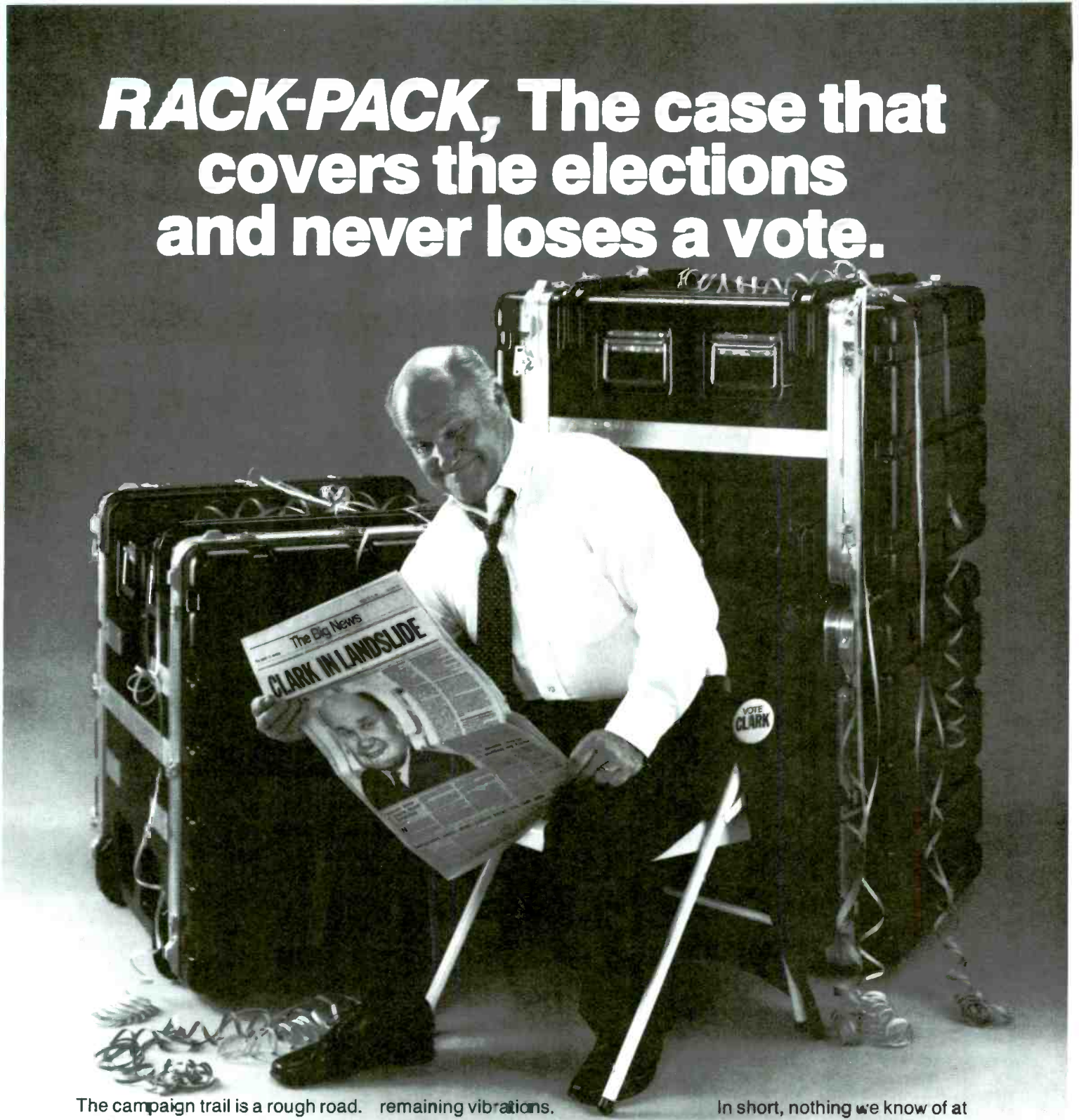

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Table I.
Some manufacturers of earth station and accessory equipment

Manufacturer	Antennas	LNAs	Accessories	Reader Service Number
ASM	X			301
Aerowave	X			302
Amplica		X	X	303
Andrew	X		X	304
Antenna Development and Manufacturing	X		X	305
Antenna Technology	X		X	306
Anixter Mark	X			307
Arunta	X		X	308
Avantek		X	X	309
Avcom			X	310
California Amplifier		X	X	311
Central Satellite	X	X	X	312
Comtech Data	X	X	X	313
Dexcel		X	X	314
Ervack Systems	X			315
Fort Worth Tower	X		X	316
Gabriel Electronics	X			317
Gardiner Communications	X	X	X	318
Gillaspie & Associates	X	X	X	319
Harris	X	X	X	320
Hughes	X	X	X	321
Industrial Scientific	X		X	322
Int'l Satellite Systems	X			323
Janeil	X			324
LNR Communications		X		325
LULY Communications	X		X	326
M/A COM	X	X	X	327
Marconi	X	X	X	328
Mariped Sales			X	329
Mark Associates			X	330
McMichael Ltd.	X	X	X	331
Merrimac Industries			X	332
Microdyne	X		X	333
Microprobe Electronics			X	334
Microwave Filter			X	335
Microwave Power Devices			X	336
Modulation Associates			X	337
Moseley Associates			X	338
NEC	X	X	X	339
National Microtech	X			340
North American Satellite	X		X	341
Pinzone Communications Products			X	342
Ramsey Electronics			X	343
Rockwell Collins	X	X	X	344
SED Systems	X	X	X	345
SatCom Technologies	X		X	346
Satellite Transmission Systems			X	347
Scientific-Atlanta	X	X	X	348
Spaceage Electronics			X	349
Standard Communications		X	X	350
Star View Systems	X			351
Tomco Communications			X	352
Triangle Engineering	X			353
United States Tower	X			354
Vidare	X			355
Vidtech Communications			X	356
Wilson Microwave Systems	X			357

tory signal when the satellite drifts to the other extreme.

When the antenna is locked in place, any number of transponders on the target satellite may be received. Some will be polarized vertically and others horizontally. This is done to reduce interference among transponders. If you plan to switch from transponder to transponder, you will need vertical and horizontal feeds from the antenna. However, this is not a problem because the device that provides vertical and horizontal feeds is small and inexpensive.

Now, lets take a look at some of the electronic components of an antenna system. Even though the signal from the satellite may be concentrated by the reflecting antenna, the signal is still not strong enough to travel down the transmission lines to the receiver. It must first be amplified several thousand times. This is the job of the LNA. In the context of satellite communication, the importance of low noise amplification cannot be overstressed. This is because we are dealing with an infinitesimally small signal, and any circuit-generated noise added to the signal can severely degrade reception. The major source of circuit-generated noise is the heat that naturally builds up in the circuit while it is operating. Thus, in the past, LNAs used for satellite communication were cryogenically cooled with liquid nitrogen. Fortunately, due to the development of the *field effect transistor*, (FET) such drastic measures are no longer necessary. The FET has allowed manufacturers to develop excellent high gain LNAs that operate at normal temperatures. However, although LNAs are no longer cryogenically cooled, their noise level is still rated according to temperature. The ratings of most units range from 90°K to 120°K. (On the Kelvin scale, water freezes at 273°K. The lower the Kelvin value, the better the amplifier. A 90°K LNA will provide better reception than a 120°K LNA, but it will also tend to be more expensive. When selecting an LNA, as with the choice of dish, the buyer will have to make a cost vs. performance tradeoff.

In summary, the antenna and LNA are critical elements in a satellite receive facility, and should be carefully chosen and matched to the user's needs. Great care must also be taken when installing these components. Difficult installations or poor signal locations will often require special antennas and amplifiers to produce high quality reception. Many consulting companies help satellite users select and install antenna systems.

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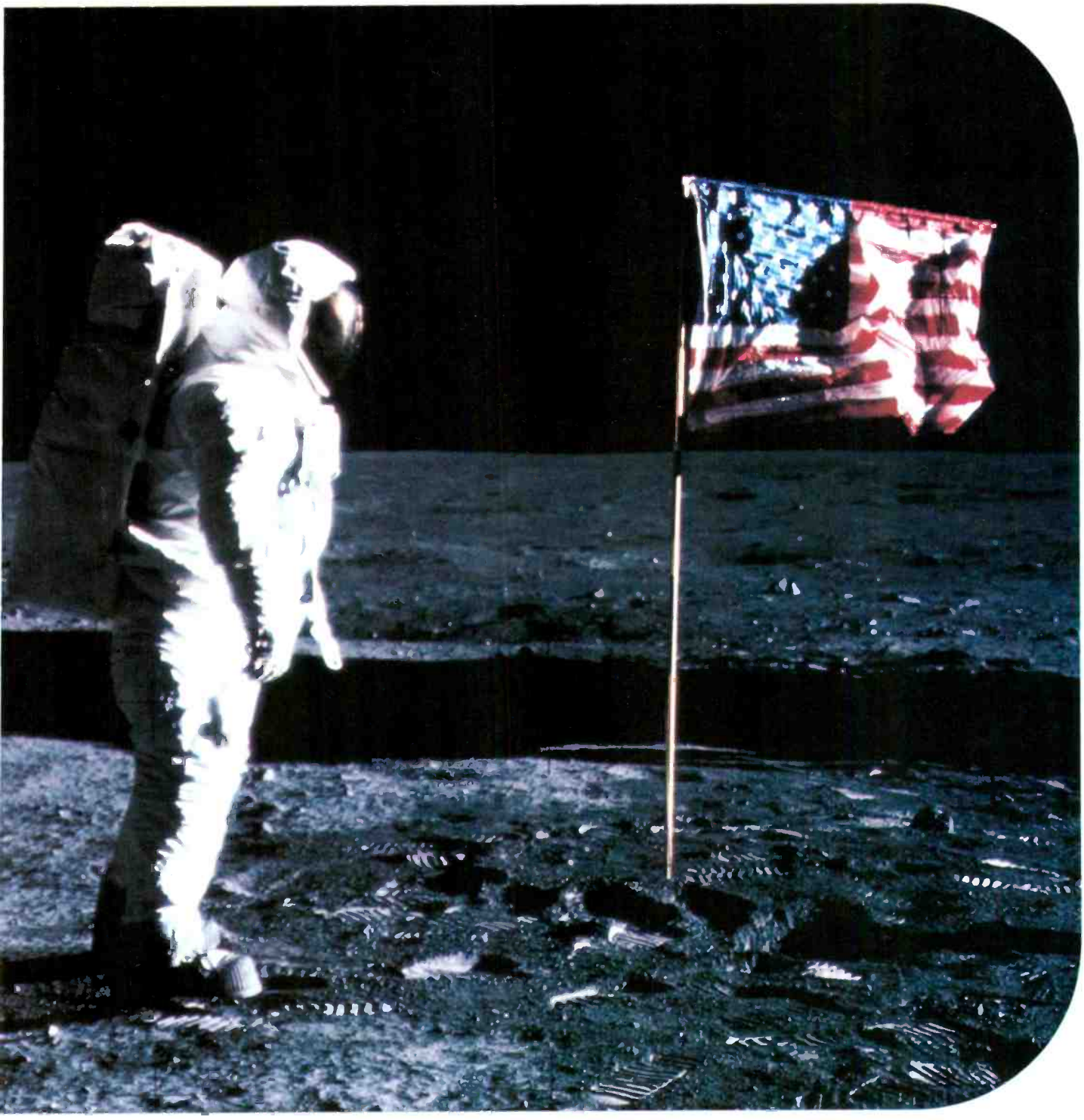

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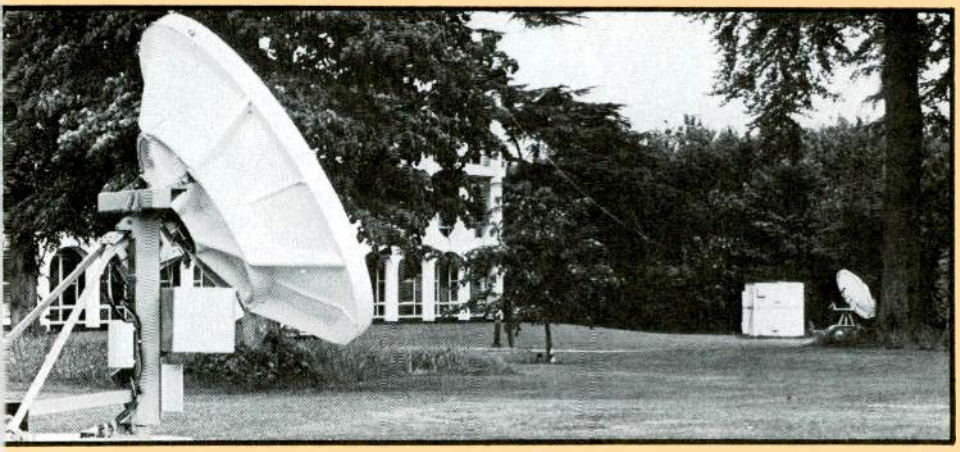
Satellites: Focus on European standards

By Michael J. Adams,
British correspondent,
United Kingdom



Satellite transmit and receive terminals at the IBA's engineering headquarters. The 10-foot receive dish, in the foreground, is a fixed installation, while the transmit terminal is mobile and has an 8-foot dish.

With some 450 million viewers, many different tongues and more than one TV standard, the European community is looking foward to a pan-European satellite broadcasting service.

At the end of May, Britain's Independent Broadcasting Authority (IBA) and 15 other European and North African broadcasting organizations within the European Broadcasting Union launched Eurikon, Europe's first experimental satellite TV service, and so provided a foretaste of a pan-European service that could be launched in 1986. The IBA has already suggested to the British Government that UK coverage could be provided by the all-British satellite announced by United Satellites—the company formed jointly by British Aerospace, Marconi and British Telecom.

The experimental service consisted of a 5-hour schedule each day in the last week in May, coordinated by the IBA, and a week in mid-July handled by Italy's RAI. There will be three more week-long sessions before the end of the year arranged by Austria (DRF), the Netherlands (NDS) and West Germany (ARD).

The IBA transmitted from its own mobile dish transmitter via the European Space Agency's Orbital Test Satellite (OTS). The signal, scrambled to prevent unauthorized use, was received on closed circuits in Algeria, Austria, Britain, Finland, France, Greece, Ireland, Italy, Jordan, the Netherlands, Portugal, Spain, Switzerland, Tunisia, West Germany and Yugoslavia.

The experimental schedules include a wide range of programs selected from the best available material provided by most of the participating countries. The aim is to identify, and as far as possible resolve, the technical, legal, financial and other problems that an operational service would present. Consequently, the objectives of the experiments include national services, as well as creating interst in European public service broadcasters toward cooperating in broadcasting by satellite.

Also, the service will experiment with, and assess the costs and effectiveness of, multichannel audio and teletext subtitling in different languages, and will seek new ways of making programs understandable to a multilingual audience. Other important areas to be studied relate to the nature and cost of the central services, including news and information services and other infrastructures that would be required for an operational service.

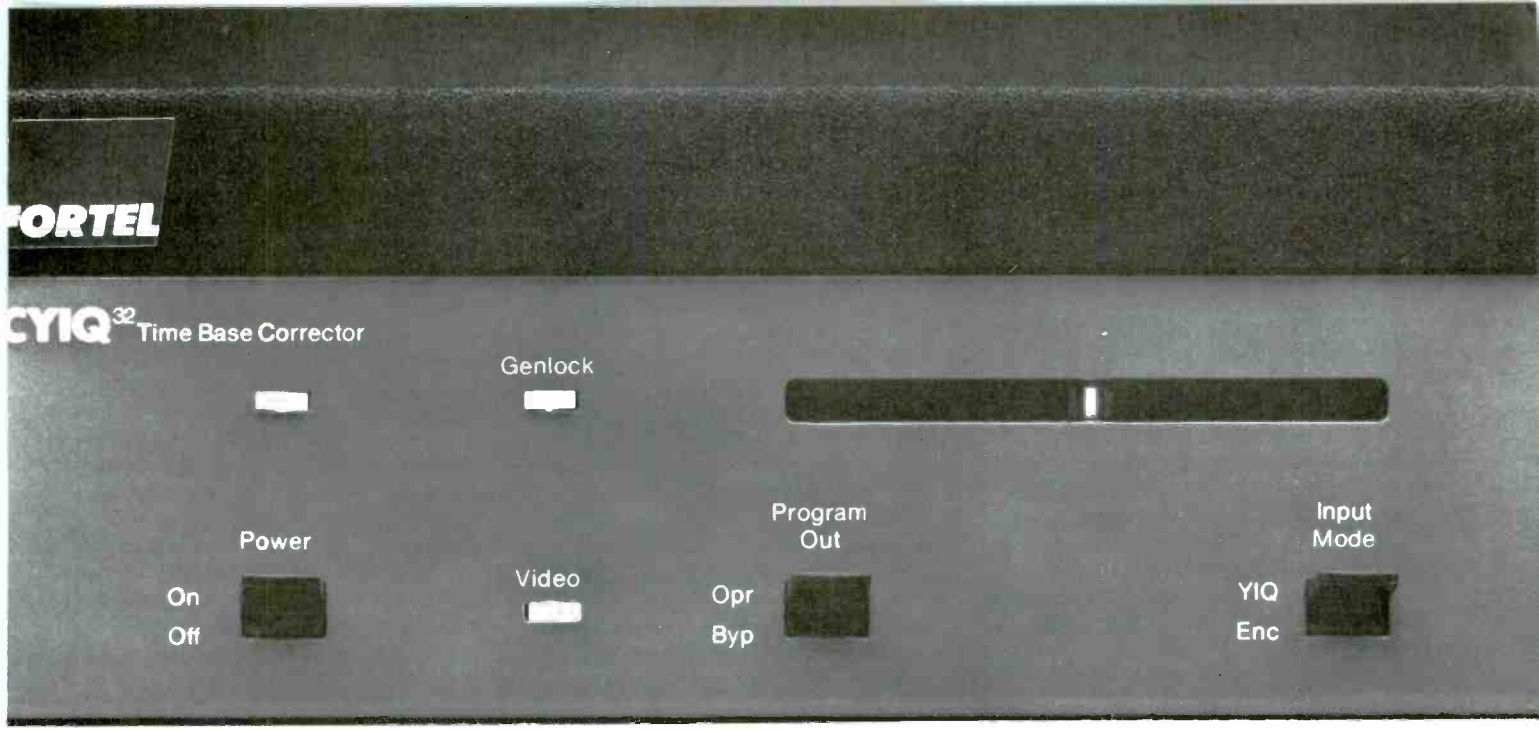
Digital transmission has been adopted, allowing six different language sound channels. Experiments used Oracle, the IBA's teletext system, for subtitling in other languages. The latest techniques in animation and graphics were used to make programs understandable irrespective of language.

The IBA hopes that its MAC—multiplexed analog component—or a similar pan-European system, will be adopted, while the BBC is pushing for the adoption of its enhanced PAL. Both cases aim to take advantage of the greater bandwidth that satellite channels will provide.

The BBC has been authorized to operate two direct broadcast channels from 1986, so that its view is that direct broadcast satellite (DBS) services must be launched using color coding standards compatible with existing TV receivers. A departure from the existing PAL or SECAM standards would necessitate additional converter circuitry for existing receivers. The unavoidable lengthy process of securing international agreement to an entirely new standard would make it impossible to meet the mid-1980s starting date for DBS.

The IBA, on the other hand, attaches great importance to the removal of the PAL/SECAM incompatibilities and the opportunities that exist for the establishment of a common transmission standard throughout Europe with this step to satellite broadcasting. Even though the pressure on the IBA is possibly less than that on the BBC, which already has authorization, it appreciates that time is still of the essence if European agreement is to be achieved. It is expected that the first national satellite broadcast services will be launched in 1984-85 in a joint venture planned by France and West Germany.

Several other European countries have tentative proposals for satellite broadcasting within the next few years. If order is to ensue, it will be



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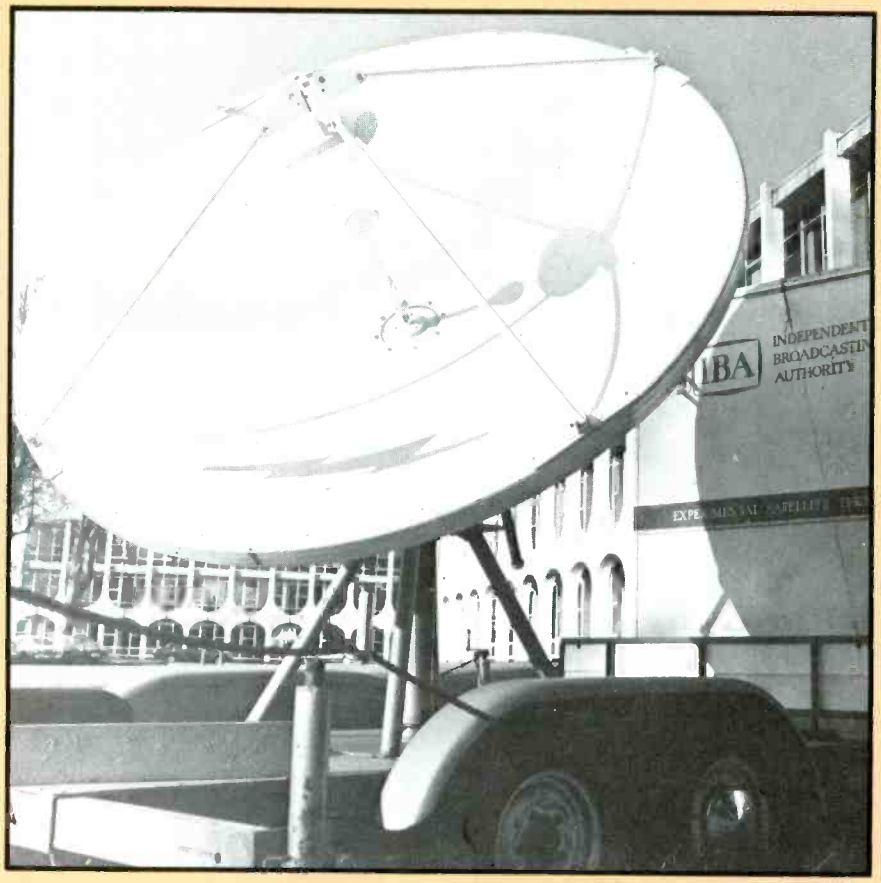


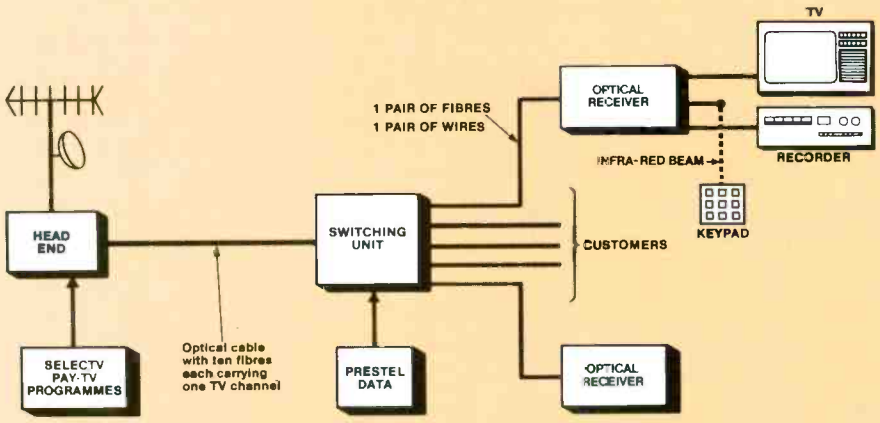
The IBA's mobile experimental satellite uplink terminal. It was first demonstrated in 1978 and since then has been used as far afield as the Azores and a North Sea oil rig.

necessary for agreement to be reached in time for all the necessary design, production and marketing work to be done, and for receivers to be in the shops, before the service is launched.

This is of particular importance because, even though they both use the 625-line format, West Germany—like many countries in Europe, including Britain—uses the NTSC-derivative PAL, while France employs the SECAM color system. If matters are resolved in time for the German-French venture, it could provide a *de facto* standard in Europe, which could prove of value for program interchange and direct broadcasting.

This is because the footprint of a satellite, in addition to providing its required national coverage, overspills into adjoining territories. The received picture quality might be somewhat lower than would normally be acceptable unless foreign users changed to something more effective than the 3-foot dish that probably would be the standard for receiving their own national programs.

A constraining influence, regardless of the adopted system, will be the need to provide signals for existing TV receivers. (Even some 20 years after the introduction of the 625-line color service in the United Kingdom, the BBC still transmits programs on



The main features of the fibervision trial network at Milton Keynes.

405 lines in black-and-white.) The BBC's enhanced PAL will satisfy this criterion. It filters off high frequency luminance components between 3.5MHz and 5.5MHz at the transmission end and shifts them to the 8-10MHz region for separate transmission. This would be out-of-band for a terrestrial transmission, but is well within the modulation bandwidth of a satellite transmission. Hence, on reception by a conventional terrestrial receiver, the bandwidth reduction would hardly be perceptible and, because there would be no luminance components near the 4.43MHz color subcarrier, there would be no cross-color effects. On the other hand, the signal received directly by a DBS TV receiver would have both portions of luminance information, which would be recombined in a special decoder to give 5.5MHz bandwidth and provide a higher quality picture than that available with the current 4MHz bandwidth.

The IBA argument for its MAC system stems from the need to use FM for satellite broadcasts as against the AM currently used terrestrially, because AM would require a prohibitive increase in transmitter power by a factor of about 100. This would necessitate a different receiver.

Theoretical studies carried out by the IBA have led to the MAC proposals, which are designed to meet the objectives of an ideal satellite transmission. MAC retains the 625-line picture format, but each TV line of separate color and brightness information is processed to compress each signal in time. Within the time taken to transmit a conventional picture line, MAC transmits first the color data, then the brightness information. The process increases the transmission bandwidth requirement, but remains within the capability of a satellite channel.

FM transmission in this format makes most efficient use of the satellite channel bandwidth and significantly reduces the problem of noise or grain on colored areas of the picture that is experienced with FM transmission of conventional color signals. A small amount of fairly straightforward processing in the in-

At the Milton Keynes flexibility point, in a small brick structure, a British Telecom research engineer uses the visual display unit to access the microprocessor unit (on left panel at rear) controlling the wideband switch (right panel), which channels the selected programs into customers' homes.

door satellite converter restores the color and brightness signals to their original form.

The European 625-line signal consists of 50 fields per second, each made up of 312 half lines. When displayed, alternate picture scans interlace with each other to make a complete 625-line picture. With MAC, each of the 50 picture scans per second contains all 625 lines instead of just half this number. Processing prior to transmission discards alternate lines to maintain compatibility with the present system. This processing might allow extra circuitry in a high definition receiver to re-create the original 625 lines of each picture scan, thus doubling the amount of detail that can be displayed.

The processing for transmission should be straightforward, because international agreement has already been reached that future studio environment digital processing will keep the color and brightness information separate. Although additional signal processing would be needed to reconstitute MAC signals for display on a conventional television, it would employ established charge-coupled technology. This is amenable to cheap, LSI circuit production, keeping additional costs of the indoor satellite adapter minimal.

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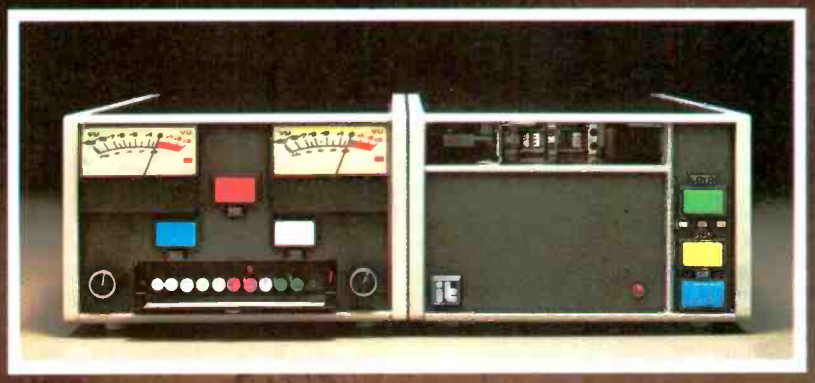

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Circle (54) on Reply Card

NRBA replay

By Carl Bentz, technical editor

- NRBA Convention
- Reno, NV
- Sept. 12-15, 1982

Broadcasters, exhibitors and NRBA staffers expressed the opinion that the '82 NRBA convention was the best yet. The more than 4500 attendees took part in many workshops for business, programming, promotion and management, as well as engineering sessions covering AM DA arrays, FM modulation, SCA subcarriers and a 2-part discussion on the state of AM stereo. More than 70 exhibitors included equipment manufacturers, computer business systems, programming services and promotional groups. Although some expressed a concern of too little traffic, others were pleased with sales made during the show. Session attendance was high.

As expected, the major engineering topic of the conference was AM stereo. The Sunday evening reception reflected the question, and Mark Fowler, FCC chairman, also approached the subject in his keynote address. Fowler alluded to work being done by semiconductor manufacturers in the development of IC chips that would receive two AM stereo formats, as well as research being done on a chip capable of receiving all five systems. Automatic switching would be accomplished by the IC in accordance with the signal being received.

Fowler called for broadcasters' continued ingenuity and for their assistance to the FCC on the subjects of deregulation and re-regulation. He was introduced by "Sis" Kaplan, newly re-elected NRBA president, and greeted by a standing ovation. He received applause throughout his talk and received another standing ovation at the conclusion.

The still unanswered question of which stereo system will be chosen for AMers might be solved by Delco, which is using radio transmissions from WIRE, Indianapolis, IN. However, Leonard Kahn (Kahn Communications), Arno Meyer (Belar) and Bill Streeter (Magnavox) all questioned whether or not Delco understood the needs of broadcasters. An additional concern was expressed as to whether the tests to be carried out by Delco would decide the issue for all, or if the decision would only be for General Motors' automotive use. No one knows if Ford, Chrysler and American Motors, for example, will use the same AM radios as GM. Chris Payne (Motorola) and Streeter expressed the opinion that although the Delco test would be important, the receiver manufacturers would influence the final system decision. David Hershberger (Harris Broadcast) and Kahn said that they thought the broadcasters would make the final decision.

The Delco tests mainly will involve transmissions from AM station WIRE. However, during the test period, WGN and WLS (Chicago) and CKIW (Windsor/Detroit) will also be using the Harris system. Hershberger said that this would allow some longer distance and skywave reception conditions for Delco in regard to the Harris system. Hershberger added that headlines found in one trade publication at the show were not true to his knowledge. WGN and WLS, both operating with Kahn equipment, were *not* dropping Kahn in favor of Harris at this point, but rather had made arrangements with Harris to experiment with its equipment. Neither had expressed any displeasure with their Kahn experiences.

Although Fowler maintained that a definitive decision by the FCC would have resulted in extensive litigation delays, with possible death to AM stereo, many continued to think that

The AM directional antenna panel (above) considers a comment being made by Ogden Prestholdt, A.D. Ring & Associates, Washington, DC. Others (left to right): Edward Edison, Hammett & Edison, San Francisco; Benjamin Dawson III, Hatfield & Dawson, Seattle, WA; and James Gabbert (moderator), KTZO-TV, San Francisco.

The AM stereo proponent panel members (left to right): Harold Kassens (moderator), A.D. Ring & Associates, Washington, DC; Leonard Kahn, Kahn Communications, Garden City, NY; Arno Meyer, Belar Electronics Laboratory, Devon, PA; Chris Payne, Motorola Communications & Electronics, Schaumburg, IL; William Streeter, North American Philips Corporation, Tarrytown, NY; and David Hershberger, Harris Broadcast, Quincy, IL.

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Circle (56) on Reply Card

the FCC had passed the buck for political reasons and because of ineptitude. Hershberger and Kahn were careful to state that they thought the marketplace approach was realistic.

Expressing a hope that this panel discussion would be the last of the *panel of five*, moderator Harold Kassens turned the floor to each of the AM stereo proponents to explain their systems. During the initial seven minutes each, and during later question/answer responses, cordial barbs were the name of the game. Only Hershberger used his response times to explain facts of Harris' system and the others, in terms of selective fades, platform shifts and other possible unavoidable events. Meyer surprised most attendees by leaving an impression that Belar has generally surrendered, but is willing to support the system that is chosen. Belar will assist eventual users in implementing their stations.

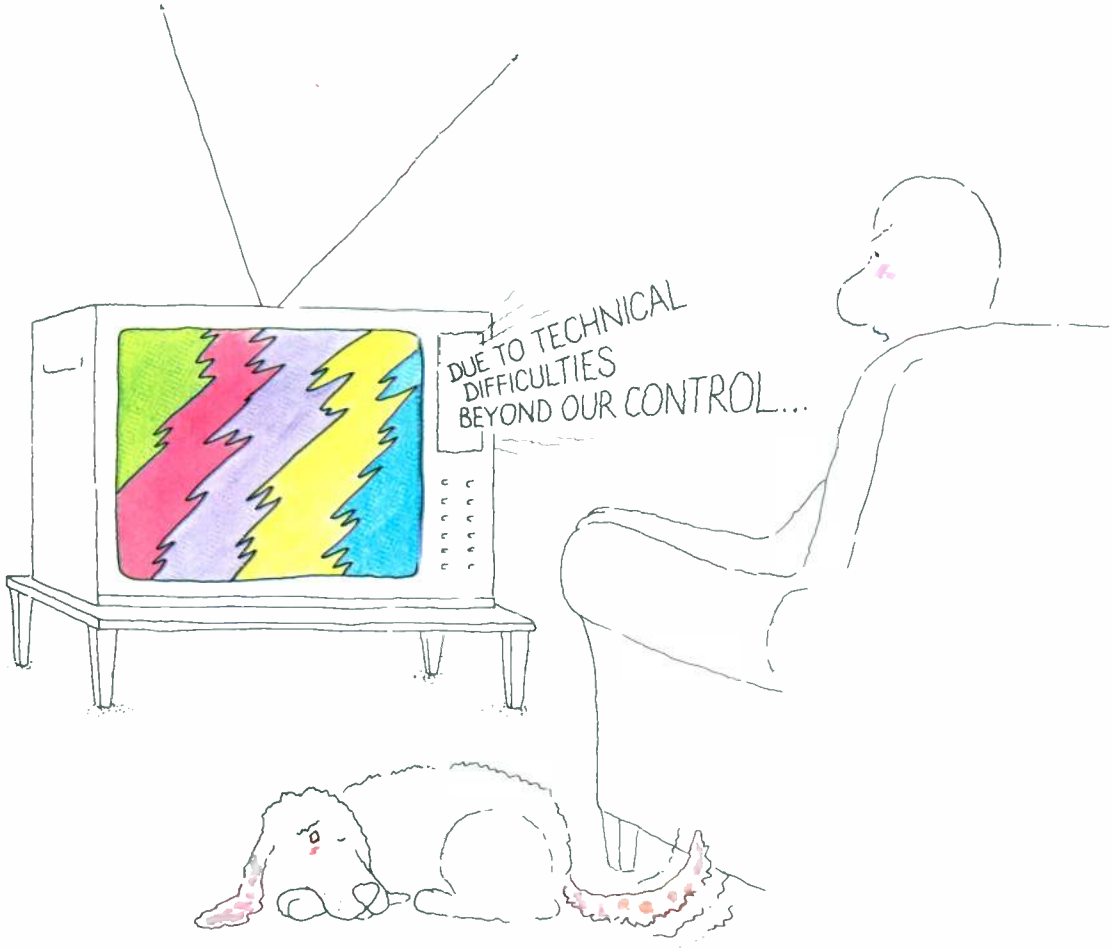
In the exhibit hall, Harris offered participants a chance to listen to its system in operation. Modified Sansui receivers included a discrete component decoder. (The Harris Semiconductor Division chip is expected to be generally available to receiver manufacturers early in 1983.) The receivers picked up Reno's KROW-AM, outfitted with a new Harris 50kW transmitter and the stereo exciter only days before the convention. Harris also offered interested individuals rides around town to listen to KROW on a modified automotive receiver. Those listening to that station heard a program service being provided, via satellite, by the Satellite Music Network.

Also in the exhibit, Kahn stereo was available, but through stereo cassettes recorded during the recent NAP PRC gathering in New Orleans. At that time, NBC radio services had provided a satellite feed of a received/demodulated New York AM signal into the New Orleans area. Those listening to the tapes were impressed with the quality, even in the rather roundabout way.

The Magnavox PMX system was implemented with a Continental Electronics Manufacturing Company transmitter and terminated into a dummy load. The exciter that Continental is building for the PMX system and associated audio processing equipment was provided by Circuit Research Labs.

Motorola and Belar did not offer listening experiences for convention attendees.

One point of agreement occurred between the five members of the panel and the AM DA discussion group. That point regards excessive expenditures on adjustments of directional arrays in preparation for AM stereo



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The FM modulation panelists (above) consider a graphic projection. Left to right: Dane Ericksen, FCC, San Francisco; Charles Haubrich, QEI Corporation, Kresson, NJ; Eric Small, Modulation Sciences, Brooklyn, NY; and Mark Durenberger (moderator), Hubbard Broadcasting, St. Paul, MN.

At one of the luncheons, commentator Paul Harvey, recipient of the NRBA 1982 Golden Award, suggested that the networks have "Manhattan myopia."

transmission. All thought that most directional arrays probably could use some improvement and suggested that no one should spend a large amount of money at this time in preparation for the system to come. The proponents said they knew of cases in which station consultants had been called in, resulting in expenses to the stations of more than $10,000.

Complementing the many sessions were two well-attended luncheons. During the Monday meal, sponsored by the Christal Company, New York, President Ronald Reagan spoke to the assembly via videotape. He congratulated broadcasters on the work they were doing and reminisced on his days of sportscasting. Commentator Paul Harvey delighted the audience after being presented the NRBA Golden Award for 1982.

Harvey openly accused network news people of tampering with the facts during network newscasts, but he praised the smaller, local media for trying to get to the real truth of stories. Later in a news conference, Harvey suggested that the networks seemed to have "Manhattan myopia" in their belief that the sun rises behind the UN Building and sets over the Appalachians. He said he thought that the hub of the network wheels may be somewhat off center.

Harvey also said that the right to know should never be allowed for anything that would jeopardize national security. He questioned if it was helpful to delve further into the John F. Kennedy assassination or the disinterment of Marilyn Monroe. Finally, he said, "I am not sure that cameras in courtrooms are really an effective part of jurisprudence."

The Tuesday luncheon included a talk by Herb Cohen, author of *You Can Negotiate Anything*. His numerous applications of negotiation processes, presented humorously, were well-taken by the audience.

Following his presentation, Kaplan presented the Gabbert Award to Bob Herpe, president of General Communicorp and owner of WPLP Radio, New Haven, CT, and WHLY, Orlando, FL.

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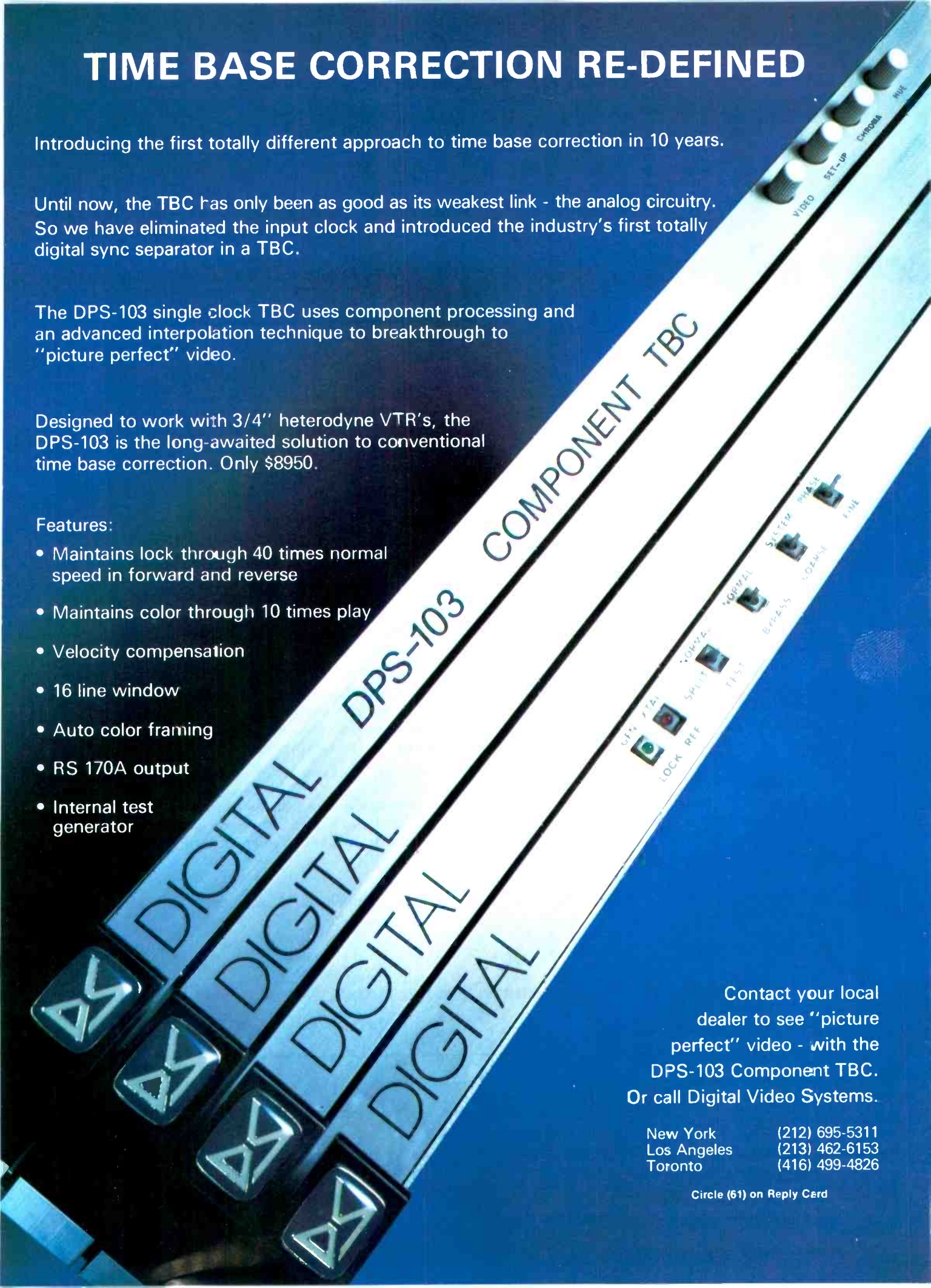

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Circle (76) on Reply Card

Field report: ROSat systems

California Microwave & Harris equipment

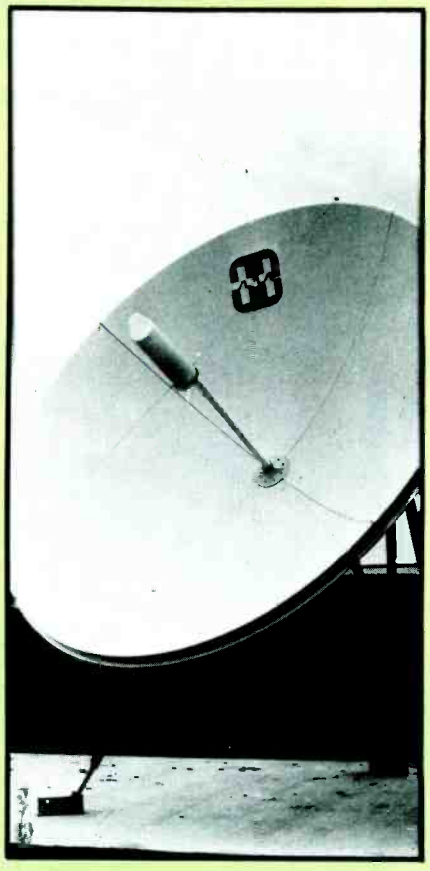
By Jerry Whitaker, chief engineer, KRED-AM/KPDJ-FM, Eureka, CA

This report covers the California Microwave and Harris receive-only satellite terminals now in service at KRED and KPDJ. The installation at our plant is unique in that we have interfaced the two systems in order to obtain access to United Press International wire and audio feeds and the RKO Radio Network.

The Harris system was purchased as part of a package put together by UPI to implement satellite distribution of its various services. While planning the purchase, management decided to join the RKO Radio Network. Because both services are on the same satellite and transponder (Westar 3, Transponder 1), they thought it would be a simple matter to pick up RKO. Harris, however, had not yet built an audio demodulator card capable of receiving RKO that would work with the UPI system mainframe. (They were working on it, but had no firm delivery date.) California Microwave *did* make an RKO demod card, the SD152, but it would not interface with the Harris shelf. It required a separate card cage and power supply.

The terminal is configured as shown in the block diagram in Figure 1 and described as follows.

The antenna subsystem consists of a 3m molded fiber glass parabolic reflector. It rests on a 3-point, steel



3m receiving dish at KRED/KPDJ. The LNA assembly is seen at the focus of the antenna.

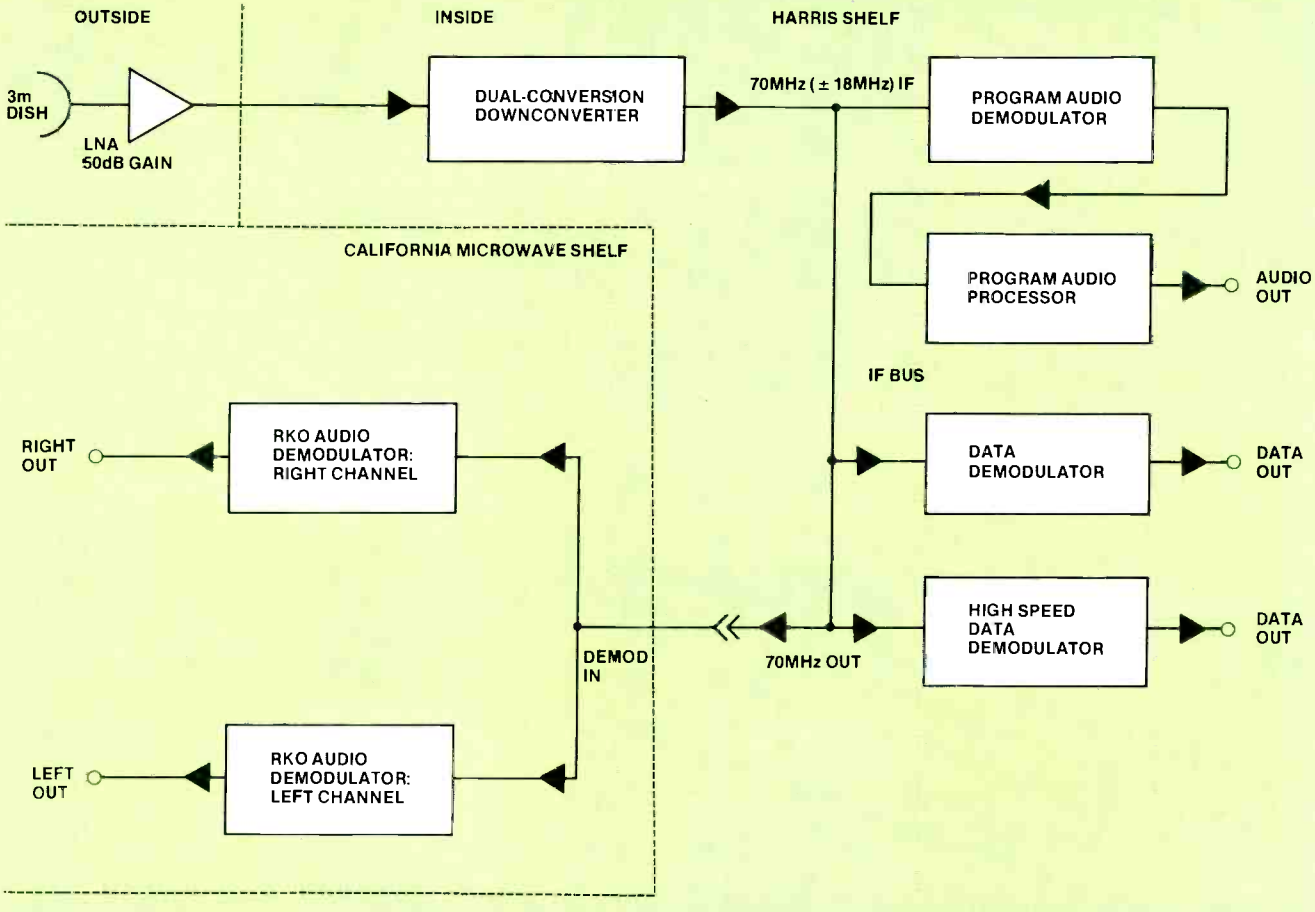


Figure 1. Block diagram of the Harris/California Microwave ROSat (Receive-Only Satellite Terminal) system at KRED/KPDJ.

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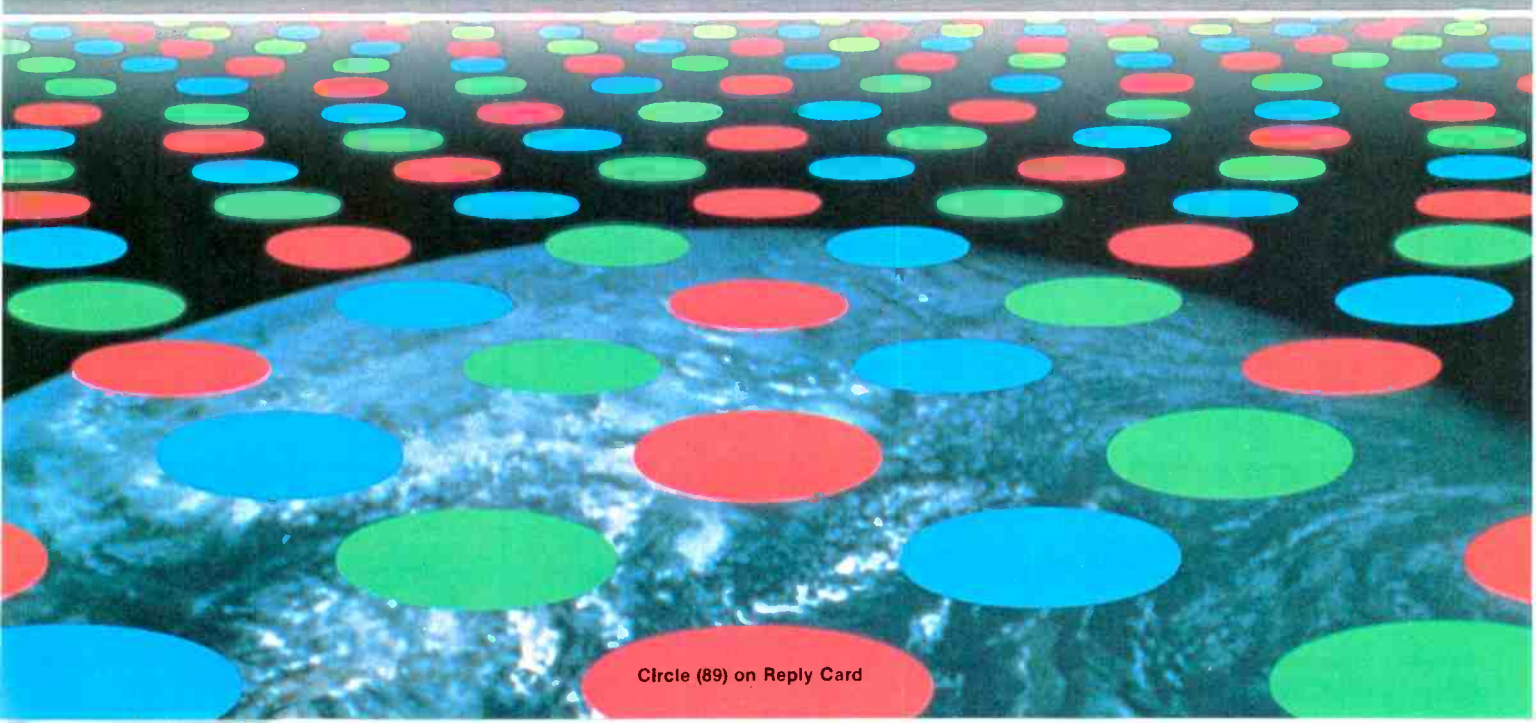

Circle (89) on Reply Card

Antenna polar-mounting arrangement.

polar mount that allows coverage of the geostationary arc from 70° to 140° west longitude. The antenna requires a concrete pad approximately 10'x10' for mounting. We poured a pad twice that size to provide room for an additional receiving dish in the future.

Attached to the antenna is a feed assembly consisting of a low noise amplifier (LNA), the feed line and support arm. The output of the LNA at 3.7-4.2GHz is carried indoors to the receiver rack by ½-inch foam coax. The coax also carries the power supply feed to the LNA. The LNA provides a minimum of 50dB gain.

The receiver subsystem consists of the basic chassis, a power supply, RF downconverter, baseband demodulator, program audio processor and audio distribution amplifier. Also available for this terminal, but not used in our installation, are a digital data demodulator and a digital data demultiplexer.

The downconverter card is a crystal-controlled tuner that accepts the amplified 3.7-4.2GHz band from the LNA assembly and outputs an intermediate frequency signal centered on 70MHz. The card uses dual conversion with the first IF at 880MHz (± 18MHz). The crystal in the first local oscillator determines which transponder the system will receive.

The downconverter 70MHz signal is fed to the baseband demodulator to pick off the UPI feeds of interest and to the California Microwave demodulator shelf. The UPI demod card is factory set to decode audio and teletype information on the particular transponder channel. The details of this decoding are a closely guarded secret. An LED, viewable from the front panel, indicates loss of signal

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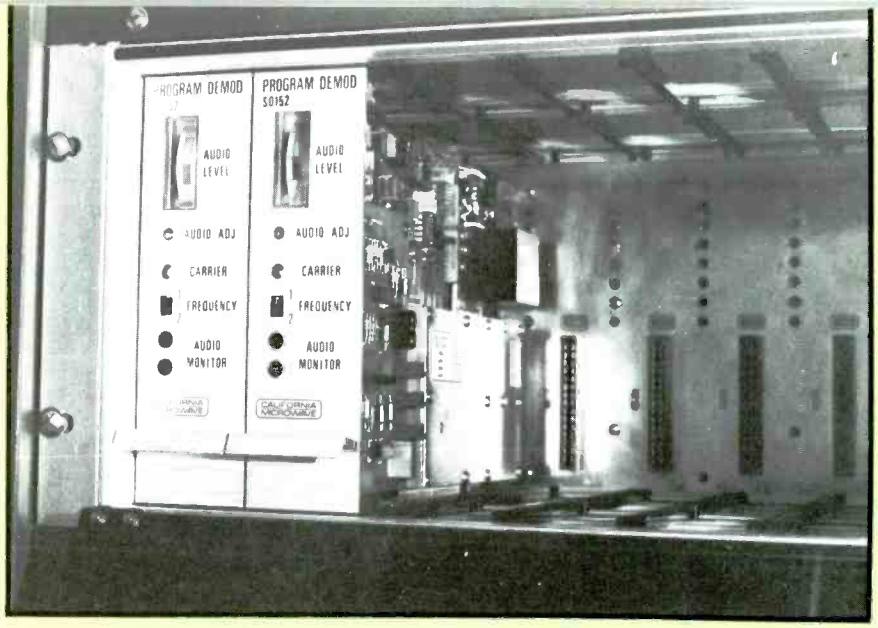

California Microwave demodulator cards installed in their cage with the cover opened.

and lights a fault-tally LED on the power supply module. Any audio feeds output by a demod card are processed by a program audio circuit card. This card includes de-emphasis, high- and low-pass filtering and optional companding.

Since installation, no problems have been encountered with the Harris equipment. There have been several uplink outages, but UPI has left the existing ATT lines in place as a backup for the satellite feed until any uplink problems are solved. This line is scheduled to come down shortly. At the same time a local loop will be connected from our equipment to a Eureka TV station to feed its UPI printer. When buying the UPI/Harris package, each station agrees to make available UPI demod signals to the phone company for distribution to other UPI users in the vicinity through the use of local loops. Another part of the package is a maintenance agreement from Harris to service the system, generally through exchange of defective circuit boards. The service contract runs for a period of one year, and is renewable at 1-year intervals.

There are almost no user adjustments for the system. The antenna and LNA subassemblies can be aligned to pick up another satellite, should a shift be necessary. The instruction manual gives detailed procedures for lining up the dish with or without the aid of a spectrum analyzer. The receiver shelf has no user adjustments except a loss-of-signal squelch and loss-of-signal alarm threshold, both of which are factory-set.

The Harris unit is well-designed and well-constructed, as is the California Microwave shelf. My only maintenance complaint with the units is a lack of detailed servicing manuals. Prints for the equipment are available, but you have to ask a couple of times to get them. The reason, presumably, is the fierce competition in the satellite terminal industry.

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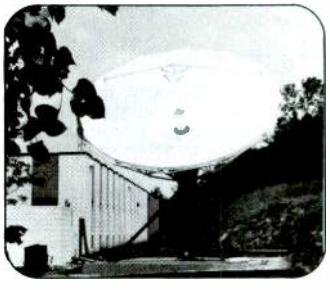

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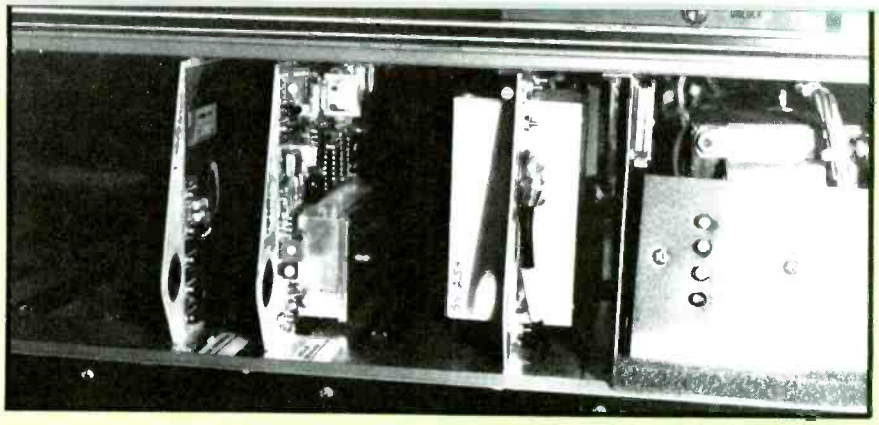


Harris downconverter and demodulator cards installed in their cage with the cover opened.

the Harris downconverter is made available at the rear panel of the unit. From this output, we are feeding the California Microwave demod shelf. After interconnecting the two systems, we found that we had an unusually high amount of noise on the program outputs. This problem was solved by inserting a narrow bandpass filter between the Harris output and the California Microwave IF input. The filter reduces the bandwidth of the signal being fed to the RKO demods from 36MHz (the full downconverter output) to 16MHz (70MHz ± 8MHz). This solved our noise problem, but the bandpass filter placed increased loading on the Harris IF bus, resulting in unacceptably low signal levels into the UPI demod. A 6dB in-line pad provided enough isolation to prevent loading of the Harris bus, but reduced the signal level into the California Microwave demods to the low end of their operating range.

We have asked California Microwave to build up an interface unit to solve these two problems (bandwidth and loading), as well as a problem of differing impedances. The Harris output impedance is 50Ω, and the input impedance to the California Microwave shelf is 75Ω. What I've suggested to California Microwave is to construct a small in-line 50Ω input impedance buffer amplifier with a gain of about 6dB, coupled to a 70MHz (± 8MHz) bandpass filter with an output impedance of 75Ω.

The California Microwave demodulator shelf consists of a power supply and card cage for up to six plug-in demods. In the stand-alone California Microwave satellite receiving system, the downconverter is located at the antenna, not with the demodulators, as is the case with the Harris unit.

The California Microwave audio demods are factory set to either of two channels, determined by a front panel switch. An edgewise meter provides a visual indication of channel output. The output level of the card is adjustable from the front side of the board. Also, a loss of signal LED and an audio output jack are included for front-panel tests. A signal strength output terminal is provided on the rear panel of each demod card. I have wired the outputs from each of these terminals to a metering panel for a continuous reading of system performance. Two alarm outputs are provided on the rear panel terminals of each card. One indicates a loss of carrier, the other a loss of AFC lock.

Aside from the interface problems outlined before, we have had no failures with the California Microwave equipment. Performance from the RKO demods has been good. The RKO system technical specifications call for frequency response ± 0.5dB from 50Hz to 15kHz, a total harmonic distortion below 0.8%, a maximum differential phase error of 10° at 15kHz and signal-to-noise ratio of 60dB. A 25μs pre-emphasis is used in transmission, as well as in 2:1 companding.

From all the tests and observations I have made, the system performs as designed. In fact, the music programs delivered over the satellite network sound noticeably better than our music service program tapes. At KRED/KPDJ, we are impressed with the Harris/California Microwave systems and expect to be planting another dish outside in the not-too-distant future.

Editor's note:

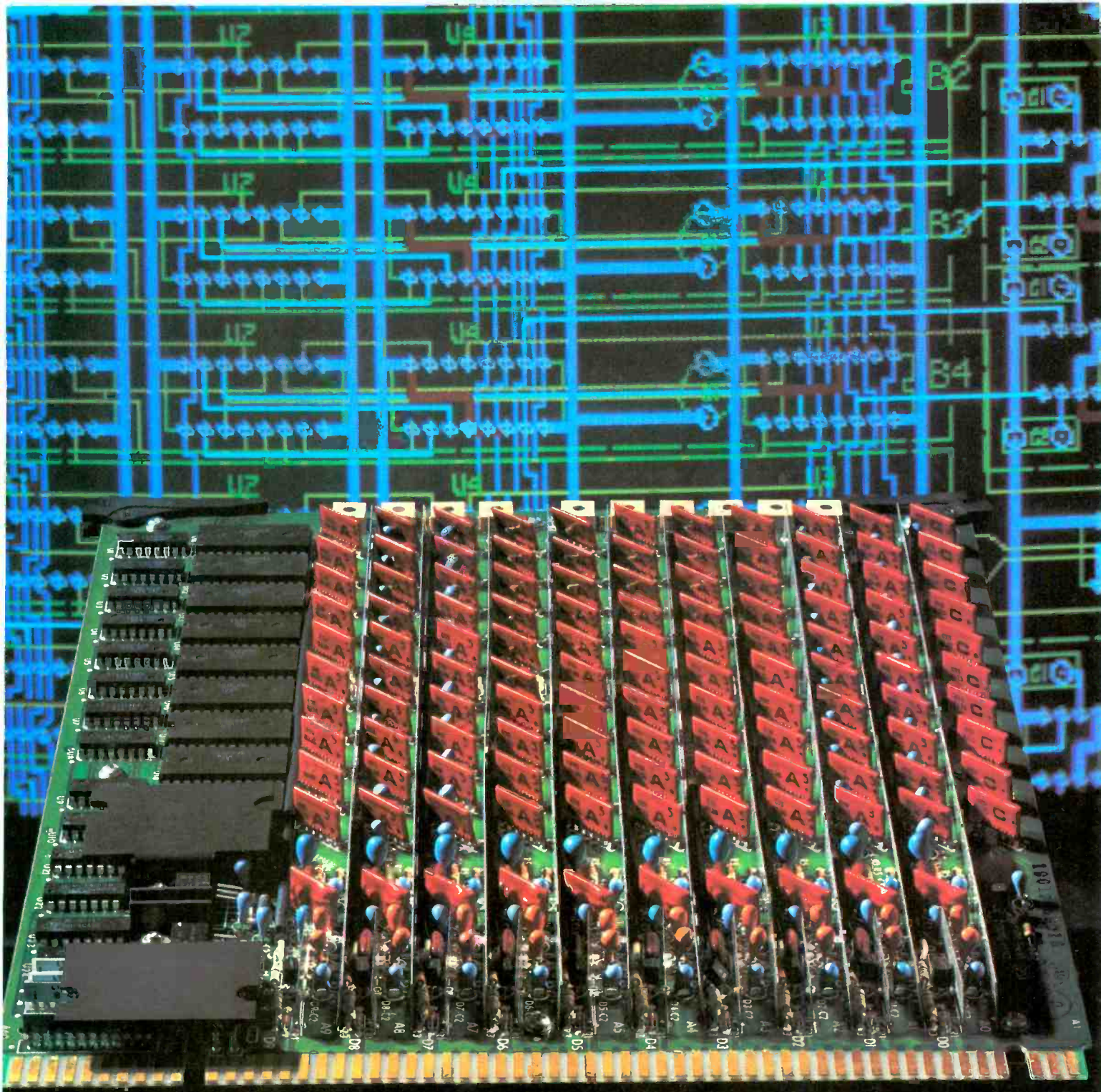
The field report is an exclusive **BE** feature for broadcasters. Each will be prepared by the staff of a broadcast station, production facility or consulting firm. The intent is to have the equipment tested on-site. The author is at liberty to discuss his research with industry leaders and to visit other broadcasters and/or the manufacturer to track down pertinent facts.

In each field report, the author will discuss the full applicability of the equipment to broadcasting, including personal opinions on good features and serious limitations – if any.

In essence, these field reports are prepared by the industry and for the industry. Manufacturer's support will be limited to providing loan equipment and to aiding the author if support is requested in some area.

It is the responsibility of **Broadcast Engineering** to publish the results of any piece tested, whether positive or negative. No report should be considered an endorsement by **Broadcast Engineering** for or against a product.

For more information on the Harris system, contact: Harris Corporation, Box 4290, Quincy, IL 62305. For information on the California Microwave system, contact: California Microwave, 990 Almanor Ave., Sunnyvale, CA 94086.



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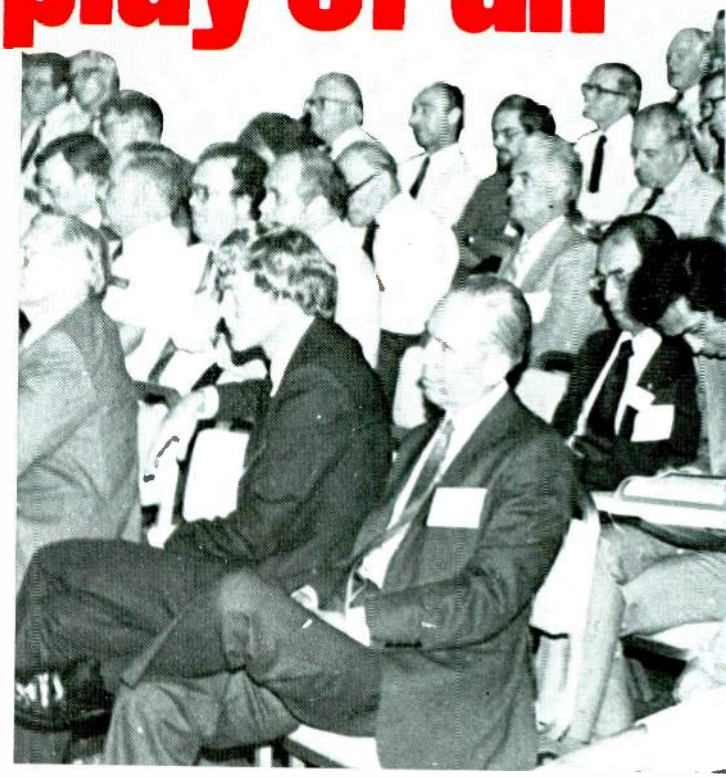
IBC-'82: Replay of an exciting convention & exhibit



The opening session on future broadcasting was packed.

By Bill Rhodes, editorial director

- The Metropole Brighton, England
- Sept. 18-21
- 7000 attendees
- 185 exhibitors (space: 11,000m²)
- 18 mobile vans and satellite ground station included in outside exhibits

The Ninth International Broadcasting Convention (IBC-'82) opened with beautiful weather and high notes of optimism for business. However, the weather did not hold and enthusiasm faltered as the air conditioning failed; but attendees and exhibitors struggled through all barriers to complete an outstanding conference and exhibit.

The success of the biennial IBC is significant in broadcasting, just as the NAB, SMPTE and AES annual conventions have been. Even though this success for IBC-'82 was marked by less than ideal conditions for exhibit space, air conditioning and hotel rooms, the convention remained an important one for radio and TV broadcasters.

There are several reasons for this success. First, unlike the NAB convention, the IBC couples an extensive technical papers program with its exhibits. In this way, it resembles the AES and SMPTE conventions. Second, it is held in September, half way between NAB events so that radio and TV equipment manufacturers have another opportunity to expose existing products or introduce new ones. Third, being held in England, it provides a more economical opportunity of exposure for

Table I.
Technical sessions

Session	Topic and chairman	Number of papers
1	"Broadcasting Technology for the Future" *Chm:* C. Terzani (Italy)	5
2A	"Picture Origination I" *Chm:* D.H. Mills (Rep. South Africa)	8
2B	"TV Transmitters and Transposers" *Chm:* R.C. Hills (United Kingdom)	6
3A	"Picture Origination II" *Chm:* D.H. Mills (Rep. South Africa)	5
3B	"Radio Transmitters" *Chm:* R.C. Hills (United Kingdom)	6
4	"Higher Definition Television" *Chm:* R.R. Green (United States)	5
5A	"Satellite Broadcasting I" *Chm:* R. Collette (Netherlands)	7
5B	"Recording" *Chm:* J.A. Roizen (United States)	8
6A	"Satellite Broadcasting II" *Chm:* R. Collette (Netherlands)	3
6B	"Propagation and Planning" *Chm:* R.A. Dilworth OBE (United Kingdom)	1
7	"Television Links" *Chm:* J.A. Flaherty (United States)	5
8A	"News Services" *Chm:* L.R. Free (Australia)	7
8B	"Measurement Technology" *Chm:* U. Messerschmid (FR Germany)	6
9A	"Sound Origination" *Chm:* P. Hansen (Denmark)	4
9B	"Receiver Technology" *Chm:* C.P. Sandbank (United Kingdom)	5
10	"Digital Coding Standards" *Chm:* A.V. Lord (United Kingdom)	4

The IBC-'82 published proceedings (Convention Publication No. IEE-220) included 370 pages of text, 12 pages of program guides and author indexes, and 43 pages of advertisements. Copies were provided to registrants at the convention and were also available for purchase in Brighton. Inquiries may be sent to: the IBC Secretariat, c/o The Institute of Electrical Engineers, Savoy Place, London WC2R 0BL, UK; or the Marketing Dept., The Institute of Electrical Engineers, P.O. Box 8, Southgate House, Stevenage, Herts., SG1 1HQ, UK.

European manufacturers. And, finally, because of the heavy concentration of European exhibitors and attendees, the IBC affords manufacturers a better customer range for those companies that still are not marketing in the Western Hemisphere.

These professional factors have made the IBC a success, but who can ignore the obvious attraction of visiting beautiful England? We went, gladly. And we'll go back again in 1984. This year we were among the more than 7000 who attended the convention, including about 1000 manufacturing/booth personnel. Thus, approximately 6000 were from broadcasting or production, of which 1707 were registered for the full convention.

The technical sessions

Without a doubt, in our minds one of the most important aspects of IBC-'82 was its outstanding collection of technical papers. The success of IBC in drawing leaders from around the world to present the latest technologies is testimony to the regard held for the convention. And, the planning and coordination of the paper selection speaks well for this year's technical program committee, which was chaired by Peter Mothersole.

The technical session this year, though leaning heavily toward television, covered both radio and TV topics. Table I shows the sessions scheduled, the respective chairmen and the number of papers scheduled per session. Of the more than 140 papers submitted, more than 80 papers were selected for presentations. The majority of the sessions included radio and TV applications, but two sessions were strictly for radio and five were strictly for television. In all, experts from 17 countries presented papers.

Broadcasting's future

It has been IBC policy not only to present papers by acknowledged specialists on subjects that are new and topical, but also to take a look at possible future developments. The scene for this was set in the opening session when invited speakers addressed the delegates on "Broadcasting Technology for the Future." The increasing importance and use of satellites in broadcasting was reflected upon in Sessions 5A/6A on this subject, when 10 papers were presented by authors from the United States, United Kingdom, Japan, Canada and India.

The opening session, covering a topic dear to the hearts of most broadcasters, was chaired by Carlo Terzania (Italy). Five invited speakers representing the United States, United Kingdom and Australia gave an overview of the different aspects of the broadcasting industry in their respective countries, describing the technical capabilities now and in the foreseeable future.

The first invited paper was by Julius Barnathan, ABC, New York, who addressed the gathering on "The Do's and Don'ts for the '80s." As the wave of new technologies impacts broadcasters around the world, he stressed the need for a balanced attitude toward the inevitable changes to come.

"We are living through a technological explosion in broadcasting and the pace can only increase," he said. "Most of today's developments fit neatly into place and serve a specific and useful purpose. Some, however, do not. And as we search for innovation in the future, research engineers must make sure that all the right motives exist—the 'ivory tower' approach belongs in the museum."

As broadcasters and manufacturers face the changes together, Barnathan called for a common attitude to meet the challenges. More reliability and efficiency is needed, and equipment, if possible, should cost less, Barnathan said. But, global problems must be faced as well. Barnathan said that one of the crucial needs was for international cooperation in creating an RF spectrum for ENG—one designated for audio, video and communications for newsgathering in all countries of the world. And, if all equipment could be interchangeable, broadcasters could go anywhere to cover any fast-breaking news story.

Charles Sandbank, of the BBC research department, followed Barnathan with a discussion of the impact of some new technologies on future broadcast services.

"We are in an exciting period for broadcast engineers," he said, "with the industry on the threshold of...direct broadcast satellites, enhanced vision and sound transmission, digital TV techniques, microprocessors as means of converting receivers into intelligent terminals, higher definition television, digital sound in consumer products, and the extensive use of microprocessors in all phases of studio and broadcast operations."

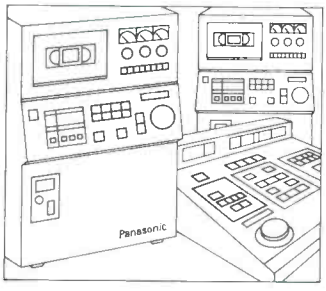
Mothersole: "Welcome to IBC-'82."

The brilliance in its design shows up in its picture. Introducing Panasonic Recam.

Total freedom from video cables isn't the most important reason to buy Panasonic Recam. Recam's exciting combination of a new recording system and a 3-tube prism optics camera is. Especially when you consider the result: Broadcast quality from ½" VHS™ recording tape.

Recam: The System

The Recam system consists of the AU-100 portable VCR, the AK-100 3-tube prism optics camera and the AU-300 playback editing system. Together they add a new dimension



to ENG and EFP.

Here's how: Unlike conventional recording systems, Recam records frequency modulated luminance signals on a single-slant track. At the same time, I and Q signals are recorded on another parallel track. By assigning separate FM frequencies to the I and Q signals, color noise, streaking and other two-phase color problems are eliminated because only the final product is NTSC encoded.

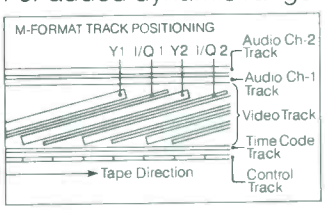
The AU-100 has a direct-drive motor for precise tape movement and a capstan motor designed for reduced gyro effect. And for accurate assembly edits after every shot, the AU-100 backspaces 30 frames every time the VTR trigger is released.

The AU-100 also records audio on two longitudinal tracks and time code on a third track. The AU-100 supplies a constant readout of vital operating conditions including drum and capstan lock status, slack tape detection, dew warning detection and a lot more.

Proven Prism Optics Performance

The AK-100 camera gives you the choice of ⅔" diode-gun Plumbicon® tubes or ⅔" Saticon® tubes. So you can shoot under a wide variety of lighting conditions without worrying about lag, blooming or burn-in.

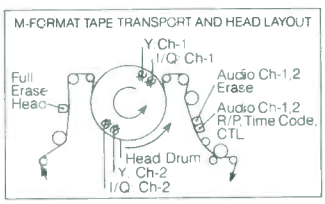
Resolution with the Plumbicon configuration is 600 lines with a S/N ratio of 59dB, while the Saticon version produces 550 lines and a S/N ratio of 58dB. For added dynamic range



and reduced comet tailing, the AK-100 includes feedback beam control. Dynamic focus and corner registration compensation circuitry add to picture quality as do horizontal and 2-line vertical contouring. There's also switchable black stretch and knee circuits for detail retention in dark or bright areas of the image. An eight-bit A/D and D/A converter with memory automatically adjusts white and black balance.

Better Chrominance Than ¾"

Recam looks even better when you look at the AU-300 playback editing system. In fact, a Recam dub is actually superior to a ¾" master. The reason: The AU-300's six-head scanner plays and records the separate Y and I/Q tracks so there's virtually no loss of luminance or chroma information during



dubbing or insert and assembly editing. At the same time, two rotary erase heads and vertical head switching make for clean, accurate edits.

Panasonic Recam. It gives you the convenience of a recorder/ camera with the picture to measure all recorder/cameras by.

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Sandbank: "...an exciting period for broadcast engineers, with the industry on the threshold of new technologies."

He said that much of this technology was being demonstrated at various IBC booths.

From another part of the world, L.R. Free from Australia looked at how domestic TV delivery services were changing in his country. This service, in part, is shaped by Australia's history, geography, population distribution and social conditions. He discussed the current methods of program distribution: radiated (broadcast); terrestrial and spatial (satellite); wired (cable); and packaged (tape). As he sees it, alternative methods of delivery are unlikely to rapidly displace the established services in Australia.

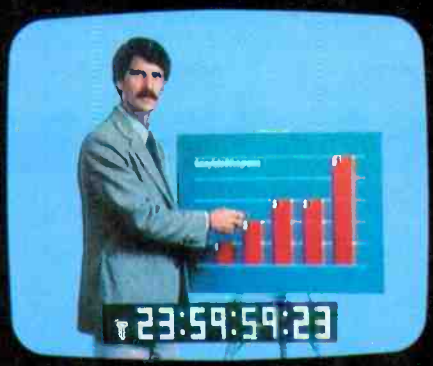
However, plans to use new delivery methods are underway. Within 15 years, Australia might be able to afford DBS services. However, that is improbable. Nevertheless, designs for an HACBSS (Homestead and Community Broadcast Satellite Service) exist. Only time will tell if they are adopted. In Australia, cable and STV have shown limited growth, but the growth of VRCs and tape have been significant. Figure 1 (page 96) illustrates the present and expected services in Australia.

From the manufacturer's viewpoint

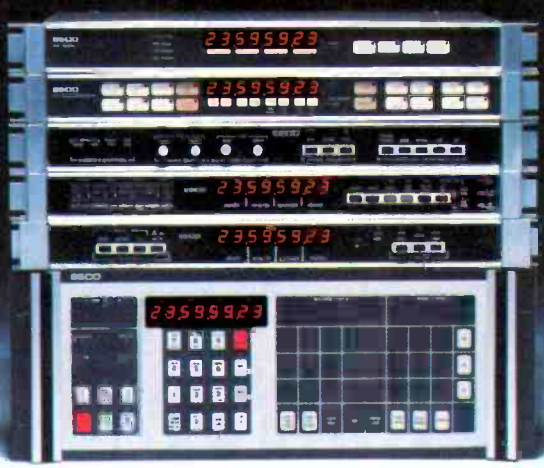
Two insights into the future of tomorrow's television were provided by authors F. H. Steele and K. H. Barratt. One view was presented in their formal paper published in the proceedings and a second was presented by Barratt in a speech. Both views touched on the impact of new technologies such as HDTV, digital television, videodisc, ENG equipment, videocassette recorders, home computers, video home

Barnathan: "We are living through a technological explosion in broadcasting, and the pace can only increase."

INCREASING PRODUCTIVITY.



IT'S ABOUT TIME.



The challenge to increase productivity facing video professionals today really means faster production and more efficient editing. Just in time, EECO's computer controls for video production help you slash production and post production time by improving edit accuracy.

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Time Code Pioneers

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Supported and serviced by our factory, EECO Video Products are distributed by: **Custom Video**–Seattle; **Harvey Professional Products**–New York City; **Hoffman Video Systems**–Los Angeles; **Lake Systems Corporation**–Newton, MA; **Lerro Electrical**–Philadelphia; **MZB & Associates**– Dallas; **Professional Products**–Bethesda, MD; **Swiderski Electronics**–Elk Grove Village, IL; **Ampex Corporation**–Worldwide.

Barratt: "HDTV is just one of the new technologies impacting the TV and film industries."

movies and DBS. They also touched on the mushrooming developments in solid-state/LSI techniques.

However, the oral presentation concentrated on the impact of HDTV, including the production of the Rose Bowl Parade and film shooting in HDTV techniques. (This was coupled with Sony's independent showing of HDTV technology in its nearby suite.) Also, Barratt gave heavy emphasis to the MAC (Multiplexed Analog Component) system being demonstrated in the IBA (Independent Broadcast Authority) booth. This system gave conclusive proof that new techniques could considerably enhance satellite signal transmissions, and that adoption of a standard could pave the way for extensive application of DBS in England and the rest of Europe.

To balance out the broadcast side in the introductory session, R.V. Arnaboldi, Thorn-EMI, presented the status of set manufacturing for consumers in the United Kingdom. The picture he painted was not attractive from the UK viewpoint. Set manufacturing for audio had almost entirely been lost to imports, he said, and video was in almost as serious a state.

To remain viable, the UK manufacturers must export their products, and the push must come soon, he said. Steps have already been made in this direction with the recent successful introduction of teletext and the forthcoming incorporation of stereo sound facilities for use in conjunction with videotape/videodisc machines. But the competition for expendable dollars in the home budget is a

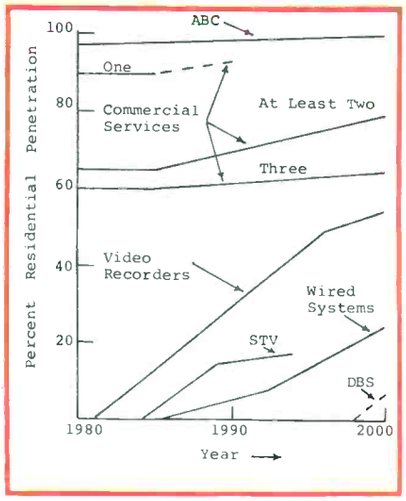

Figure 1. Services in Australia—today and in the future.

limiting factor. With the current high costs of TV sets, disc and tape machines, tape and disc programs, pay TV hookups etc., budget strains are already demanding for the typical family. Toss in DBS, video games, and home computers, and families have to make choices among their sources of entertainment.

A dramatic suggestion was made on the second day of the convention when T. F. Rogers of the US National Research Council said that the world's entire high frequency broadcasting plant be replaced with a sophisticated, single, high capacity

The maximum for the minimum

In designing the HK-302, Ikegami kept the frills —and the price—to a minimum while maximizing the performance. And that helps keep a moderate equipment budget from interfering with first-quality program origination.

However, staying with the basics doesn't mean sacrificing advanced technology. The HK-302's highly efficient optical system coupled to ⅔" low capacitance diode-gun Plumbicon* tubes and high transconductance FET pre-amps deliver sharp, low noise pictures (S/N 57 dB) with excellent colorimetry. And the compact camera head includes a full range of operational automatics to ensure consistent signal quality.

Built-in test, maintenance and operational features are integral parts of this camera's "basics" as well. A comprehensive test pulse system lets you adjust the video with the pick-up tubes off or removed. Complete monitoring circuitry and a broadcast quality sync generator with genlock are also standard features.

To add to the versatility of the HK-302, use the Ikegami automatic highlight compression option. It ensures highly detailed pictures even in high contrast scenes.

With the HK-302 you don't have to mortgage your station to afford prime time performance. So if you're looking for the maximum in studio production capability with a minimum of cost and maintenance, look over the Ikegami HK-302. For complete information and a demonstration, contact Ikegami.

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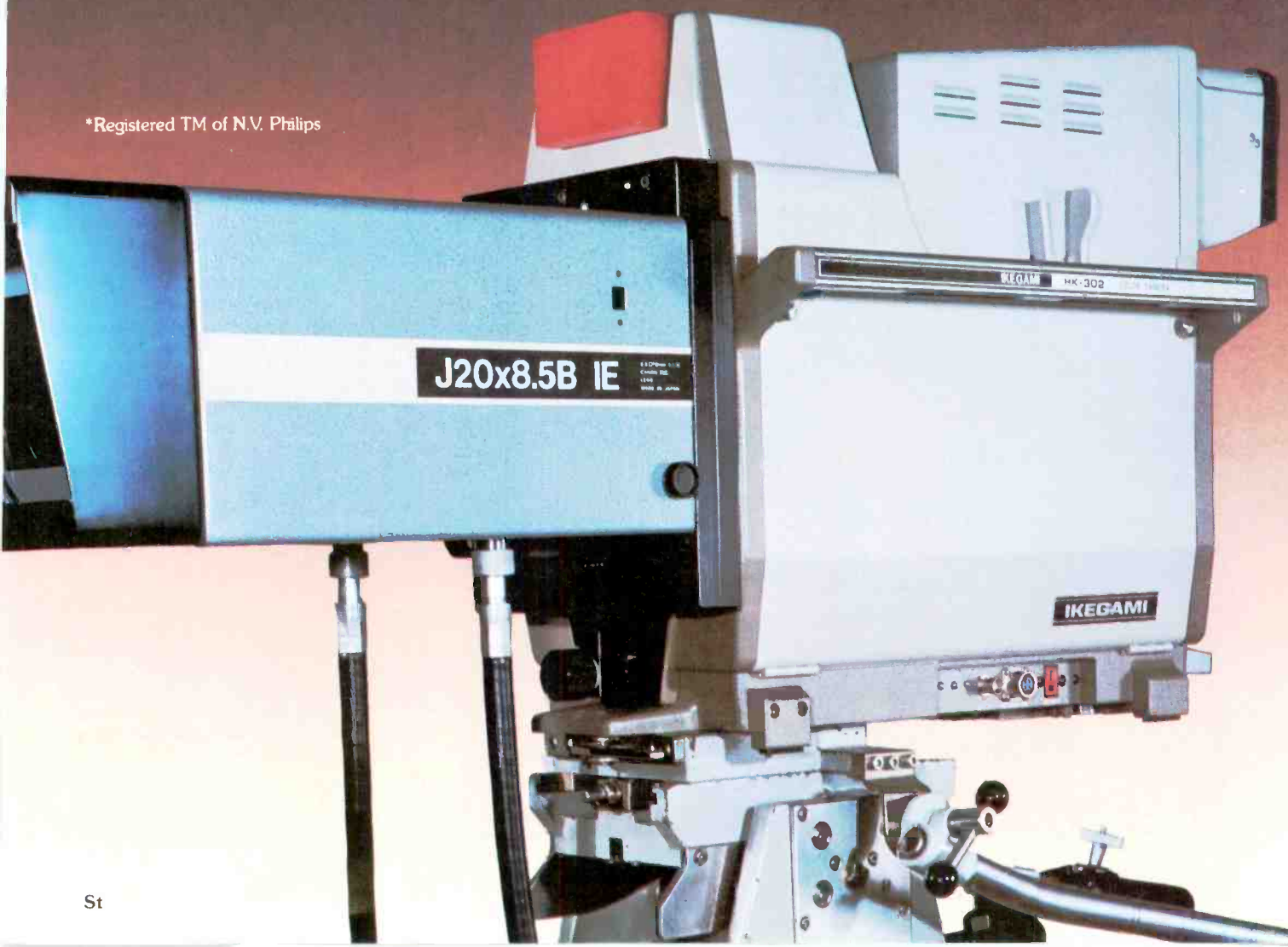

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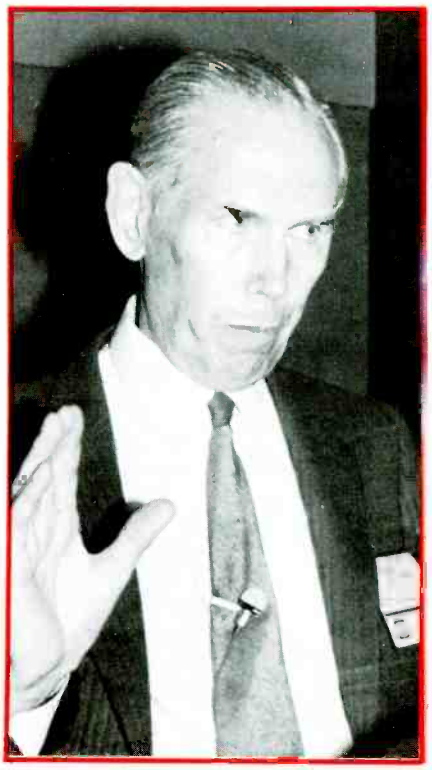

Arnaboldi: "The family budget is severely taxed to keep up with the new equipment and new programs."

geostationary spacecraft. For 20 years or more, people have thought of using spacecraft to improve broadcasting, and the inhibiting factors have been political and financial—not technical.

"A common-carrier system would provide an effective, reliable and low cost service for all countries and, started now, could be available in 10 years," Rogers said.

The rest of the papers at IBC-'82 dealt with the impact of current and imminent technologies on broadcasting. Interested readers are referred to the proceedings for further details. (See Table I, page 90.)

The exhibits

It's a toss-up as to what makes a convention successful—the technical sessions or the exhibits. At IBC-'82, interest was high in both, and this made attendees and exhibitors happy. Exhibitors introduced lots of new equipment at IBC-'82, some so new that it was shown without data sheets.

Because of space limitations, it is not possible for us to review all the new items introduced. However, if you are interested, you may obtain data on each exhibitor's established or new products by using the exhibitor listings* and our Reader Service Card. Note, however, that not all exhibitors will send you data, because many exhibitors do not export to all the countries served by **Broadcast Engineering.** So, if a particular company cannot provide you with the equipment, it may not wish to send you data. Be that as it may, express your interest, and we will pass it along for further action.

Convention potpourri

There was technology covered at IBC-'82

*See "Exhibitors at IBC-'82" on page 128.

FM BROADCASTERS, IS YOUR SIGNAL REALLY ON TARGET?

You know your market numbers, and the demographics that tell you where you should have your best signal coverage.

That's good, because your competition knows them too.

But, are you certain that you're delivering every watt into those numbers? Do your field-strength numbers raise a few doubts? And, what about the quality of your station's sound? You've spent all that money on the studio equipment. You've fine-tuned your transmitter. Great. But those improvements really don't count for much if your programming is hitting the open pastures while your competition is zeroing-in on the key demo sectors. This is where a CETEC FM Antenna comes in.

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Because your market has changed since your antenna was first put into service, or it's come time to directionalize, it makes good sense to look into the benefits of upgrading with CETEC ANTENNAS. Here's three different ways:

1. Our Pattern Optimization Service;
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With pattern optimization, we can give you more uniform coverage and better signal quality. Typical nulls and peaks can be virtually eliminated. All of our work is done fullscale to eliminate errors too. Parasitic elements are precisely determined on a custom basis for your particular site. When you optimize your signal our way, you optimize your market reach and penetration—your way.

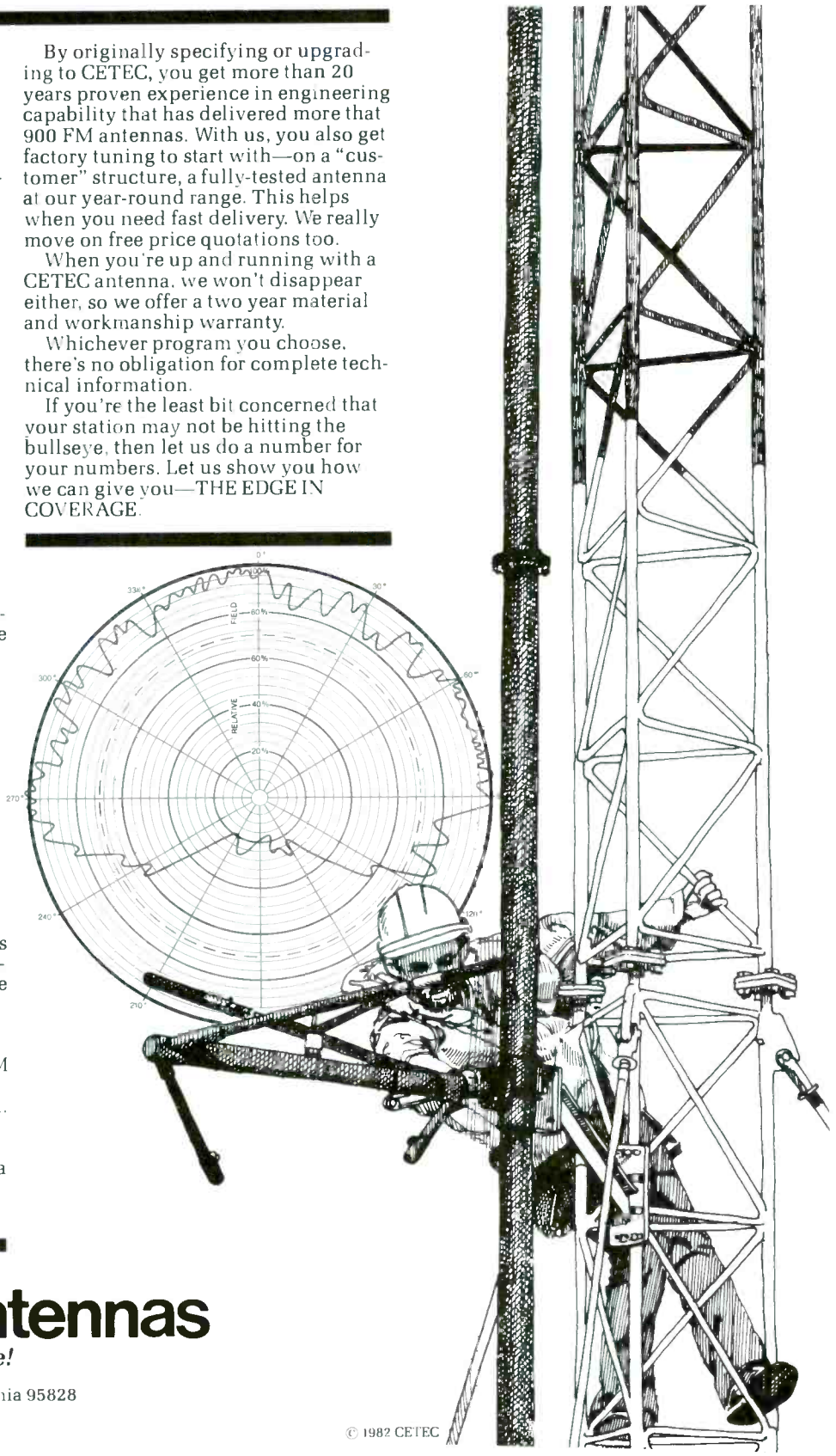
Cetec Antennas meet FCC requirements for directionalizing. With us, FM antennas aren't a sideline. All of our FM's are CP and can be directionalized. From 4KW to 360KW, one bay to large, multiple bay systems, we're one of the largest suppliers to the industry. With a CETEC directional, we can place your signal right where you want it.

By originally specifying or upgrading to CETEC, you get more than 20 years proven experience in engineering capability that has delivered more that 900 FM antennas. With us, you also get factory tuning to start with—on a "customer" structure, a fully-tested antenna at our year-round range. This helps when you need fast delivery. We really move on free price quotations too.

When you're up and running with a CETEC antenna, we won't disappear either, so we offer a two year material and workmanship warranty.

Whichever program you choose, there's no obligation for complete technical information.

If you're the least bit concerned that your station may not be hitting the bullseye, then let us do a number for your numbers. Let us show you how we can give you—THE EDGE IN COVERAGE.



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that went beyond the hardware found in the exhibitor listings (pages 128 and 130). Such was the case at the BBC and IBC booths. The BBC had a spectacular display illustrating the extent to which R&D at the company has contributed to broadcasting in the United Kingdom and throughout the world. Many of these developments have led to commercial products.

At the BBC booth, emphasis was given to studio still store; enhanced satellite TV transmission; electronic captioning for TV; radio data transmission for tuning and identification; multimachine tape editing; fiber-optics for digital video and data transmission; automatic TV waveform analysis; static and animated electronic videographics; headphone sound limiting equipment; improved access to teletext and telesoftware; usage of satellite ground stations; outside vans for TV and radio; reverberation timing; loudspeakers for monitoring; and a TV training package for institutions. Experts were also on hand to expand on these and other BBC developments.

At the IBA (Independent Broadcasting Authority) booth, there was an aura of excitement about new developments. The IBA is the central body appointed by the British government to provide independent TV and local radio services in the United Kingdom. The imminent opening of Channel 4 in all 14 independent broadcasting regions of the United Kingdom and the Channel Islands from 31 main transmitters and about 100 local relays this year emphasizes the range and depth of the IBA's involvement with large UHF transmitter networks. It now has some 700 unattended installations supervised from four computer-assisted regional operations centers.

But, the major feature at the IBA booth was the special live demonstrations of the Multiplexed Analog Component (MAC) satellite transmission system it developed for the European Direct Broadcast Satellite (DBS) systems. This equipment overcomes the incompatibility between different transmission systems, and will also give viewers improved pictures. The IBA used this system for its coverage of the World Cup soccer competition in Spain.

Expectations for MAC are not only that it will overcome the problems of incompatibility between the PAL and SECAM systems but also that it will provide viewers with better pictures by keeping luminance and chrominance signals through use of time compression and expansion. The MAC system can also be used with advantage over intercity links when it is required to obtain the advantages of separate (component) signals.

The results of IBA work on enhanced graphics for ORACLE (level 4) teletext and on the microprocessor-based MATE (Maintenance Automatic Test Equipment) was displayed. Other exhibits included a flexible frame store developed as a powerful experimental tool and a digital pattern generator developed in association with VG Electronics.

The ITCA (Independent Television Companies Association) was also on hand to exhibit some of its accomplishments. The ITCA is a non-profit organization established by the ITV Program Companies to undertake selected activities, including research and development in signal origination and processing.

Among the recent developments demonstrated were examples of 4:4:4 (RGB) and 4:2:2 (YUV) digital coding systems with chroma-key processing. These exhibits provided a useful side-by-side comparison of the two systems. Another demonstration showed the capabilities of ITN's advanced graphics generator VT80, which is a character-based high resolution graphics system with facilities for creating animated sequences during transmission. (This versatile equipment was used with success on the most recent US presidential election results.)

A PAL 8-field sequence controller and indicator developed for ITCA was also demonstrated. Other exhibits included two microprocessor-based clock displays (one designed for school programs, the other for sports) and a digital caption generator that is used for displaying breakdown apologies.

Information Technology Year

In the fields of broadcasting and communications, 1982 is a special year in Britain. It has been designated *Information Technology Year;* parliamentary approval has been granted for setting up TV services by direct broadcasting satellites; breakfast-time TV services will be launched; a fourth TV channel will be inaugurated by the Independent Broadcasting Authority (IBA); and an official study into the extension of CATV services has been started. Also to be noted, 1982 is the 60th anniversary of the BBC.

Business activities

The hottest news at IBC-'82 was in the business area. Companies exhibited for the first time; sales contracts were signed; firms were merged; and new ventures were announced. These are the events that make conventions an arena of excitement.

Some of the action at IBC-'82 is itemized as follows. Where appropriate, more editorial coverage will be scheduled in future issues of **BE**.

News from exhibitors at IBC-'82 was good, in some cases even ebullient. For instance, **Ampex** thought that its decision to introduce three new VTR products at Brighton was successful. Members of the press had an opportunity to attend an Ampex press conference and see demonstrations of the company's new product entries. Because the new Ampex portable VPR-5 is a joint venture with the **Nagra** organization, this was also an occasion for the press to meet the top people from Nagra.

Following all this was the announcement that Julius Barnathan, ABC TV Network, New York, and guest speaker on the first day of the convention, signed a contract with Ampex for 100 VPR-3 1-inch helical-

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The FOTON is a blend of Panavision award winning industrial design and advanced microprocessor based features. Available with either 25mm or 30mm tubes, the FOTON is easy on your budget and economical to operate.

Features:

- 2 Dedicated Microprocessors for each camera provide set up, monitoring and self-diagnostics.
- Automatic continuous registration without charts or diascope.
- Diagnostics monitor 16 critical camera functions.
- Interactive viewfinder graphics assist operating and supervisory personnel.
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- Detail Blanking eliminates outlines caused by clipping in peak whites.
- 9" viewfinder rotates and tilts facilitating periodic maintenance while providing operator convenience.
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- 2200 feet of cable permitted between head and CCU.

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Satellite technology, OB vans and earth stations were emphasized at the convention. Shown here are some of the activities on the promenade across from the Metropole (seen at upper left).

scan videotape recorder systems, a package valued at approximately $10 million.

A.F. Associates, the European distributor for **Dubner Computer Systems,** announced the appointment of **Dynamic Technology Ltd.** as exclusive representative in the United Kingdom for the Dubner range of color background generators. Initially developed for the complex needs of ABC, the Dubner CBG2 presents broadcasters a unique production tool with a wide variety of applications.

A newcomer to the convention, **Applied Video Systems,** reported intense interest, especially from overseas markets, in its range of all-British digital standards converters. Firm orders totaling approximately £150,000 have been signed, and more contracts are under negotiation.

CMX/Orrox announced plans for a major expansion of sales and technical support activities in Europe, the Middle East and North Africa for its **CMX Systems Division.** The expansion program includes an office and technical facility in Amsterdam, the Netherlands, to be followed by advertising, promotion, support for distributors, and a broader E.M.E.A. representation. Sait Electronics Nederland has been appointed a CMX Systems distributor. Klaus Eichstadt of CMX has been appointed director of international market development.

Consolidated Communications is to build what is said to be the world's most advanced TV facility, The London Communications Centre, at an estimated cost of £40 million. This complex with studios, post-production areas and computer-linked offices has been designed primarily for international TV news agencies, and should be operational in 1984, working 24 hours a day. The center will have its own ground station, hitting the Atlantic satellites and, when launched, the medium distance satellites, which will cover the United Kingdom and Europe. Satellite booking will be controlled by the center's computer, ensuring equitable access for all participating bureaus.

Crow of Reading received an order for a CEI-310 broadcast color TV camera for incorporation into a video animation unit being built by Neilson Hordell for **Molinaire Audio Visual.** The unit is designed for frame-by-frame animation and real time recording direct to videotape or videodisc.

Gowrings Engineering MVC Ltd. announced a contract from **Yorkshire Television** for the construction of YTV's new mobile VTR/editing vehicle, including the associated electrical and electronic installation work. It will be equipped with Ampex VTRs having a capacity for three 1-inch helical machines. It is due to begin service before the end of this year.

For the **Grass Valley Group,** IBC-'82 served as an opportune time to open its new European headquarters, the Grass Valley Group Europe, serving Europe, Africa and the Middle East.

Hitachi Denshi (UK) Ltd. announced three major contracts: **TWS,** TV South West, for six studio color cameras; **Nigerian TV Authority,** for 20 color cameras to equip TV studios throughout the country, bringing to 62 the total number of cameras supplied to NTA; and **TVAM,** for 12 lightweight Hitachi broadcast cameras for use in electronic newsgathering for its new centers in London, Glasgow, Newcastle, Manchester, Birmingham, Cardiff and Bristol.

Hitachi is also to supply an SK-91 portable camera complete with digital command unit and triaxial cable to **Editel,** a new broadcast facilities operation based in Edinburgh. The camera is supplied with Hitachi's HR-100 1-inch Type C portable VTR.

Marconi announced the sale of an MR2B videotape recorder to **VCL,** the London-based video facilities house. Marconi said that VCL has also ordered a Marconi B3410 digital line array machine. Also announced was the sale of the MR2B to the W. G. Deutsche Bundepost.

After the recent announcement that **McMichael Ltd.** and **GEC (Radio & Television) Ltd.** had merged their activities to form GEC-McMichael Ltd., the IBC witnessed the first public demonstration by the GEC group of companies of a complete high performance DBS domestic receiver system.

Michael Cox Electronics is to buy the **Crow** AA-1B flying spot scanner being used as the RGB chroma-key source in demonstrations of its new T16 vision mixer. Crow said that the AA-1B scanner has also been supplied to the Welsh fourth TV channel.

Neve announced the award of a

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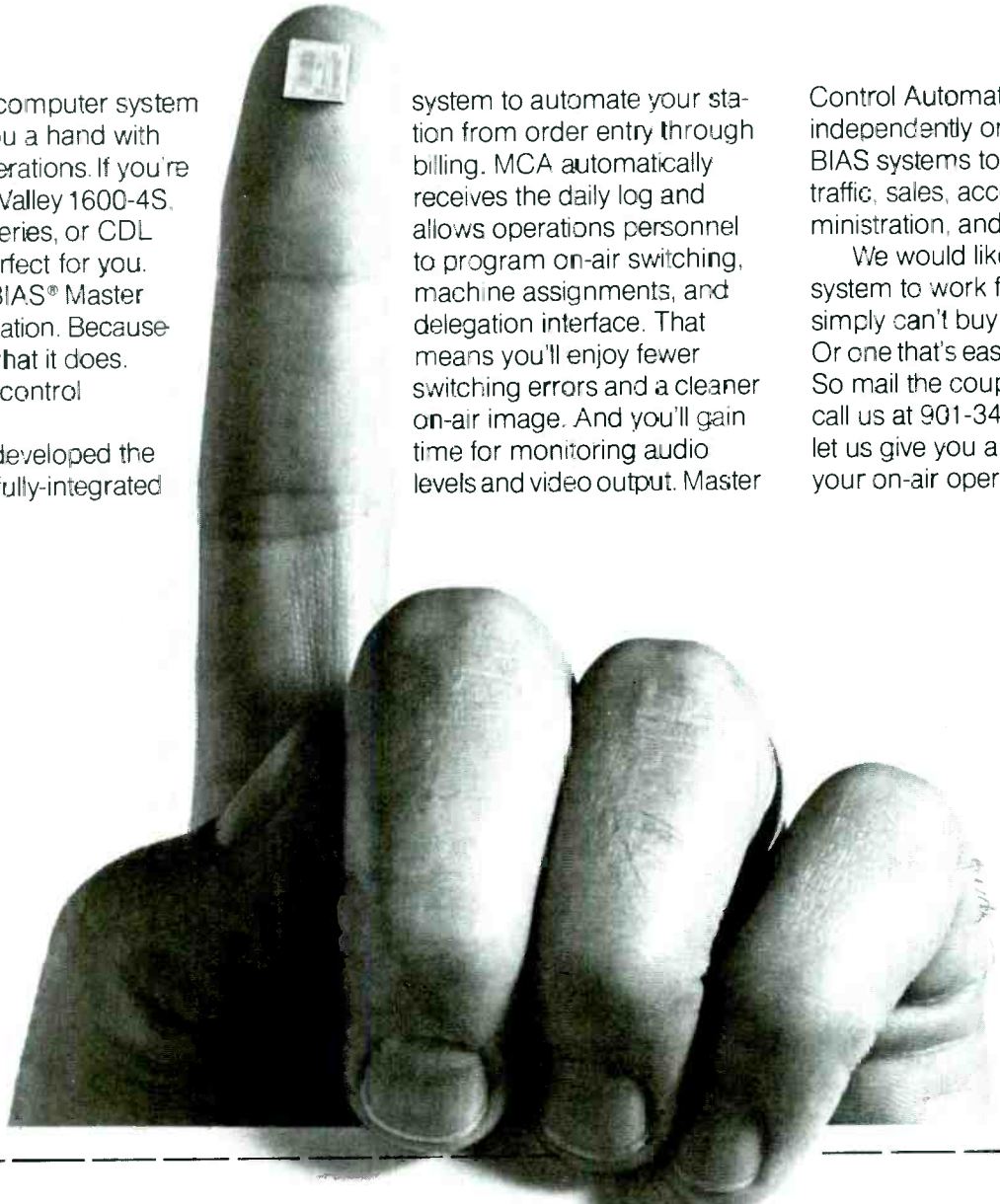

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Julius Barnathan (left), president, Broadcast Operations and Engineering, ABC, shown with Charles A. Steinberg, executive vice president and chief operating officer, Ampex Corporation, upon signing a $10 million VTR contract at IBC-'82.

£500,000 contract to supply equipment to the **Organization for Broadcasting and TV for Egypt.** The order includes 15 of Neve's new 51 series broadcast consoles, plus a customized music desk. Neve specialists will also be providing a training program for six Egyptian engineers, at the training school in Melbourn, UK.

Following Neve MD Dereck Tilsley's visit to Australia, many Australians will be enjoying television with Neve sound. Orders for 51 series broadcast consoles have since been received from five commercial networks—ATN7, HSV7, NBN3, TCN9 and TEN 10. Neve's agent in Australia, Ray Sheldrick of **Magna Techtronics,** said that the new 51 series desks met his company's requirements to perfection. News has also just reached Sheldrick that NFU-New Zealand has confirmed its order for a Neve 5116, part-customized console for film post-production.

Neve announced a contract with **Central Independent Television** for five custom SI series audio consoles and nine audio submixers. The order also included the complete audio installation package. The final details and conditions were negotiated at the Neve booth. The order value exceeded £750,000. The equipment will be installed at Central's new TV center in Nottingham.

The 5104/16 stereo broadcast console seen at Neve's booth was one of a pair earmarked for **TV-AM's** new London Studio Complex. The second will be a 5106/24 model. Both are part of a complete audio installation package Neve is currently working on for the new TV channel scheduled to go into operation in February of 1983.

Paltex finalized an agreement to market the range of Dynair video and audio distribution and routing equipment in the United Kingdom. Dynair routing systems stress high technical specification, flexibility and reliability.

Protel Computer Systems Ltd. announced a contract to supply a comprehensive *commercials* compilation system to support TV-AM's technical operation. The contract, valued at nearly £280,000, comprises several functional systems from Protel's range of integrated computer systems dedicated to supporting the broadcast industry and the media.

Pye TVT, the Broadcast Company for Philips, announced significant sales of mixers into French broadcasting. The **SFP (Societe Francaise de Production)** at Buttes-Chaumont, Paris, a major French production center, has acquired two model 10 switchers. Other switcher sales included the CD-480 and models 6 and 4/5.

For the **Quanta Corporation,** the big news at IBC-'82 was the first public appearance of its new EAME (Europe, Africa and Middle East) headquarters, managed by David Hughes.

Rohde & Schwarz UK Ltd. was awarded a contract worth more than £200,000 by **Thorn-EMI-Ferguson Ltd.** to supply its factory with a complete TV transmission system, with associated test and measurement equipment. The system is capable of providing TV test signals including Standard I (PAL), Standard B/G (dual-stereo sound) and Standard L (SECAM). The system is scheduled for delivery by the end of this year.

Rohde & Schwarz also recently supplied and installed a fully automatic test system for **Sony Broadcast Ltd.** in Basingstoke to test professional VTRs.

A. Smith (Great Bentley) Ltd. announced a contract to supply four OB radio link vehicles to the BBC.

Two orders were placed by **TVS** and **Border Television** for the new BVH-2000PS 1-inch Type C video recorders on display at **Sony Broadcast's** booth. The order from TVS is valued at about $1 million and includes the installation of 11 machines at its Maidstone and Southampton studios. The order from Border Television, valued at about $200,000, includes the installation of two BVH-2000PS video recorders in the company's Carlisle studios. This is the first time that Border Television has decided to use the new 1-inch Type C machines.

Utah Scientific announced the furnishing of a large switching system consisting of six video matrices, eight audio matrices, three reed relay matrices, and three tally matrices to the **BBC** for its Lime Grove Studios. Including numerous custom control panels, the order exceeded $600,000.

Zoom Television announced the sale of a Videomedia Z6000E editing system to **Crystal Video,** the London-based video and film production company. The £50,000 order includes intelligent time code readers, production switchers and a dual disc drive unit.

IBC-'84

As the curtains closed on another IBC, the Secretariat announced plans for the next meeting. IBC-'84 will be held Sept. 22-25, 1984 at the Metropole Conference and Exhibition Centre, Brighton, UK. We will plan to see you there.

NO COMPARISON

Comparing video from a conventional TBC to video from a Y-688[32] Total Error Corrector is like comparing apples to oranges. A time base corrector, as the name implies, corrects timing errors. The Y-688[32] Total Error Corrector corrects timing errors and virtually all VTR induced errors.

The major cause of video quality loss in 3/4 VTR's is inherent in the color under process. This process separates the input color video signal into its luma and chroma components, converts the chroma frequency for recording and playback and recombines the luma and chroma for color video output. The worst part is that this quality loss is cumulative, in that it is compounded with each pass through a VTR or conventional TBC.

Total Error Correction

The Y-688[32] TEC is designed specifically to overcome multiple generation quality loss from color under VTR's. The Y-688[32] TEC utilizes "dub" (Y-688) input and output as well as encoded video. The "dub" mode allows processing of component (Y-688) video bypassing the separation, frequency conversion and recombination cycle. "Dub" signals processed through the Y-688[32] TEC are better than encoded video signals because they contain more information and are less degraded.

The Y-688[32] TEC also utilizes advanced signal processing techniques, some manufactured under exclusive license from Faroudja Laboratories. These techniques reduce chroma noise by up to 20dB, correct luma/chroma timing automatically, reduce luma noise by up to 10dB, improve chroma rise times, reduce second order ringing and eliminate luma/chroma crosstalk. Some processing is used during each pass through the Y-688, while the balance of the processing is used for the last copy or for broadcast to correct any minor degradations which have occurred.

A Difference You Can See

The improved quality of Y-688[32] TEC video can be seen in first generation playback. It becomes more obvious in successive generations. It is particularly noticeable in third and fourth generations because conventional TBC video has gotten worse with each pass, while fourth generation Y-688[32] TEC video approximates original quality.

The Y-688[32] TEC is simply the most powerful tool available for extending multi-generation quality from color under VTR's.

For more information on the Y-688[32] TEC or an on-site demonstration, circle the reader's card. For immediate response write or call Fortel today. **Circle (101) on Reply Card**

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Norcross, Georgia 30092-9990
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FORTEL

Y-688[32]
Total Error Corrector

New products and special events at IBC-'82

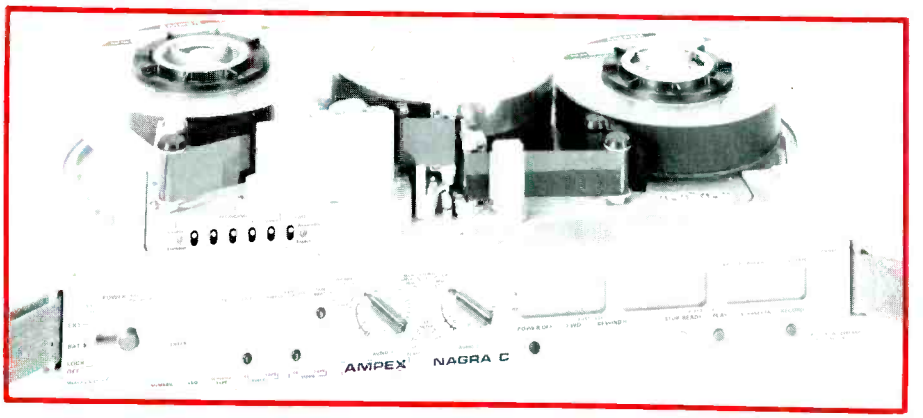
By Bill Rhodes, editorial director

The IBC serves as another launching pad for manufacturers to introduce new hardware, software, business ventures and technologies. Probably the most exciting action at this year's show was in satellite technology, especially with enhanced picture transmission. The reason for this is simple: The UK is poised on the brink of plunging into the cable and satellite distribution in a major way, and both the BBC and ITA put forth techniques for improved satellite broadcasts—both in the technical papers and in booth demonstrations.

Indeed, by the time this issue goes to press, there could be a UK/European standard established for satellite broadcasting. To further illustrate this surge in satellite distribution, the beach in front of the exhibit center was crowded with earth stations and mobile vans.

But the satellite area was only the beginning of the line of new products introduced at IBC-'82. Highlights of some of these will be touched on here, but data on all products may be obtained by using the exhibitor listings, "Exhibitors at IBC-'82," on pages 128 and 130.

Among its vast range of broadcasting and studio equipment, **AEG-Telefunken**



Ampex was one of the exhibitors at IBC-'82 introducing new products. Shown here are the VPR-5 lightweight 1-inch helical-scan VTR (right), the ARC-10 integrated camera/VTR with supporting editing and control equipment (upper right) and the VPR-3 Type C 1-inch helical-scan VTR with companion TBC (above).

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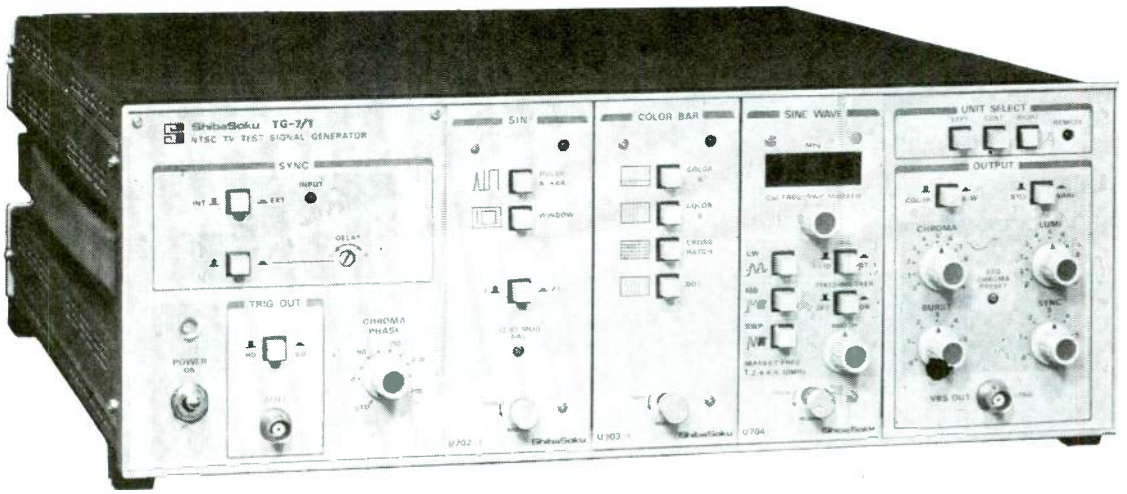

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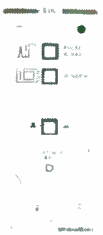
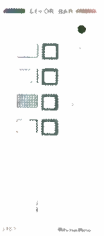
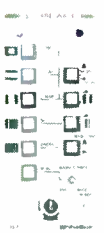


U702 SIN² UNIT



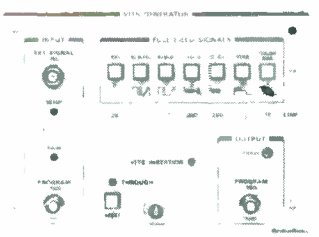
U703 COLOR BAR UNIT

U704 SINE WAVE UNIT



U705 SQUARE WAVE UNIT

U706 NOISE TEST UNIT



U707/1 VITS GENERATOR

ASACA/SHIBASOKU TG-7 TV test signal generator is a main frame which accommodates interchangeable modules, and by using it together with these modules, it generates TV test signals which are used for the adjustment, testing and measurement of video equipment.

Features

- The sync signal generator contained in the main frame allows color lock and gen-lock with the VBS or sync with color burst.
- The model contains a built-in dual axis balanced modulator and this allows the chroma phase to be varied from 0-360°.
- The subcarrier oscillator is incorporated into an oven and its frequency stability is within ±5Hz.
- Independent output terminals provide video component, sync signal, color burst level signals to be connected to an external programmable attenuator, each output level can control with external signals independently.
- The main frame and plug-in modules are coupled with DC circuit and so there is no bounce from the signal selection.
- Switches provided on the front panel enable selection horizontal or vertical drive for a trigger pulse output.
- The maximum variety of test signals can be generated with the minimum number of modules.
- Optional IEEE-488 Bus unit provides automated program control.

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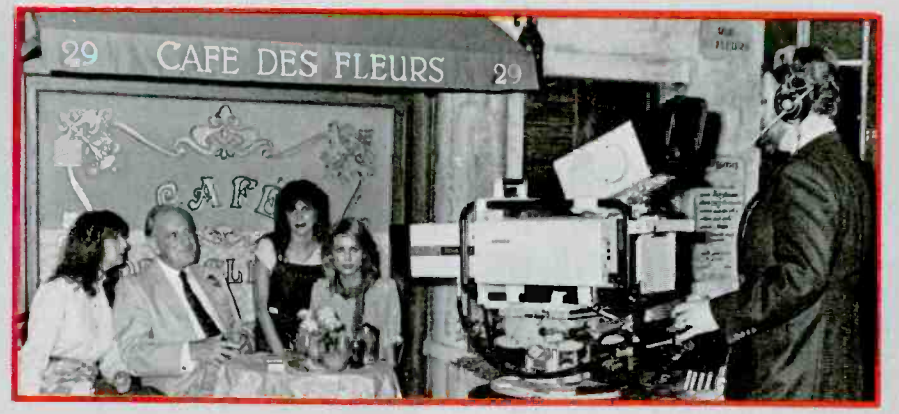

Ampex: Using the French setting.

showed a model of the Flevoland Broadcasting station; the model of a standard transmitter program (PANTEL); a modular system engineering technique for planning and building radio and TV centers anywhere in the world (TELCOPLAN); and studio editing systems.

AKG emphasized its wide range of professional audio equipment, which included condenser microphones; the CK3 capsule mic; the C460B mic preamps; headsets; cartridges; the SATT 42 and 48 portable mixers; the **Aphex** II aural exciter; the Aphex EQF-2 parametric equalizer/filter; and the Aphex CX-1 compressor/expander. A 25% lengthening of its tortional transmission line (TTL system) over the older BX20 system was also announced. This new BX25E is a 2-channel design and is approximately one-third the size of the BX20.

American Data featured the latest additions to its 3100 series video production mixers, including the new 3104A modular mixer and the 3101-20 with its editor and DVE interface. Also shown was the 2100 series vision mixers, including the new 2104 with key edger; and the 860 downstream keyer with built-in digital matte generator and CCD edger circuits.

Ampex took the opportunity at IBC to impress the world with some new products and to put on a spectacular exhibit for attendees.

Since the introduction of the recorder-in-camera systems at NAB a couple of years ago, Ampex has remained suspiciously quiet about this product. But not anymore. At Brighton, Ampex introduced the world to its new ½-inch integrated camera/VTR system, the ARC-10, based on the Matsushita M-format and the ½-inch VHS videotape cassette.

The ACR-10 is designed to interface with existing studio equipment and can produce broadcast-quality signals superior to that realized on ¾-inch VTRs. The system is composed of the ARC-10, the ARC-40 studio editing VTR and the ARC-30 electronic edit controller. The recording time is 20 minutes on one VHS cassette. Four video recording heads are used to produce high quality pictures. The system is complete with built-in SMPTE time code generator. Price for the basic system is approximately $35,900, without lens. NTSC will be available this month, followed by PAL in January 1983.

Ampex also unveiled its VPR-5, a revolutionary, ultralight portable 1-inch helical-scan VTR for EFP, which was produced by a marriage of technologies between Ampex and Kudelski (of the Nagra fame). Weighing in at 6.8kg (less than 15 pounds) with tape and batteries, the VPR-5 provides 20 minutes recording capability for EFP but can accommodate 60-minute reels for studio/table-top use. The system incorporates full-performance C-format video record capability along with two high quality audio channels and a SMPTE/EBU time code track as standard features. It also has comprehensive built-in editing capabilities. It is priced at $45,000 and will be available in NTSC in December and in PAL early in 1983.

However, Ampex did not stop there. It also introduced the VPR-3, its versatile 1-inch Type C helical-scan VTR with companion TBC-3 digital time base corrector. Incredibly fast and precise in tape han-

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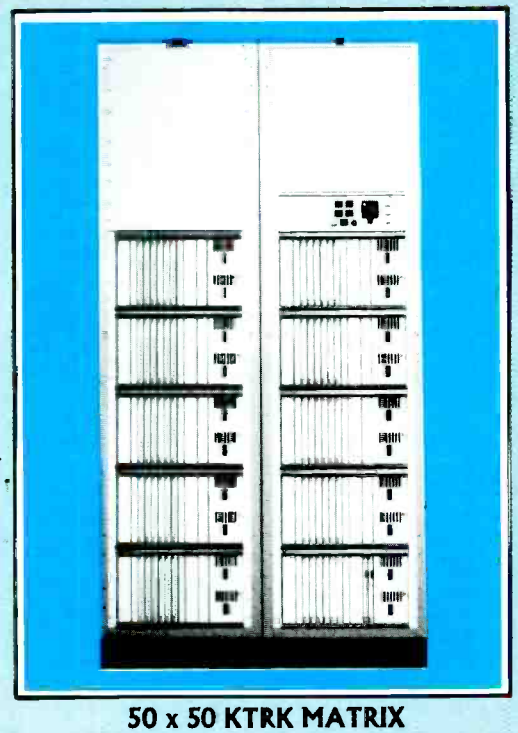
OUR SWITCHER SPECS SPEAK FOR THEMSELVES

Following is a summary of test data compiled from the final test measurements made on a 50-input by 50-output audio/video switching matrix sold to Capital Cities' Houston outlet KTRK-TV. We invite comparison of these test results with our published specs and with the published specs of routing switchers manufactured by others.



50 x 50 KTRK MATRIX

KTRK TEST DATA BREAKDOWN

	Worst	Mean	95th Percentile	Published Spec
VIDEO				
Crosstalk @ 3.58 MHz	−63	71.1	65	−60 dB
Diff Gain	.05	.042	.05	0.1%
Diff Phase	0.1	.056	.08	0.12°
Diff Delay	1.0	.89	.95	±1°
Freq Response	.05	.02	.05	±.12 dB
Hum & Noise	−79	−84.6	−80	−75 dB
Gain Uniformity, All Paths	.017	.006	.017	±.07 dB
Input Return Loss	46	51.2	46	40 dB
Output Return Loss	45	48.8	46	40 dB
AUDIO				
Crosstalk @ 20 KHz	−80	−84.7	−81	−75 dB
Hum & Noise	−88	−91.8	−90	−85 dBm
THD 30 Hz - 20 KHz				
@ 0 dBm	.017	.011	.015	0.1%
@ +24 dBm	.24	.13	.17	0.5%
Gain Uniformity, All Paths	0.1	.044	.09	0.2 dB
Common Mode Rejection	80	88.3	83	70 dB

Our routing switcher specs are the best in the industry—we test each matrix for conformity and we beat our own specs by comfortable margins.

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dling, with sophisticated audio features and human interface controls built in, the VPR-3 is aimed at the teleproduction, broadcast, cable and satellite productions markets. It has a vacuum capstan transport that allows a pinch-rollerless design to provide tape handling control similar to that of advanced computer tape drives. Full audio confidence monitoring on all longitudinal tracks is standard, with dual-channel stereo monitoring provided. Six menu-identified soft keys allow the user to simplify operational controls, edit setup and diagnostics. The VPR-3 is priced at less than $60,000 for the basic system, with NTSC and PAL systems available in early 1983.

Following an Ampex press conference, we toured the Ampex booth to see all its products on exhibit. These included the VPR-80 helical-scan recorder together with other C-format studio and portable recorders; the TBC-2B time base corrector; SMC-100 slow motion controller; STC-100 multipoint search-to-cue system with still storage capability; TRE-2 remote editor; RCO-2 remote and TCO-3 time base changeover units; the ACE computerized editor; its new HPE-104 list management editing system; the BCC-20 Digicam EFP and BCC-21 studio/EFP cameras; the 4100 video production switcher and the AVC switcher; the ADO digital optics system for special effects, shown for the first time in a PAL configuration; audio and video magnetic tapes; an OB van with comprehensive camera/recording facilities; and, for audio recording and synchronizing, the ATR-80, MM-1200 and ATR-124.

Link Electronics


At an Ampex press conference, Mark Sanders (podium), general manager, VTR group, Audio-Video Systems Division, presented Ampex recorders. Tom Hasty, product manager, is holding the new VPR-5.

Also shown were the line of **Chyron** TV/DIGIFLEX/RGU-2 graphics and titling systems and the **EECO** audio products, including the new time code reader and generator, MQS-100 multisource synchronizer and the VCG-750 series video character generator. Both lines are marketed by Ampex. But that still was not all. Ampex showed new tape lengths for its recording products.

Andrew Antennas was on hand to describe its line of antennas, coaxial cables, waveguides and supporting field services. Featured were its new line of earth station antennas for 4/12GHz: 1.8m, 2.4m, 3m, 3.7m and 4.5m; the new TRASAR UHF transmitting antennas; and the HELIAX coax cables and elliptical waveguides.

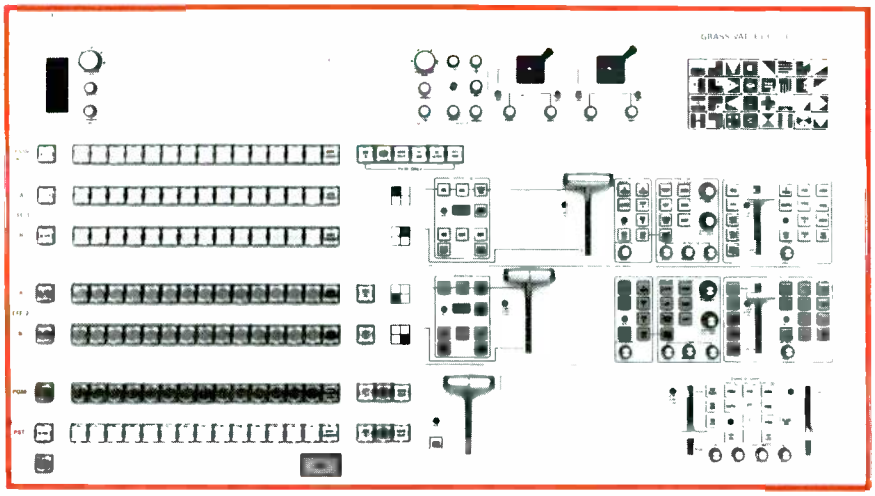
ASACA/Shibasoku featured its broadcast color monitors (14- and 20-inch PAL/NTSC/SECAM switchable), the 925 video noise meter, the 201 envelope delay measuring set, the 205 and SV11 video sweep generator, the TG-7 TV test signal generator, the ASW100 portable production system, and the ADM810 videotape cleaner/evaluator.

Audio & Design (Recording) exhibited its line of audio processing equipment, including the F601 Superdynamic Limiter, the Transdynamic processor, the SCAMP modular signal processors, and a RAINDIRK series 400 broadcast and TV audio mixer. Audio & Design also announced plans to market EELA Audio products, which include ENG mixers and ancillary equipment.

Audio Kinetics demonstrated the exceptional flexibility of its Q-LOCK with Q-SOFT dedicated control programs developed to streamline machine control in widely differing operational environments. Included were demonstrations in video/audio post-production, film dialog replacement looping, automatic time code indexed sound assembly, and a simulcast/cable TV automation.

The **Barco Industries** stand included its Video Systems and Communications Divisions. Featured was the Barco CTVM-3 series color monitors, TVM-3 monochrome monitors, CD-3 decoders, VSD-2/2X TV demodulators, CC-1000 TV channel processors, VSBM-1/S modulator/exciters for TV transmitters, a complete line of grade II monitors (9- to 20-inch), and color monitors for computer and videotex display. The Barco CM22 is claimed to be the first 9-inch color monitor to meet two grade specs.

Five young men dropped into the **Bell and Howell** exhibit, in more ways than one. The high flying *Robins*, the RAF's parachute team, fell out of an overcast sky


Grass Valley introduced its 1680-16F 2-mix/effects production switcher into the European market.

Time in Your Grasp...

The Studer time code system for highly precise synchronization of stereo recorders

The new Studer A810 points the way to the future; now even two-channel ¼" stereo recorders may be perfectly synchronized. Precise SMPTE time code synchronization and maximum crosstalk rejection are attained by separating time code heads from audio heads, and by using a microprocessor-controlled delay. Studer has finally solved the problem of synchronizing stereo machines!

Until now SMPTE-code synchronizing of video-audio, film-audio, or audio-audio has been restricted to multi-channel machines. But such linkups pose no problem for Studer's A810 time code recorders. Designed for maximum system flexibility, the A810 has a fully digital control system for both the tape transport functions and audio electronic alignment. And, for the first time in the history of audio recording equipment, the A810 offers complete data exchange to peripheral equipment via serial interface. The bus-compatible A810 is ideally suited to complex automation tasks, and the A810's flexible modular concept allows simple, cost-effective changeover to specialized configurations.

We'll be glad to send you more information on the analog and digital capabilities of Studer's new A810 – the audio recorder with a grip on the future.

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to land with impressive precision in front of the mobile systems display on the Esplanade while Flight Lt. Hennessey directed his team from the ground. Sgt. P. Reynolds, team leader and instructor, recorded the action with a B & H video camera fitted to his helmet and a recorder strapped to his leg. The Robins use the B&H equipment to help with their training and to improve their style and performance. A tape of the event was replayed at the exhibit.

Robert Bosch exhibited its full range of studio and portable broadcast equipment: cameras, VTRs, telecine, mixers, editing and switching systems, monitors, synchronizers and graphic effects units. Highlight products were the BCN 100 1-inch cart VTR, the FDL60 CCD telecine, the Mach One editing system, the Compositor graphics system, the BCN video recorders, and the KCP/KCA/KCI cameras. On display for the first time was a new range of Blaupunkt receiving monitors.

Making its European debut was the new Bosch KBF-1 recorder/camera system, which uses ¼-inch CVC cassettes for a 20-minute play time. An editor is planned for 1983.

Broadcast Electronics had the good fortune of having an IBC booth between the registration desks and the main convention center. From this key position, they were able to easily meet with all attendees interested in their FX-30 exciter for VHF transmitters, single-deck 3000 series and multiple-deck 5300B tape cartridge machines and stereo rotary mixers.

At its booth, **Canon** displayed its wide range of TV zoom lenses for ⅔-, 1- and 1¼-inch cameras for studio, EFP and ENG applications, including the new 14X and 20X lenses. Canon also set up a Canon-equipped camera across the exhibit hall to show exhibit visitors a zoom closeup of themselves from the remote site.

CEI (a Panavision company) displayed its 300 series—CEI 310, 330, 340—color cameras, which use microprocessor control for continuous size and centering maintenance, pedestal, iris, and tone capture. Also featured was the Foton I, a 1-inch, 3-tube studio color camera with a built-in microprocessor.

CMC Technology showed its broad range of video head assemblies for broadcasters. For quad recorders, CMCT furnishes Alfesil or Ferrite heads for the Ampex Mark XX, XV and X and for the RCA high band units. Head transducers for the VPR-2B VTRs were also introduced. CMCT provides special services and heads for PAL/SECAM/NTSC standards.

Clear-Com of California introduced to Europe its new line of System 11 intercoms as well as a number of other products that have been added to the line. The company's broadcasting and intercom systems are used by broadcasting organizations worldwide. Included were the SB412 4-channel matrix/switchboard, the MS-400 mainstation, the RM-400 remote station, and the new CP-100 TV belt pack.

Convergence featured the ESC-104 list management editing controller with a variety of system hookups to show ease of use. By special invitation to its suite, we saw Convergence's range of post-production equipment and met wtih its staff on hand for more detailed questions.

Crow of Reading exhibited equipment for TV studios, field production, video signal transmission, production switchers, color cameras and color monitors. Included were the CEI-300 color camera; first-time showing of the ACG series of video signal linear distortion correctors; the new ACG2037 EBU automatic video equalizer; and the new Crow AA-1B flying spot slide scanner.

Delta Electronics exhibited its range of RF monitoring and measuring equipment, including its coaxial antenna switches. Included were the RCS-1 remote control system; a microprocessor-based remote control/parameter monitoring system; impedance bridges; transformer-coupled ammeters; digital and analog antenna monitors; and modulation controllers.

First-time exhibitor **Digivision Broadcast** launched a new range of video processing, distribution and test equipment. Of particular interest were the DNM 1228 video noise meter for making accurate real time signal-to-noise measurements; Grades I and II studio color monitors; and high quality monochrome monitors; and the DRS-167 remote control for video switcher.

Dynamic Technology displayed its own line of Datalite lighting controls and its family of products for remote control, data transmission, source ID and time code. Also shown were the **Dubner Computer Systems** color corrector computer and CBG full-function character generator and the **Harris Video Systems'** IRIS II digital image system and 517 PAL/SECAM digital video TBC.

The **ENERTEC** Audio Professional Department (Schlumberger Group) introduced its new F500 audiotape recorder

Marconi introduced its B3410 telecine with line array image sensors and digital video processing.

With SAM you don't have to play it again

SAM (Station Automation Manager) plays for keeps. And SAM plays the finest in television "look" the first time, everytime.

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Neve's booth at the convention.

for broadcast studios, theater or emergency studios; and its new UPS 6000 series portable, compact console line. Also featured were the F462 master tape recorders, the UPS 5000 consoles, static switching matrices and various products for turnkey operations.

The **English Electric Valve Company** (EEV) highlighted its line of advanced and standard Leddicon camera tubes. These included the 30mm, 25mm, 17mm (⅔-inch) Leddicons; the new generation 1-inch HOP diode gun Leddicons; a new ½-inch P8470 tube for miniature ENG/EFP cameras; and the P8190 25mm diode gun Leddicon. The Marconi MKIX camera was used to demonstrate the quality of the 30mm Leddicons.

Other electro-optic devices included Vidicons for telecines, captioning cameras, subtitlers and electronic prompters.

FOR-A concentrated on its wide range of specialized video products: the FA-410P TBC with its new digital image enhancer and noise reducer; the CCS-4200P color corrector; the TGS-5000P sync generator; the TKY-4500 title keyer; the compact TA-20P title colorizer and switcher; and the TA-10P Telop adapter. FOR-A also showed its range of video typewriters, the VTW-250 with 32-page memory and display mode units. Others systems based on magnetic card and floppy disc memories were also on display.

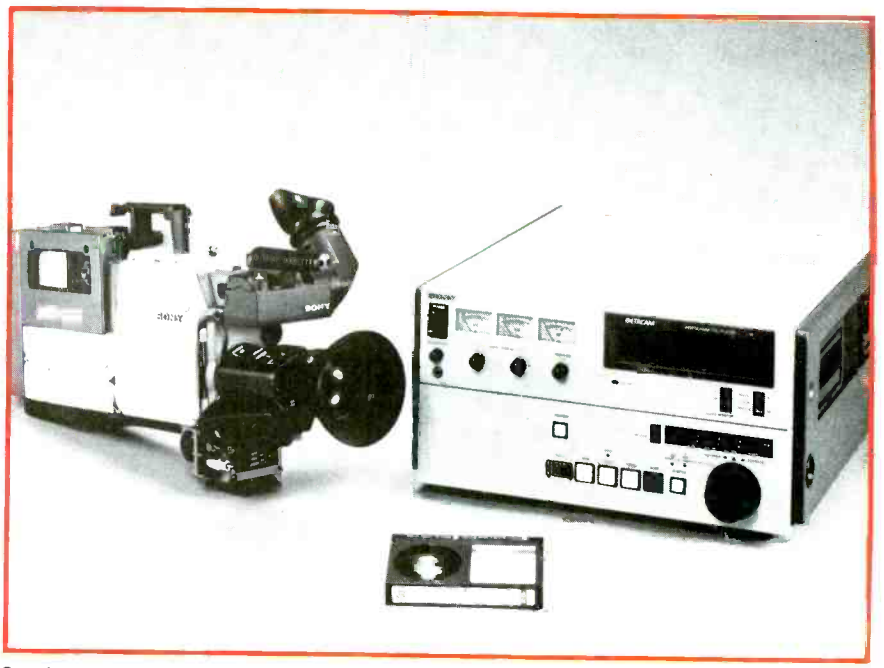
The **Fuji Photo Optical Company** exhibited its complete range of ENG, EFP and studio camera lenses and accessories. Included were the lightweight A14X9 with built-in 2X extender for ENG (now with shot-box option); the A30X11 with built-in 2X extender for EFP; the new 1- and 1¼-inch studio lenses (P28X15ESM) with built-in 1.7X range extenders and focusing from 23.5mm to 714mm; the new A14X9 ERM zoom lens for ENG; and the new P17X16.5ESM studio zoom lens.

The big news at the **Grass Valley** booth was the announcement of its new European headquarters, but attendees were also interested in seeing the quality of its equipment. On exhibit was the 300 series production vision mixer with digital video effects, the recently introduced 1680 series production vision mixer, the new Ten-X utility routing switcher, the 440 series routing switcher, the Wavelink fiber-optics system, a new 3259 PAL SC/H phase meter designed to aid in establishing and maintaining an SC/H phased video system, as well as other modular products.

A new E-MEM III Effects Memory System for the 1680 M/E was also being offered. Grass Valley shared its booth at IBC with its parent company, Tektronix.

Hitachi exhibited a complete range of video cameras and videotape equipment for studio, ENG and EFP operations. Included were the SK110 computer-managed, auto-setup studio color camera in its multicore and triax modes; the HR100 and HR210 1-inch helical VTR machines in portable and studio models; the new solid-state broadcast cameras with integral tape recorders in 1¼- and ½-inch configurations; the SK-1 ENG camera with MOS image sensors; the HR-50 PAL ½-inch VCR; the ERC-50 editing system for the ½-inch M-format VTR in NTSC/PAL versions; plus a full range of test instruments and waveform monitors.

Ikegami showed its latest line of prod-



- Sony's exhibit included its new BH-2000 PS 1-inch Type C VTR (upper left), the Betacam camera/recorder system (above) and an MCI broadcast audio production package.

ucts for broadcast studios, field production and ENG operations. Especially notable were the HK-381 fully automatic field/studio camera and the compact HL-38 ENG color camera.

Industrial Sciences took pride in introducing its 904 video production mixer incorporating advanced electronics to handle complicated studio productions, remotes and post-productions. This mixer features two complete mix effect systems and a program/preset mixer, downstream key edger with four inputs, and a master fade to black. Each system has 16 patterns: 12 standard, a star and three rotary patterns. The system is available to NTSC/PAL/PAL-M standards.

Also shown was the model 200-1 video production mixer providing all the production power of the larger 200 series system with Polykey Concept, but in a smaller package.

Link Electronics demonstrated its broad line of products and services through new products, custom-built OB vans and represented products. New was its Link 130 automatic studio color camera, but also shown were the A/V distribution amplifiers, video noise meters, talk-back systems, pulse generators and telephone exchanges.

NEC cameras; **Conrac** studio monitors; **Grass Valley** vision mixers and A/V distribution amplifiers; and **GE** large-screen projectors were all also a part of the Link display.

Logica's Television Systems Division exhibited FLAIR, a new video graphics system that allows graphic artists to paint or draw in video and produce high quality graphics. Developed by the BBC, it is being manufactured by Logica. Units have been sold to the BBC, Ercotron-Sweden and TV South-West. Others have been ordered by broadcasting organizations and production companies in the United States, Australia and Europe. Also shown was the Context teletext editorial system.

M/A-COM Video Systems promoted its range of terrestrial, mobile and ENG/EFP microwave equipment. Included were the MA-2.5CP frequency agile portable transmitter and receiver; the ultraportable 2.5-MX transmitter; the 2.5-MX high/low power switchable, self-contained transmitter; fiber-optics transmission equipment; ENG/EFP antennas; the MLV-700 Manpack UHF link for ENG; and the FLT-1500R radio-telephone series.

The rising interest in global communications was exemplified at the **McMichael** stand. Its new range of color and monochrome TV monitors; the ACE 4-field standards converter that can operate between any of the line standards/color systems; a complete teleconferencing van, including satellite ground station with a McMichael 4000 series video fiber-optic link; and an electronic clock/logo generator, were all of particular interest.

Members of the press were treated to an evening meeting with key people of **Marconi Communications Systems** to discuss new products and to meet R&D people from the BBC who have helped in the development of equipment built and marketed by Marconi. This was an interesting step back into history for us, because it was the founder of the Marconi Company who invented wireless telegraphy, set up the studio on Savoy Hill and, not very far from Brighton, founded the first broadcast operations.

At the center of its impressive display, Marconi demonstrated its B3410 digital line array telecine, which employs the latest advances in telecine technology.

The B3410 has solid-state imaging sensors in place of the electronic tubes of conventional designs to achieve high performance and reliability. Video signal processing is all-digital and microprocessor-controlled. The unit accepts both 16mm and 35mm film, handles positive and negative color film as well as black-and-white, and is equipped for different forward and reverse running speeds. Included was the new PREFIX programmable color correction feature.

Other advanced systems exhibited by Marconi were the MR2B VTR and a new 2kW VHF/FM transmitter in solid-state, which incorporates four 500W modules.

Only technology this advanced can achieve music reproduction this pure. The Technics Digital Cassette Recorder.

No tape hiss. No wow and flutter. Not even head contact distortion. With the digital technology in the Technics SV-P100 Cassette Recorder, they no longer exist.

Utilizing the Pulse Code Modulation (PCM) digital process, the SV-P100 instantaneously translates musical notes into an exact numerical code, stores them on any standard VHS cassette, then "translates" them back into music on playback. Duplicate tapes are exactly the same as the original. Thus, every recording and every copy is a "master."

The revolutionary size of the Technics SV-P100 Cassette Recorder (17"x11"x10") is the result of state-of-the-art semiconductor technology. The built-in videotape transport mechanism brings the convenience normally associated with conventional front-loading cassette decks to a digital application. Tape loading is completely automatic. And, frequently used controls are conveniently grouped on a slanted panel with LED's to confirm operating status.

Despite its compact size, the SV-P100 Recorder offers performance beyond even professional open-reel decks. Since the digital signal is recorded on the video track, the space usually available for audio can therefore be used for editing "jump" and "search" marks. The unit employs the EIAJ standard for PCM recording. And, in addition, editing and purely digital dubbing are easily accomplished with any videotape deck employing the NTSC format.

The Technics SV-P100 Digital Cassette Recorder is currently available at selected audio dealers. To say that it must be heard to be appreciated is an incredible understatement.

Technics

The science of sound.

Circle (114) on Reply Card

Each module is in effect two 250W modules with separate power supplies.

Pictures from the "Ghorizont" and OTS satellites were seen from several operating ground stations on the **Megastat** stand in the nearby Bedford Hotel.

Another active international marketer, already exporting through 31 distributors worldwide, was **Michael Cox Electronics.** Added to its large range of equipment for this year's exhibition was a new presentation mixer, the Type 1221. It provides 12 *married* audio and video inputs, with an additional six *unmarried* sound-over inputs. Audio inputs and outputs are balanced, and the mixer features simple next-event operation, master sound and vision faders, cut and automix transition, and captioning facilities.

The series T16 multilevel mixers, the 500/400 assignment switchers, the Cox color corrector and store and videotape post-production equipment were also on display.

Microtime exhibited its digital video processing equipment for studio, EFP and OB applications, including the S-130 (PAL/NTSC/PAL-N/PAL-B) video frame store synchronizer and the 2080 TBC.

Mullard, a member of the Philips Worldwide organization, is known for its leadership in developing solid-state chips, especially for teletext applications, as well as for its manufacture of TV sets. However, on display at IBC was the line of Plumbicon TV camera pickup tubes and broadcast-power tubes/valves/klystrons.

The Plumbicon display included the latest of the series, the 80XQ—a ½-inch tube for ENG/EFP cameras. This was joined by the XL1690, the latest SSB transmitter tetrode of the series, which offers a WKW output at 30MHz with a high gain of 23dB.

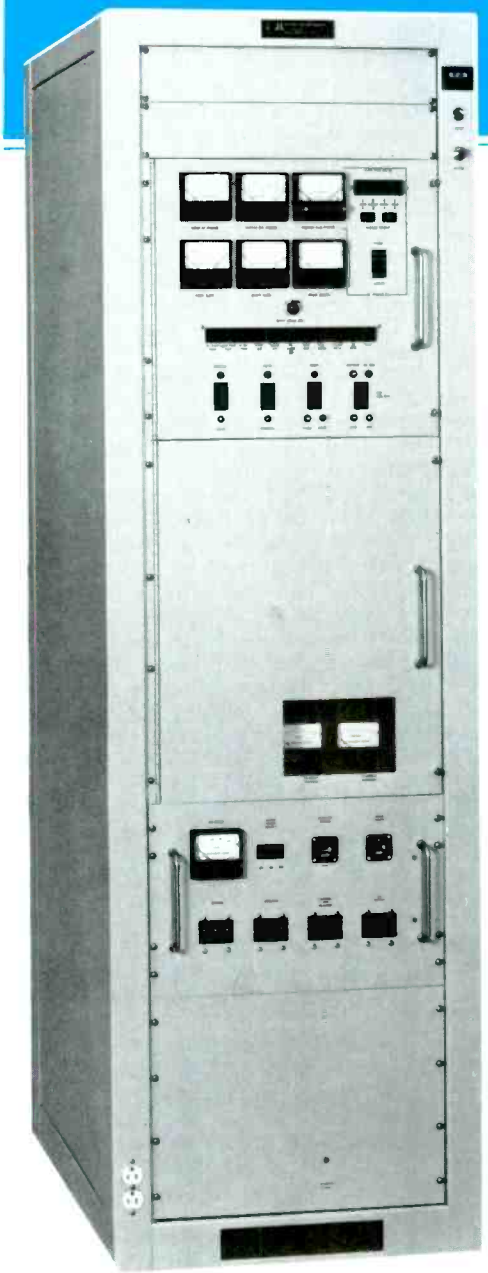
NEC Telecommunications showed both its transmission studio and equipment. For the transmission field, the 4/12GHz satellite receivers were shown as well as the all-solid-state 1kW UHF TV transmitter, a 1kW VHF FM radio transmitter, 13GHz/40GHz FPU microwave units for ENG microwave, and a laser FPU for up to 2km operation.

For studio equipment, NEC showed its program automation system and its E-Flex digital video effects unit.

Neve Electronics exhibited consoles from its range of sound mixers for the broadcast, recording and film industry. The 5104/5114 is a 4-group, two-main output console that can have 16-, 24- or

Tektronix offered its dual-standard (PAL/NTSC) ANSWER system.

Advanced Design KLYSTRON AMPLIFIER by Aydin



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750W TO 3.35 KW
KLYSTRON AMPLIFIER
5.9-6.4 GHz

Model 1031E

The HPA's You've Learned to Trust Have Quietly Gotten Better.

Six years of field experience have proven a lot about Aydin's Model 1031E High Power Amplifier. **Reliability. Performance. Ease of Operation.** Qualities that 1031E users around the world have come to expect from Aydin power amplifiers.

Standard amplifier features such as solid-state control logic, long life LED displays, and a static mag-amp regulator have placed the Aydin 1031E well ahead of other amplifier designs.

But times change. New satcom systems demand new performance capabilities. Aydin has kept ahead of the times.

For instance, a solid-state driver has replaced a TWT IPA in the 1031E for even greater reliability. Options have been added for computer interface to EIA and IEEE standards. Peak-reading power meters have been added for TDMA operation.

Either of two qualified sources can now be used for the klystron, in order to optimize delivery or comply with user preference. Tubes from both sources are interchangeable in the 1031E.

We haven't had to redesign our amplifier to keep up with new systems. But we have made it better, to stay ahead of your needs.

Aydin listens to the people who use HPA's; they trust the 1031E.

Aydin makes a complete line of satellite and troposcatter high power amplifiers from 200 Watts to 10 kW. Find out more about the 1031E or the complete line by contacting Chuck Weden, Aydin Microwave Division, 75 East Trimble Road, San Jose, California 95131. Tel: (408) 946-5600.

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36-input channels. The 5106 has eight subgroups and four main outputs, and is available in up to 48-channel versions.

The new Neve 5322 console is a 16-channel unit for local radio disc jockey use. The inputs can be microphone, high level stereo or stereo outside broadcast source. Provision is made for monitoring, talk-back facilities, delay systems and telephone inputs. It is designed as a most useful unit for the small studio.

On display also was the 542 range of compact consoles for portable and small studio applications.

Neve engineers were on hand to discuss applications of the new digital audio console for sound broadcast applications; the Necam automation system; and the Necam II for post-production dubbing.

Nurad engineers discussed their microwave systems for TV broadcasters, including the single-band and dual-band equipment for operation at 2GHz, 2.5GHz, 7GHz, and 13GHz. The SUPERQUAD II ENG/EFP Quad-Polarized receive antenna system, the GOLDENROD-D transmit antenna, the MC-3 remote control system, a dual-band microwave transponder and equipment for ENG/EJ/EFP operations were all on display.

Optical and Textile Ltd. featured a wide range of new products. The major announcement was the launch of its Tri-Video Collinator test unit. The company said the time taken in the preliminary setting-up procedure for all types and makes of video cameras can be reduced significantly by using this device.

Yet another first exhibitor, **Ortofon,** manufacturer of quality pickup cartridges, launched a unique line of advanced audio test instruments through its subsidiary company, Ortofon Instruments. Included were the TC-310 audio test computer and P400 measuring computer.

Among the number of first-time exhibitors at IBC, Panasonic introduced a number of new products, including a ½-inch ENG/EFP camera/recorder combination; professional VHS editing system; two ENG/EFP color cameras; a new lightweight portable video recording system using standard VHS cassettes; color special effects generator; a large-screen projection TV; the WV-777 ENG/EFP 3-tube prism-optics color camera; and the WVP-100 E ultrasonic auto-focus camera.

Polar Video exemplified at IBC the dual role of a manufacturing and representative exhibitor. Its own products include the Script Writer and the Autofade. Products for **Fortel UltiMatte** included its video traveling matte (UltiMatte) and the new NewsMatte. Featured for **HEDCO** was its AFV stereo monitoring switcher; the TransPath I 3-stage A/V routing switcher; and its distribution amplifiers.

Another first-time IBC exhibitor was **Profile Video,** which exhibited a new digital processor by **Snell & Wilcox.** The processor performs TBC, digital noise reduction, frame store, synchronization and standard conversions of either PAL or NTSC (in either direction).

Pye TVT presented its largest-ever exhibit at the conference with live demonstrations of its latest TV and radio equipment, from cameras through switchers and mixers to transmitters.

Pye also promoted its division that specializes in the design, building, equipping and operating of any size of broadcast device, from a self-operated 1-man radio system to a large multistudio project. Over the last 35 years, Pye has supplied more than 1300 TV transmitters in 65 countries.

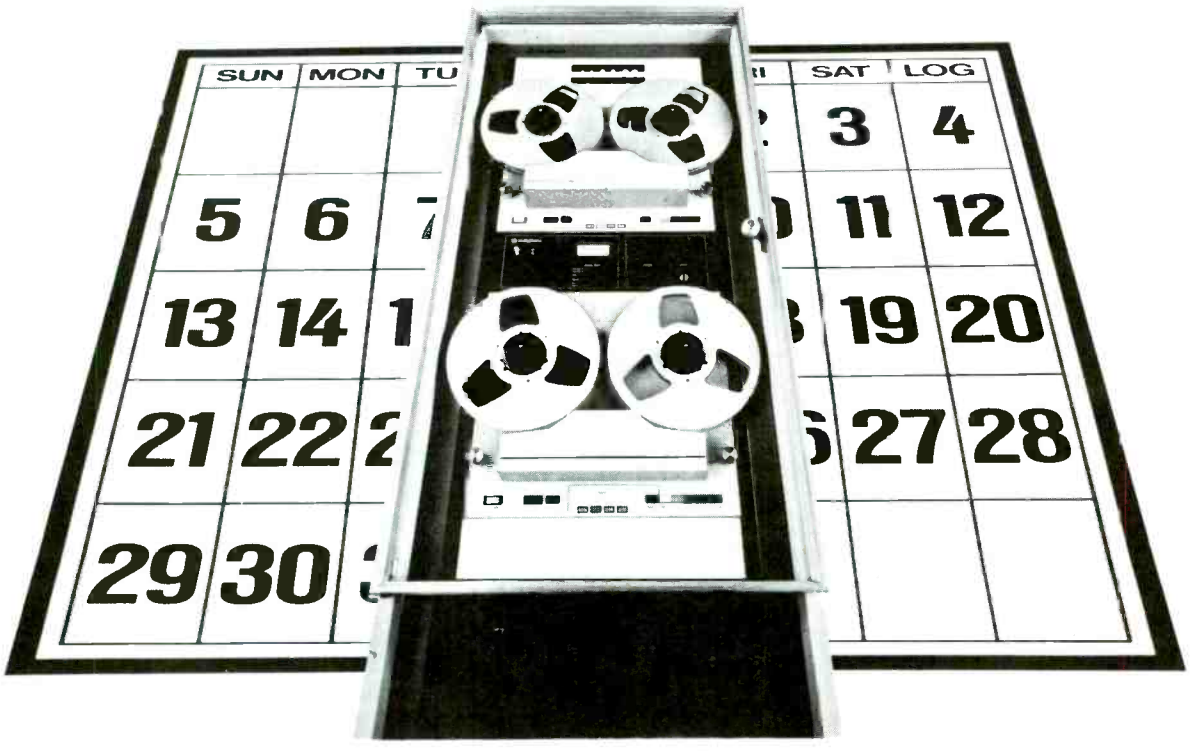
IBC-'82 saw the European launching of Pye's new LDK6 camera featuring four microprocessors and six operational memories in a single system. This brings an unusual degree of digital control and automation to the use of a TV camera. The LDK6 is suitable for studio or location work and can operate over cable lengths of 2.5km from the camera processing unit.

Other cameras shown were the LDK 5 Triax, the LDK 25 multicore, the new LDK 14SL ENG camera and the LDK 44 camera for ENG/EFP/studio modes. The LDK 44 was shown along with vision and audio mixing units that make the modular studio configuration.

Central Dynamics production switchers were represented with the CD-480 range of production switchers, including the Models 4 and 8 and the new 6S featuring computer-aided production, and a new range of special effect accessories. Economic CDL VS10 and VS14 switchers were also featured.

Demonstrations with attendee participation, of the new 7-bus MC990 and APC920 master control switchers were also included. But, that was not all. Pye also exhibited its signal routing and timing products, machine control systems, vertical interval/time code products, waveform

The first 8-days-a-week logger.



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Whether charting the hits or checking the spots, Dictaphone's new Veritrac SL voice communications recording system is practically indispensable. Here, in a package you can lease for as little as $99 a month, is recorded testimony to what you've aired. Uninterrupted by tape changes. 24 hours a day.

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monitors and vectorscopes, the new LDM6200 14-inch color monitor, monochrome monitors, the LDM3001 digital noise reducer, test and measurement equipment, UHF transmitters, a new annular beam control super-efficient klystron tube, a range of radio transmitters, and remote control and telemetry equipment.

Quanta Corporation (formerly System Concepts) showed its Q8 font loading character generator, its Q7B low cost portable character generator, the Quantafont QST subtitler, the Microgen low cost micro-character generator, the Quantavision computer-controlled character generator for cable TV, and the Quantanews electronic newsroom system. Also, Quanta announced the opening of its new European office in the Netherlands.

Quantel put on a spectacular demonstration of its extensive range of digital framestore equipment. Included was the Mirage picture manipulator that transcends digital effects; the Paint Box graphics studio; the Library System to capture, store and present still pictures; the Digital Production Effects system to manipulate up to five images simultaneously; a digital standards converter; a digital framestore/synchronizer; and a digital audio synchronizer.

QuesTech introduced its new 6101 PAL video effects framestore system and showed its frame store controller, synchronizer and comb filter decoder.

Rank Cintel added an important member to its selection of telecine equipment. Developed in association with the BBC specifically for TV broadcasting, the ADS-1 is a new low cost telecine. Offered at what the manufacturer claims is half the price of comparable systems, it offers a number of interesting features and has been designed to reproduce positive film stocks. Rank Cintel says it is particularly suitable for broadcast TV stations that require a simple, inexpensive, reliable telecine for everyday transmissions.

Also shown was the digital and analog versions of its flying-spot scanner, of which the MKIIIC offers optimum picture quality with maximum operational features. Also, the recently introduced FeRRIT separate magnetic film recorder/reproducer for telecine, VTR and sound dubbing applications was shown.

RCA continued its format of holding a series of technical seminars in conjunction with IBC. In a special suite at the Metropole, RCA held 2-hour sessions in the morning and afternoon for only invited attendees (and for special network groups). In all, about 500 attendees were introduced to the 625-line Hawkeye recorder-in-camera system with associated editing and replay accessories; the TR800 1-inch C-format videotape machines with complete AE800 editing facilities; and new TKP-47 portable computer setup camera, also shown in the -47T (triax) version; and new improvements in the well-known TK-47 studio camera.

Although RCA had a stand on the convention floor, it served mainly as a means of inviting attendees to the RCA technical sessions. It also provided a place for weary attendees to rest and have a cup of coffee.

Rohde & Schwarz's main thrust at IBC-'82 was its line of broadcast equipment, including the measurement equipment for video noise, group delay, teletext, and transponder testing. Also shown, for the first time in the United Kingdom, was the company's latest dual- and stereo-sound technique for television.

Sachtler, a new exhibitor in the United Kingdom, showed its line of supporting equipment. Included were the Video 18 and new Video 20, 25 and 30 fluid heads for studio and field operations; carbon fiber lightweight legs; rolling triangles and many accessories.

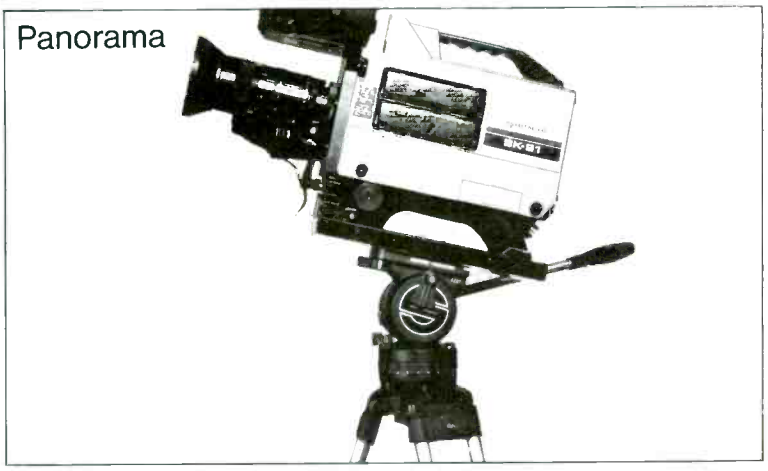
Scientific-Atlanta announced its new low cost (less than £4000) 2.8m and 3.2m satellite TV receive-only ground stations for quality reception of signals in the Ku and C bands. The systems include everything to convert the satellite signal to video and audio outputs.

Shintron concentrated on its line of video equipment for studio, EFP and ENG: vision mixers; distribution equipment; EBU/SMPTE time code reader with raster display and shot list printer; EBU vertical interval time code reader and generator; character generator and graphic titler; encoded chroma-keyer; and color monitors.

Singer Products displayed its audio consoles and tape cartridge machines; capabilities for packaged AM and FM broadcast stations; and broadcast transmitters. Included also was the **Blonder-Tongue Laboratories** equipment

Videotek introduced its new VSM-5A vectorscope.

sachtler



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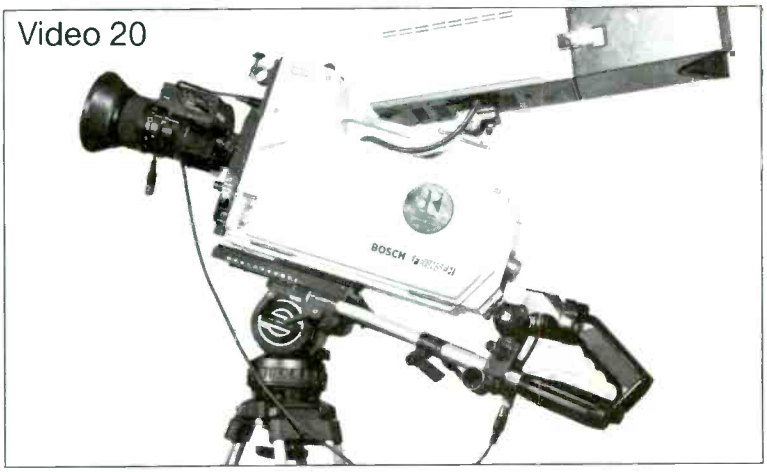

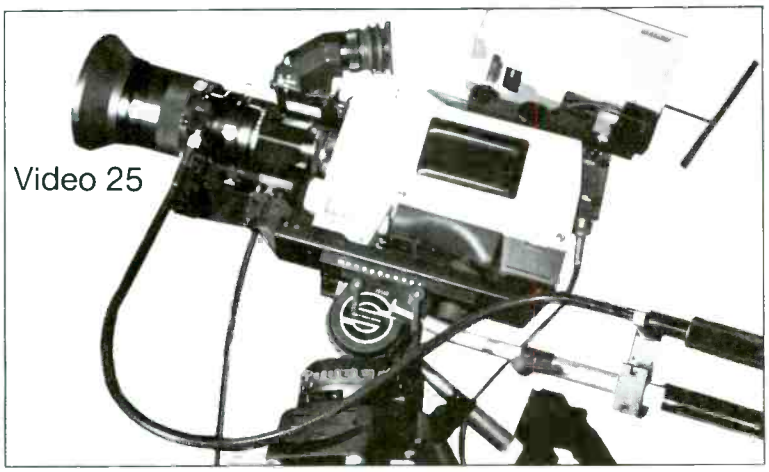

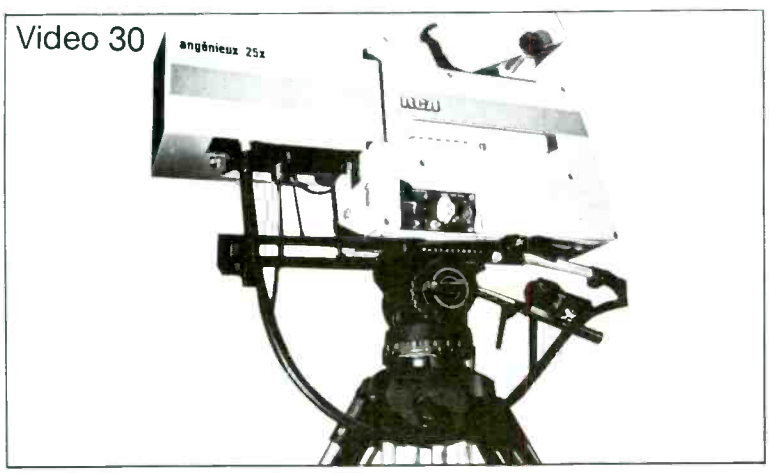

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	Average No. Copies Each Issue During Preceding 12 Months	Single Issue Nearest To Filing Date
A. Total No. Copies Printed (Net Press Run)	39,497	39,255
B. Paid Circulation		
1. Sales through dealers and carriers, street vendors and counter sales	--	--
2. Mail subscriptions	501	560
C. Total Paid Circulation	501	560
D. Free Distribution (including samples) by mail, carrier delivery or other means	37,350	37,931
E. Total Distribution (Sum of C and D)	37,851	38,491
F. Office use, left-over, unaccounted spoiled after printing	1,646	764
G. Total (Sum of E and F should equal net press run shown in A)	39,497	39,255

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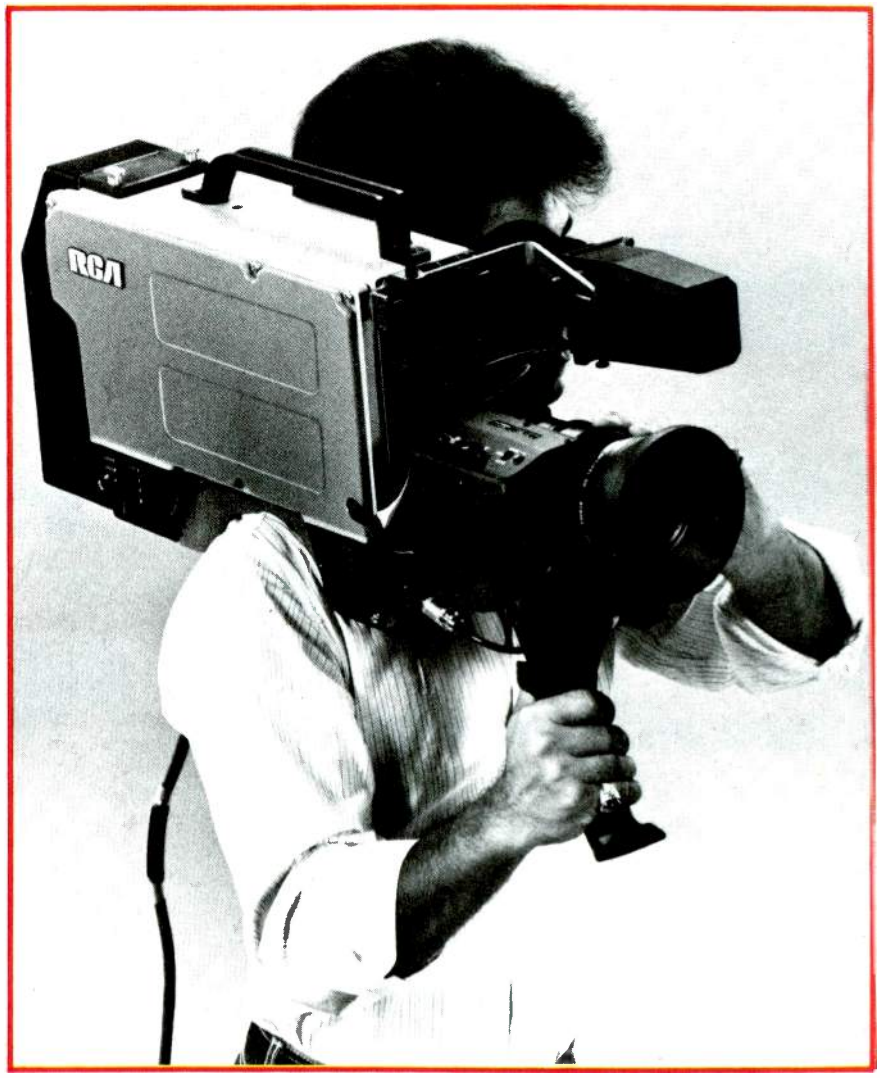

The RCA TKP-47.

for subscription TV, MATV and CATV.

This year **Sony Broadcast** showed the dynamic growth of its product line since it first exhibited at IBC in 1978. In keeping with its effort to communicate the breadth of these products, Sony set aside an evening for the press to see its line of video and audio equipment, with special attention to HDTV, new video systems and the MCI/Sony audio products.

Among the products vying for attention at the Sony stand was the BVW-1 integral recorder-in-camera (Betacam) system being shown in 625 lines for the first time. The system included both single- and 3-tube cameras, the BVV-1 stand-alone camera, and the BVW-10 player interfacing to high band U-matic and C-format machines.

Sony demonstrated its HDTV developments by treating the press to a special evening showing as well as providing demonstrations on the hour throughout the duration of the exhibit. This system, first proposed and developed by NHK in Japan, is envisaged as a possible future TV standard, as well as being used for various other applications.

Specifications for the system included: 1125 scan lines, 60Hz field frequency, 1:2 interlace ratio, 3:5 aspect ratio, 30MHz video bandwidth, and 5 to 6 times the amount of information provided by current world TV systems. We were treated to seeing movies produced with HDTV and to a discussion of the editing and cost advantages offered with this technology.

Outstanding among the Sony products at IBC-'82 was the BVH-2000PS video recorder, the first of a new generation of 1-inch C-format BVH series recorders, demonstrated on PAL and SECAM standards. Claims include extreme versatility, high performance, exceptional reliability and economical pricing.

Also shown was the new version of Sony's BVP-330P/S camera, the BVP-330AP/S lightweight camera incorporating dynamic focusing; the BVU-820P/S editing recorder featuring dynamic tracking; the BVE-800 edit controller; the BVM 2000P/S and 1301P/S, 2002P/S and 1302P color monitors; the new BVT-800P digital TBC; the new BVG-100PS time code reader; time code generators; professional microphones and accessories; and the complete line of Sony's digital and analog audio recorders, players, mixers, processors and reverb units.

Soundcraft Network Video, sole agents for **United Media** in the United Kingdom and Europe, displayed the new Commander IIC computer-assisted editing system with impressive features. In conjunction with the 425 audio dissolver, the combined system can route and dissolve

In search of the ideal mixer.

In demonstrating our microphones throughout the country, we've found a serious limitation in most stage mixers. They are unable to handle wide range microphones on stage. And they just can't cut it when it comes to making demo tapes. Which means that the musicians need TWO mixers and perhaps TWO sets of microphones to get the sound they want on stage as well as on tape. It's a luxury not everyone can afford!

So, to solve your problem – and ours – we set out to create a "double threat" mixer which would be a great stage mixer, yet still give you the sound and control you need while taping. A mixer designed to take full advantage of every mike you own, including phantom-powered models.

Our standards (like yours) were high. Everything had to be rugged, reliable, and very clean. With wide basic frequency response, plenty of headroom, and very low distortion and noise. And the mixer had to be very natural to use. Finally, the price had to be right. We invite you to examine the new Audio-Technica ATC820 and ATC1220 stereo mixing consoles to see how well we have accomplished our goal.

Our prototypes have done a lot of traveling. Users were impressed with the features, the flexibility, and the sound. They liked the 3-band EQ on every input. And the 7-band stereo graphic program equalizers, plus another graphic equalizer for the monitor output. But most appreciated were the variable high-pass filters for each output. They permit you to use wide-range recording microphones on the stage, while exactly limiting bass response to suit acoustics and to keep from overloading your speakers. Yet during recording you can go all the way down to 20 Hz if you wish.

There's a long list of very practical features. Phantom power is available at each of the transformer-isolated mike inputs. Two 20 dB mike input pads plus an LED to warn of clipping on each input. A SOLO button to check any input with headphones without affecting the mix. "Stackable" design when 8 or 12 inputs aren't enough. Even an assignable talkback input. And all the logical controls for the transformer balanced MONITOR, EFFECTS, SOLO, PHONES, and OUTPUT busses. In short, very flexible, and quite complete.

With a very modest investment, you can do almost everything the single-purpose boards can do . . . and do it very well. And get the benefit of phantom-powered recording mikes on stage as well as during recording. The more you learn about the ATC820 and ATC1220 the more impressed we think you'll be. Ask your Audio-Technica sound specialist for a hands-on tour of this brand new breed of mixer. Or write for literature. We may have the ideal answer to *your* mixer requirements.

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Circle (124) on Reply Card

audio simultaneously with video, but with independent audio rate control. Also shown was The Director for auto dialogue replacement; The Translator for identifying the record cue points prior to post-production; a wide range of SMPTE time code generators, readers, character inserters, and peripheral equipment. Soundcraft also highlighted its own nationwide production equipment hire service.

The staff from **Spin Physics,** a Kodak company, was available to discuss the company's magnetic recording heads for video, audio and instrumentation fields. Also described was quad panel refurbishing services using unique manganese-zinc hot pressed ferrite heads that offer high performance and cost savings.

Studer Revox, displaying at the F.W.O. Bauch stand, had an outstanding exhibit. Shown were the A800 multi-track recorder; the A810 and new 2-track recorders; the A80/RC and B67 recorders; the 900 series mix consoles; a newly equipped studio design; the PR99 compact recorder in conventional and reproduce-only versions; and the new A710 professional cassette deck with balanced in/outs.

System Video featured its new 1250 series waveform and vector monitors incorporating microprocessor keyboard function control and providing digital measurement of voltage, time and phase. But also shown were sync pulse and waveform generators; the 1150 waveform and vector monitor; and the 1500 series audio/video switcher.

Tektronix, joining Grass Valley in its stand, introduced its 1980 ANSWER measurement set with software to monitor video quality in either PAL or NTSC in the same system; the 381 portable waveform/vectorscope monitor in PAL; the new OF150 fiber-optic time domain reflectometer (FOTDR); and the 690SR 19-inch color picture monitor in PAL/NTSC/RGB versions. Also shown was the AA501/SG505 distortion analyzer system for complex audio measurements.

Thomson-CSF had to take two stands at IBC-'82 to display its equipment from four divisions: Broadcast; Components and Materials; Radiodifussion Television—DRT; and Equipment and Systems.

Thomson-CSF is one of the world's few manufacturers of radio and TV equipment to specialize in production broadcasting and transmission, from components through systems.

Its DRT Division builds and markets broadcast video equipment, while its US and Chatou, France, subsidiaries manufacture broadcast and low power transmitter equipment. Products exhibited included: TTV 1525A, B cameras; ENG/EFP systems; slide scanner with zoom; digital special effects mixer; measuring systems; fiber-optics picture transmission; UHF transmitter; UHF/VHF transponders/transmitters; satellite receive stations and associated antennas; and TV transverter.

Among Thomson-CSF's new equipment introduced for the first time in Europe were the TV 1525 B camera displayed for the first time in its PAL version; the Vidifont Graphics V character/graphics combined generation system developed by the US Thomson-CSF subsidiary; the new 10kW UHF TV transmitter using a solid-state combined vision and sound amplifier; and a range of TV receive-only stations designed for the reception of domestic satellites.

The **Thomson-CSF Broadcast Division** is responsible for the design of audio and video processing equipment. On display was the Vidifont Graphics V; the loudness controller; and the PAL color control corrector.

The **Equipment and Systems Ltd.** group is responsible for marketing, sales and support of the company's products in the United Kingdom.

The **Components & Materials** group presented professional electron tubes, including pyrolitic-graphite grid transmitter tubes; TWTs; CCDs; silicon RF power devices; a new range of SAW devices for radio and television; and PMTP quartz oscillators.

Thorn-EMI Varian displayed and demonstrated an extensive line of microwave tubes and associated equipment, including EIMAC klystrons; the new EIMAC KLYSTRODE TV transmitter tube; cavity amplifiers for FM and TV transmitters; pyrolitic graphite grid tetrodes; and Varian's unique high gain beam triodes; and EIMAC's super-power tetrodes for AM transmitters.

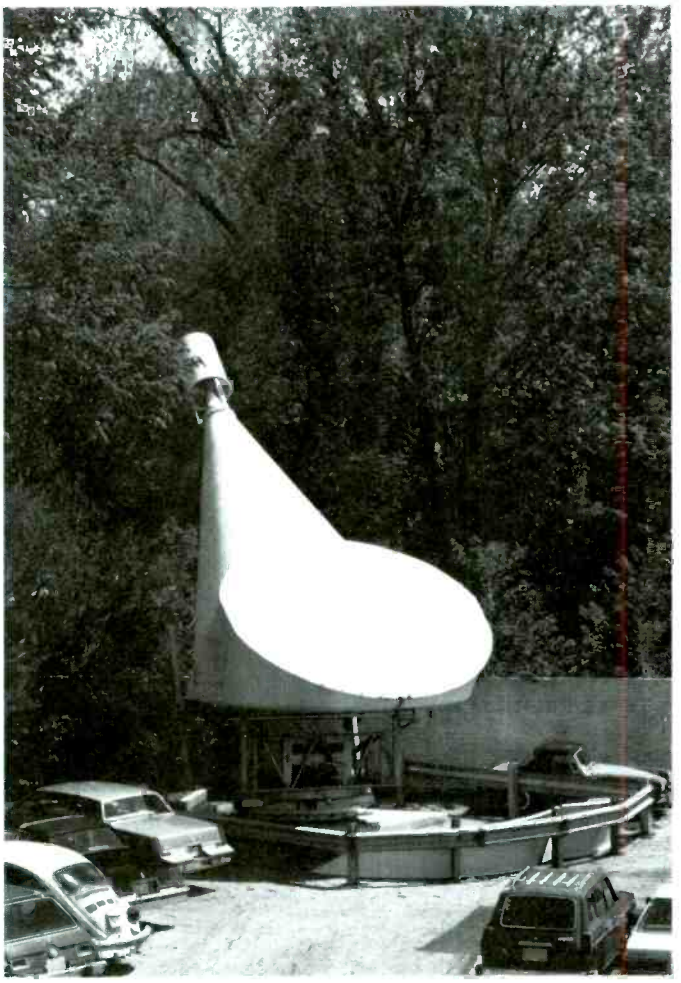
3M took the IBC as an opportunity to exhibit its complete line of video and audio magnetic tape, including the Scotch 479 1-inch helical-scan videotape plus the new range of Color Plus U-Matic cassettes for high and low band applications, with emphasis on editing, EFP and ENG. Also displayed were its series of character generators; memory disc drive; the digital mastering multi-track system; its D8800 graphics generator with camera logo compose facility; and routing switcher.

Utah Scientific, at the CCL Associates stand, demonstrated its range of video and audio routing switchers and a new machine control system that shares the switching matrix coaxial party lines for transmission of machine control commands and status responses.

Britain's thriving electronics industry includes hundreds of small companies that are strong on design and meticulous in their manufacturing techniques. One such concern represented at IBC-'82 was **VG Electronics,** which demonstrated a wide range of measuring instruments for advanced studio equipment and teletext networks. An item of special interest was the VGE1035 zone plate generator, which generates a vast range of test signals to examine in detail the performance of equipment under test. Also shown was the new VGE1006 inserting data bridges; a test page generator with 10-page capability for 625- or 525-line use; and a new VGE1054 automatic video level corrector for the TV studio.

Videotek, sharing a booth with Industrial Sciences, made its debut into the PAL market and introduced IBC attendees to new equipment. Featured were its new VSM-5A video vectorscope and TSM-5A waveform monitor for monitoring color TV signals from cameras, VTRs and video input/output lines; the new PAL standard color monitors and test equipment; and the new APM-8R audio program monitor for multichannel selection of up to eight inputs from a single rack-mount panel.

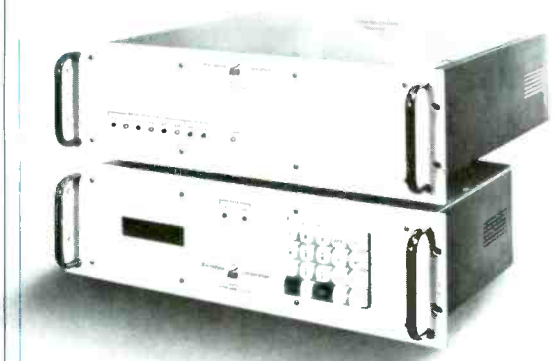
WHEN A DISH WON'T DO



MICRODYNE'S CH-14 AND MAPS II OPERATE SIDE BY SIDE.

Satellite reception is difficult in certain locations. Tall city structures or even mountains often require that parabolic antennas be placed on property elsewhere to avoid interference. Microdyne's field proven, rugged CH-14 conical horn antenna operates where other antennas will not and may be co-located with your station's studio. It is recognized by terrestrial common carrier network operators throughout the world for its superior reception.

Microdyne's CH-14 is constructed of one-piece fiberglass. Its low noise temperature and narrow beam contribute to its unsurpassed reception capabilities. Furthermore, our CH-14 complements Microdyne's Antenna Positioning System (MAPS) II for simplified satellite selection.



MAPS II is a precise antenna pointing system with memory for permanent location storage. Our sophisticated satellite receiving system minimizes bicycled tapes and expands program selection for your market.

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The audio/visual control room for the IBC-'82 convention was well-equipped and efficiently run. The conference broadcasting room was organized by a special committee headed by Thames Television's chief engineer Brian Scott. The A/V facility included three different professional broadcast videotape formats and used VTRs loaned by Ampex, Marconi and Sony. A perfect signal was assured, courtesy of the new Questech comb decoder. Additional facilities included an Eidophor, courtesy of Link Electronics; an audio-visual slide projection system from the IEE; and an Astor-3 video character generator.

Exhibitors at IBC-'82

Manufacturers exhibiting at IBC-'82

Use the assigned numbers and our Reader Service Card if you wish to obtain product literature from these exhibitors. We have included two numbers for your convenience. Use the number from the *Full-Line* column if you wish the exhibitor's full line of product data. Use the number from the *New Only* column if you only want data for new products introduced at IBC-'82.

Manufacturing exhibitor	Full line	New only
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AKG Akustische U. Kino-Garate GmbH	363	364
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Acron Video	369	370
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Audio & Design (Recording) Ltd.	393	394
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Audix Ltd.	399	400
Autocue Products Ltd.	401	402
Avitel Electronics Ltd.	403	404
BASF Aktiengesellschaft	405	406

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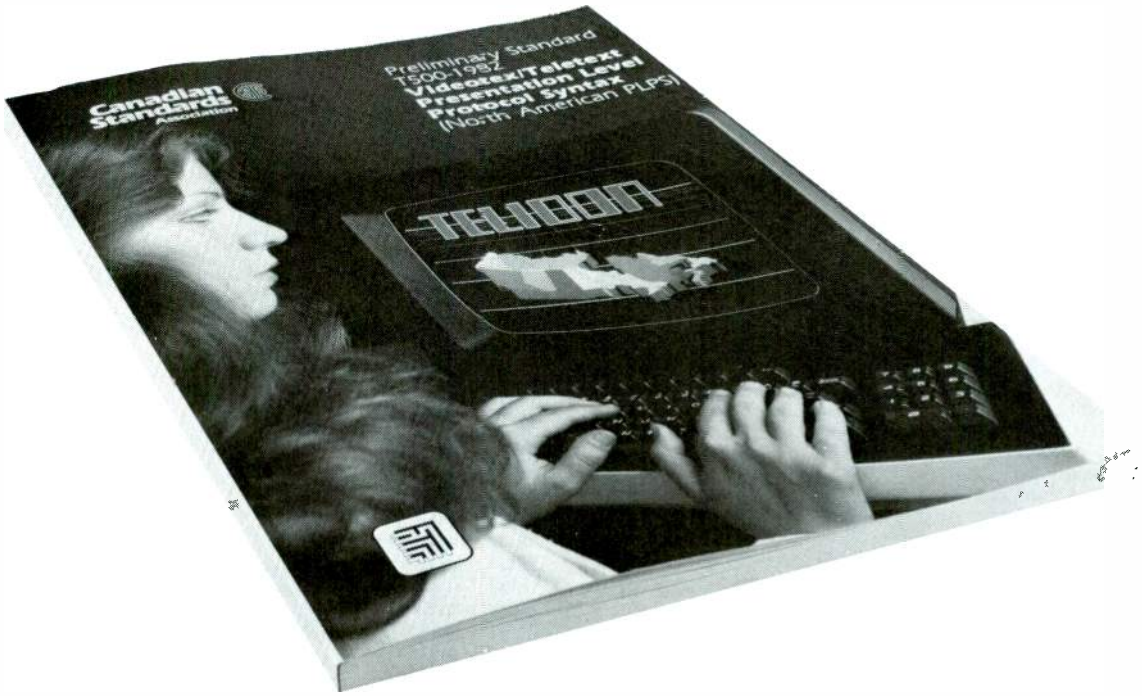

CSA Preliminary Standard T500 for the Presentation Level Protocol Syntax for Videotex and Teletext.

This 143 page document describes the formats, rules and procedures for the encoding of alphanumeric text and pictorial information for videotex and teletext applications. What's more, CSA is presently developing additional standards for other levels such as session and application.

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Manufacturing exhibitor	Full line	New only
BIW (UK) Ltd.	407	408
BTX (w/Scenic Sound)	409	410
Barco Industries	411	412
Bell & Howell A-V Ltd.	413	414
Blonder-Tongue (w/Singer)	415	416
Robert Bosch GmbH	417	418
Brabury Group	419	420
British Aerospace Dynamics Group, Space and Communications Division	421	422
Broadcast Electronics	423	424
CEI (A Panavision Company)	425	426
CEL Electronics Ltd.	427	428
CMC Technology	429	430
CMX (w/Bauch)	431	432
Cannon UK Ltd.	433	434
Central Dynamics (w/Pye TVT)	435	436
Chyron (w/Ampex)	437	438
Clear-Com Intercom Systems	439	440
Connolly Legate Ltd.	441	442
Conrac (w/Link Electronics)	443	444
Continental Microwave Ltd.	445	446
Convergence Int'l	447	448
Michael Cox Electronics	449	450
Credowan Ltd.	451	452
Crosspoint Latch (w/Paltex)	453	454
Crow of Reading Ltd.	455	456
Datatron (w/Paltex)	457	458
Delta Electronics	459	460
Alan Dick & Company Ltd.	461	462
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Representatives exhibiting at IBC-'82

Use the assigned numbers and our Reacer Service Card if you wish to obtain product literature from representatives exhibiting new and established products for their principals. Use the number from the *full-line* column if you wish to obtain full-line product data from the companies exhibited in the reps' stand. Use the number from the *new only* column if you want data only on new products introduced at IBC-'82.

Representative exhibitor	Full-line	New only
F.W.O. Bauch Ltd.	699	700
Canda TV Equipment Ltd.	701	702
Optical & Textile Ltd.	703	704
Profile Video	705	706
Samcine Sales Ltd.	707	708
Scenic Sounds Equipment Ltd	709	710
Technology Resources SA	711	712
Zoom Television	713	714

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FCC update

Continued from page 6

In order to avoid dilution of the diversity preference, further adjustments would be made to make sure that applicants in the top and middle tiers would have a combined probability of selection of at least 40% at this first stage of the calculation.

In the second stage, the minority ownership preference, a 2:1 preference for minority applicants would be applied to the previous calculations. Only applicants who are owned 50% or more by minorities would receive this preference.

Once the preferences were computed, a lottery would be held. The winner's application then would be reviewed by the commission's staff. Petitions to deny the winner's application could be filed. If a substantial question regarding the selectee's qualifications were raised, the application would be designated for hearing; if not, it would be granted. If the selectee is disqualified in hearing, a second lottery would be held among the remaining applicants.

The commission hopes to finalize its lottery rules by March 1983. In the interim, processing of low power applications will continue under the procedures adopted earlier this year.

Other services proposed, covered by the lottery rules: public land mobile (including 35MHz and 900MHz paging), rural radio, off-shore radio, aeronautical advisory stations, public coast stations, private land mobile stations operating above 800MHz and possibly microwave stations in the private operational-fixed service.

COMSAT DBS application approved

COMSAT, a subsidiary of Satellite Television Corporation (STC), has been granted a construction permit for the first phase of its proposed national DBS system. The first stage would provide DBS service to the Eastern Time Zone. STC's three later phases—each corresponding generally to a US time zone—also were conditionally approved.

The commission did not assign frequencies or orbital locations, saying that these matters would be addressed after the Region 2 Administrative Radio Conference in 1983.

In granting STC's application, the FCC rejected numerous petitions to deny. One of the petitioners, NAB, has said it would seek reversal of the grant in the US Court of Appeals for the District of Columbia Circuit. Commission action on eight other DBS applications is expected in the near future.

Editorial

Continued from page 10

could be worked into one US and/or North American standard.

We have been to England, and we've seen teletext work on a large scale as a powerful communications tool. Teletext also offers an excellent multimedia buy, providing regionally programmable electronic messages to augment media buys in radio, TV, newspapers, magazines and direct mail. This is a point that American broadcasters have not recognized. Instead of its *positive* values, American broadcasters have often viewed this new media as a threat to their advertising base.

We believe this to be an error in analysis and that teletext/viewdata offers a powerful form of electronic communications with far-reaching applications. We are just on the threshold of this technology. And, we don't see it as a threat to other forms of publishing or communications, merely as another possible tool whose scope it will take years to realize. But it *will* come to pass; the question is when—especially in North America.

Communication is not unilateral. Each month **Broadcast Engineering** strives to bring you the information you want and need. As we assemble an issue, we draw on widely varying backgrounds in the journalism and broadcast spheres. Objectivity is a key to our work, but we do have opinions, and so do you. This editorial page is our soapbox to air opinions on current issues.

But the communication loop will not be complete without your participation. Give us your comments on our opinions, as well as your thoughts on other topics. Our *Feedback* column will include some of your responses. Through this interaction we will better serve you, perhaps even solve a problem or two with the discussions. Opinions that differ from our own are welcome, and so are confirmations on key issues.

Address comments to: The Editor, **Broadcast Engineering,** P.O. Box 12901, Overland Park, KS 66212.

RKO to use RCA Americom ADDS

The RKO Radio Networks and RCA American Communications have announced a $9.8 million agreement whereby RCA Americom will provide its Audio Digital Distribution Service (ADDS) to RKO over an 8-year period beginning Sept. 1, 1983. The service will be used to access RKO affiliates from the company's headquarters at 1440 Broadway, New York, via the Satcom satellite system. RKO will provide a minimum of 300 earth stations to the top 150 affiliates of RKO ONE and RKO TWO.

Under the terms of the agreement, RCA Americom will initially provide four 15kHz audio channels and two 32Kbit/s voice cue channels, along with analog/digital conversion equipment that will be installed at the RKO Radio Networks studios. Two additional 15kHz audio channels will be added to the service on Jan. 1, 1984.

ADDS permits radio networks to distribute any number of high quality radio programs simultaneously on a nationwide or regional basis. Receiving stations may select alternate channels of programming, as desired, or stations may receive two or more programs simultaneously. Network expansion is achieved by adding more channel units to existing receivers. New radio stations become a part of the network by installing small aperture receive-only earth stations.

MCI/Sony selected for Soviet on-location taping

Multi-track recording equipment from MCI/Sony is going "on the road" in the Soviet Union. Melodiya, the Soviet state recording company, has acquired an MCI-equipped 32-foot remote recording van. Soviet technicians are using the van for broadcast and recording of popular, classical and ethnic music.

The fully air conditioned customized trailer won immediate approval when it was exhibited and demonstrated in Russia recently. The van is equipped with a 24-track MCI recorder and MCI multi-track console in addition to two MCI stereo mixdown recorders. All MCI/Sony equipment features fully transformerless input and output stages for improved frequency response, phase linearity and transient response. Op-amp circuit design also is standard.

Victor Duncan relocates

The new Dallas offices of Victor Duncan have been completed. The new location brings together corporate administration with the rentals, sales and technical services branches. The new address is as follows: Victor Duncan, Four Dallas Communications Complex, 6305 N. O'Connor Road, #100, Irvin, TX 75039; 1-214-869-0200.

CEI reorganizes and changes name

Panavision Electronics has been formed to combine all the video operations of CEI in Mountain View, CA, with the cinema operations housed at the Panavision facilities in Tarzana, CA.

Panavision Electronics will continue to sell its line of broadcast cameras through existing distribution channels, and Panavision will continue with its business of camera rentals. The entire management staff at CEI will remain with the new company, whose headquarters will be in the former CEI facilities in Mountain View, CA.

LPTV permit granted

Gavilan Communications has been granted an LPTV permit by the FCC. Its station is one of the first approved for construction in the United States, from the more than 6500 applications now pending. (The new technology is expected to draw as many as 10,000 applicants.)

The station, using equipment from EMCEE, is scheduled to begin broadcast in the spring of 1983. It will carry original programming, obtained at first from national distributors. Later, Gavilan will seek programs from local sources. Programs received from satellites will also be featured.

Gotham Audio acquires Quantum Audio Labs

Gotham Audio recently acquired 100% of Quantum Audio Labs' stock. With the move, Gotham has entered the manufacturing field, and will provide products specifically designed to meet export market demands. Quantum's design, engineering and manufacturing facilities will continue to operate as a unit under its new vice president and general manager, Ernest Knight.

New Englanders are getting the pictures

More than 70 special event requests filled during the past year by New England Satellite Systems have told owner John J. Foley, Jr. that there is a need for occasional downlinking services. Using 4m and 5m parabolic antenna systems, the company has provided services to a variety of corporate users and cable systems. TV broadcast clients include WSMW/TV 27, Worcester, MA; WSBK/TV 38, Boston, MA; WTXX/TV 20, Waterbury, CT; WMUR/TV 9, Manchester, NH; and WEZF/TV 22, Burlington, VT. Closed circuit reception has included World Cup Soccer live from Spain, the Cooney/Holmes heavyweight fight, and a December 1981 Rolling Stones live concert simulcast.

New England Satellite Systems provides permanent installations for commercial and broadcast organizations that require full-time reception capability. For occasional users, the company maintains transportable systems. Each of the 5m antenna systems provides RS250B video from any of the domestic satellites. Complementing the Microwave Speciality Corporation antennas are redundant electronics and test equipment. Video projection systems are available on request. Special event or longer term rental arrangements can be arranged.

One of the 5m satellites available for rental.

Modulation Associates concept stresses economy

Current satellite transmission architectures for audio users involve four general techniques: frequency division multiplex (FDM); time division multiplex (TDM); subcarriers on a video carrier; and single-channel-per-carrier (SCPC). The first three require the audio to be transported to some central location for combining into the composite signal for uplinking. SCPC, by definition, allows multiple carrier use of a transponder with each 7.5kHz program channel to be uplinked independently and simultaneously from diverse locations. Yet, for state networks and smaller specialized programmers, SCPC is still outside of comfortable economic reach.

J. Walter Johnson, president of Modulation Associates, Mountain View, CA, explained that his organization has considered the economic plight of many would-be satellite users in developing its concept of *optimized* delivery system. By using a more sophisticated optimized demodulator, designed for the specific use to which the channel will be put, with a 3.7m antenna, the satellite power can be cut from 19dBW (80W EIRP) to 10dBW (10W EIRP). The consumed bandwidth over the satellite is reduced four times.

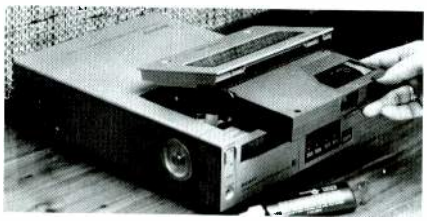
The economic advantages claimed for the optimized SCPC operation are eye opening, according to Johnson. The space segment cost has been cut from $11,500 per month to less than $3000, nearly equivalent to a free earth station per month. Most state networks could save their entire investment in earth terminals over a 3- to 5-year period. Also, the Modulation Associates optimized SCPC demod, designed for use with its R-SAT (Regional network Small Aperture Terminal) may be used with any of the 3m SAT systems currently looking at WESTAR III or Westar IV. Duplicate antennas are eliminated, further enhancing the economic benefits. The 8-to-1 reduction in uplink power and complexity obviously reduces uplink system costs as well, from half a million to less than $80,000.

Because FM SCPC is by nature phase coherent, two optimized SCPC satellite links can be used for stereo delivery to AM stereo affiliates. The same levels of quality, low noise and distortion audio enjoyed by ABC TalkRadio, AP, Dow Jones and Music Country Network can be provided to state networks, because the same enhanced compandor and modulation parameters are used in all Modulation Associates systems. Only the multiplexed program and data channels are forfeited in order to cut the required satellite power and bandwidth.

Even with added sophistication in the satellite receiver, Johnson said that one will find significant cost reductions have been made in all areas of the SAT system. An R-SAT 3.7m antenna, designed to meet a 2° satellite spacing, costs less than a 3m antenna did two years ago. The turnkey price of a 3.7m R-SAT, purchased in quantity for a state network, is approximately half the $14,000 installed price of digital SAT systems required for affiliates of the New York-based networks.

new products

VCR cleaner



The *Allsop* GEN II/for Beta, #66000, uses a soft cleaning ribbon and a cleaning solution to remove oxide and particle buildup.

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Audio measurements

THD measurement to below −102dB and noise measurement to below −120dBm are possible with the *Amber Electro Design* model 3501. A tone generator and four noise weighting filters are included in the portable package.

Circle (282) on Reply Card

Portable VTR

Weighing in at less than 15 pounds, the *Ampex* VPR-5 1-inch Type C VTR incorporates dual-microprocessor design. Record times of 20 minutes are increased to 60 minutes with movable reel spindles.

Circle (283) on Reply Card

Multiband microwave antenna

Simultaneous dual-frequency/dual-polarization operation in the 4GHz and 6GHz bands are features of the *Andrew Corporation* UMX™ antenna. The antenna uses a 4-port combiner.

Circle (284) on Reply Card

Snap-around VOM

The 10-ounce TD-6 Slim-Snap VOM from *A.W. Sperry Instruments* includes a 600Vac fast acting, high interrupting capacity fuse in its Ohm-probe.

Circle (285) on Reply Card

Phantom power supply

Up to 12 condenser mics or 20 Crown PZM models may be powered by the *Crown* PH-4 master phantom power system. PH-4S slave units provide additional capacity up to a 100ma limit.

Circle (287) on Reply Card

Lighting system

With 250W, 120Vac and 75W, 12Vdc lamps, the *Cool-Lux Lighting Industries* system allows flexibility. A Mini-Cool system includes a dc power cord, handle and camera adapter. Seven more voltage lamps are available.

Circle (286) on Reply Card

Distribution amps

The models 9401 and 9402 video distribution amplifiers from *Graham-Patten Systems* are compatible with the GVG*900 series trays. The 9401 may be used as a pulse or subcarrier DA. The 9402 includes cable equalization.

Circle (288) on Reply Card

Proc, distribution amps

New to the *Lenco* 300 System are the PRC-365 video processing amplifier and the PVA-351 white clip video DA. Pedestal, black clip, soft white clip, vertical interval line select, standard or helical lock and an internal digital sync generator are features of the PRC-365. The PVA-351 provides variable white clipping from 80 to 120 IRE units.

Circle (289) on Reply Card

Modulation meter

The functions of a conventional modulation meter, RF power meter, frequency counter and audio analyzer are combined in the *Marconi Instruments* model 2305 2GHz meter. An optional GPIB interface is available.

Circle (290) on Reply Card

Audio accessories

The *OpAmp Labs* model 700 externally adjustable audio oscillator is used as a level set reference in audio consoles, laboratories and tone generator sets. Then, for monitoring needs, the SM-100K power operational amplifier provides dual 50W rms or mono 100W rms amplification from dc through the audio spectrum.

Circle (292) on Reply Card

Portable camera

Complementing the TK-47 camera system, the new RCA TKP-47 can use the same CPU, remote control units and setup terminal. At 15 pounds, the TKP-47 uses ⅔-inch diode-gun lead oxide tubes.

Circle (293) on Reply Card

Portable earth station

Gillaspie and Associates offers a collapsible 8- or 10-foot metallized fabric dish, with a battery-operated satellite receiver and 5-inch screen. The system was originally developed for satellite site survey needs.

Circle (294) on Reply Card

Studio furniture

Adding to its line of studio and control room fixtures, *Ruslang Corporation* offers the RL 400-A console for the Otari 5050 Mark III/8 audiotape recorders. Also available are modular video or audio/video switching consoles for standard 19-inch wide electronics.

Circle (295) on Reply Card

Passive routing

The *Shintron* model 260 AFV routing switcher includes 12 video inputs with stereo audio channels for each. A 13th stereo audio input is used for override or emergency feed.

Circle (296) on Reply Card

Universal test leads

Catalog no. 05577, the deluxe test lead system from *Simpson Electric Company*, includes red and black 48-inch test leads, extenders, probes, alligator clips and a probe tip.

Circle (297) on Reply Card

Acoustical foam

Alpha Audio is distributing Sonex acoustical foam. This foam, available in blue, green, brown, orange and silver, comes in 4-foot square sheets in 2-, 3- or 4-inch thicknesses. It reduces noise and controls sound.

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calendar

Nov. 30-Dec. 1

The *Third Annual San Diego Professional Video Symposium and Exhibit* will take place at the Al Bahr Temple. Demonstrations and seminars will focus on a wide variety of video related topics including: Marketing with Video; Interactive Videodisc for Training; Using the Microcomputer to Expand Video Training; and From Basic Editing to Computer-assisted. Two minitheaters will show continuous award-winning industrial videotapes. For more information, call Voice & Video at 1-714-560-1166.

Dec. 7-10

Fundamental concepts of digital processing are provided in a course offered by Integrated Computer Systems titled "Digital Image Processing and Analysis," to be held in San Francisco. Topics of the course include: image acquisition, enhancement, tracking and coding; image processing software and database structures; interactive 2-D and 3-D image processing and display; and real time array pipeline processing techniques. Price is $845. For more information, contact Ruth Dordick, Integrated Computer Systems, 3304 Pico Blvd., P.O. Box 5339, Santa Monica, CA 90405; 1-213-450-2060.

Dec. 10

A radio management workshop dedicated to new technology issues in radio broadcasting will be held in Tampa, FL. Issues will include cable FM radio, the networks' conversion to satellite distribution, and the new cable competition for advertising dollars. The workshop will be led by Dennis P. Waters, editor and president of Waters and Company, Binghamton, NY. Tuition is $195 for the full day, with a multiple registration discount given to two or more managers from the same company, reducing the fee to $145. More information may be obtained by calling Pamela Shane, workshop coordinator, at 1-713-461-9958.

Jan. 16-19, 1983

PTC '83, the *Fifth Annual Conference of the Pacific Telecommunications Council*, will be held at the Sheraton-Waikiki Hotel in Honolulu. The theme is "Telecommunications for Pacific Development." The focus will be on satellites and associated terrestrial systems, and on communication infrastructures. There will be exhibits, panels and papers, along with a satellite workshop and roundtable. For more information, contact PTC '83, 1110 University Ave., Suite 303, Honolulu, HI; 1-808-941-3789.

Jan. 24-26, 1983

LPTV West will be held at the Disneyland Hotel in Anaheim, CA. There will be three screening areas in the exhibit hall, with 24 shows available for viewing in the 3-day period. Programming will include satellite received, locally originated, and subscription TV. For more information, contact Frank Camoro at 1-203-852-0500.

people

BE technical editor, **Carl Bentz,** has completed three 1-day technical seminars on satellite equipment, sponsored by Scientific-Atlanta. The courses covered headend products (including modulators, processors and demodulators); distribution products (including amplifiers, coaxial cable and splitters); and earth station products (including antenna dishes, receivers and dish mounts). Bentz attended the seminars last March in Kansas City, MO, to keep abreast of new technology in broadcasting and CATV.

Scientific-Atlanta holds each seminar quarterly at various locations in the United States, in which company engineers and sales personnel teach the classes. Topics cover basics and technical aspects of Scientific-Atlanta's satellite equipment line. According to a company spokesman, primarily TV station chief engineers and managers attend the seminars, which cost $65 for the set of three. For future seminar dates and locations, interested broadcasters may contact Scientific-Atlanta at One Technology Parkway, Box 105600, Atlanta, GA 30348; 1-404-441-4000.

M/A Com Video Systems has appointed **John DeLissio** as vice president of the Broadcast Division. DeLissio was formerly vice president for Harris Broadcast.

Ronald H. Fried has been named vice president, marketing and sales; and **Edward F. Bolger** named director, broadcast equipment sales, for ADDA Corporation.

Gino Nappo has been promoted to national sales manager for the Broadcast and Professional Division of Hitachi Denshi America Ltd. Nappo replaces **Bernard Munzelle** who was promoted to vice president, marketing.

Microwave Filter has named **John Fannetti** senior technical consultant. Fannetti will conduct field research; advise customers; advise and assist R&D of new products; and assist in engineer training.

Bob Morse has been appointed marketing consultant for Logica. He will be assigned to the company's British Videotex and Teletext project.

Sonny Funke has been appointed pro-audio and broadcast representative for Sound Technology, covering California and Arizona.

Dean Dixon has been appointed vice president, satellite systems sales and marketing for Anixter-Mark.

Allen R. Scharf has joined Comtech Data Corporation as director of audio/video operations. He will be responsible for directing the company's satellite TV and radio receive-only equipment business.

Hans Batschelet has been appointed vice president for marketing, Studer Revox America. He will be responsible for marketing Studer professional and broadcast audio products in the United States.

Thomson-CSF has appointed **Stanley E. Basara** as president. He was most recently senior vice president and general manager, Vital Industries.

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PATCH PANEL BARGAINS—24 pair, ¼ inch, 3 conductor normaled jackfield, used good condition—$60.00 ea. 48 pair, bantam, 3 conductor, normaled, jackfield, as new—$100.00 ea. Trompeter video normals, new, $6.00 ea. Trompeter video patch cords, new, $5.00 ea. Trompeter video patch. (408) 758-8314. 10-82-2t

EQUIPMENT FOR SALE (CONT.)

ANDREW 19209B 3⅛ INCH by 18 inch flex section. Used, good condition, $300.00 ea. Flanged 3⅛ elbows, used, $50.00 ea. E. Dausman, (408) 758-8314. 10-82-2t

QUALITY BROADCAST EQUIPMENT: New and Used, Buy and Sell. Transmission, Video and Audio. Formed my own company. Call Ray LaRue, (404) 563-9331. 10-82-tfn

THE SOURCE FOR QUALITY CABLE AND Connectors. Video Cable, Audio Cable, BNC Adapters. EX.: Equiv. Beldon #8281, $295/M, UG-255/U BNC male—UHF Female, $1.95 ea. Call for catalog. CZ Labs, 55 Railroad Ave., Garnerville, N.Y. 10932, (914) 947-1554. 11-82-tfn

BARCO MONITORS 2 SERIES: Reconditioned 90 day warranty: 6-2/35 14" high resolution $1,500-$3,000. 7-2/38 15" standard resolution $1,500. One 2/51 20" standard resolution $2,000. Chris Golson or Kathy Serven, (201) 575-0750. 11-82-1t

USED AUDIO EQUIP. Ampex, Scully, Inovonics, etc. A&R Recording Inc., NYC, 212-397-0330, Mr. Green. 11-82-1t

COMPLETE COLOR REMOTE STUDIO PACKAGE—Over a million dollars worth of equipment at ⅓ of the new cost. Includes Norelco PC-100 Triax (5), Ampex VPR 2B (2), large Ampex Switcher, excellent pulse, monitoring, audio, 2 vans, etc. All this can be financed for a well qualified buyer. Call Bill Kitchen, Quality Media Corporation, 404-324-1271. 11-82-1t

QUAD VTR'S—Year-end clearance on Ampex, RCA, all models new and old. Unbelievably low prices. Bill Kitchen, Quality Media Corporation, 404-324-1271. 11-82-1t

COLOR CAMERAS—Year-end clearance on Norelco P-70, RCA TK 45A, Ikegami HL33 & 35. Prices have never been this low. Bill Kitchen, Quality Media Corporation, 404-324-1271. 11-82-1t

UHF TRANSMITTERS—RCA TTU-30, Emcee 1kw Translator, RCA TTU-1B. Several others available. Bill Kitchen, Quality Media Corporation, 404-324-1271. 11-82-1t

REMOTE CRUISER FOR LEASE—Beautiful Ampex Crusier with PC-70 Cameras (3), Quad and ¾" VTR's, all switching, audio, etc. Small deposit and $3,000 per month. Bill Kitchen, Quality Media Corporation, 404-324-1271. 11-82-1t

FILM CAMERAS—Two RCA TK 27 Film Cameras, unbelievable year-end price. Bill Kitchen, Quality Media Corporation, 404-324-1271. 11-82-1t

EQUIPMENT FOR SALE (CONT.)

TRANSMISSION LINE—3 inch 50 ohm E.I.A., line 800 feet or more available. Bill Kitchen, Quality Media Corporation, 404-324-1271. 11-82-1t

USED BROADCAST TELEVISION EQUIPMENT. Hundreds of pieces wanted and for sale. Please call System Associates to receive our free flyer of equipment listings. (213) 641-2042. 1-82-12t

LOWEST PRICES ANYWHERE! Don't buy anything until you have checked our prices. Guaranteed to be the lowest anywhere. Send for our free listing. Audio Systems Corporation, P.O. Box 17562, San Antonio, Texas 78217. Dept. BE, 512-824-6402. 10-82-3t

NEW & RECONDITIONED EQUIPMENT FOR SALE: Ikegami ITC-350 ENG Cameras w/saticons; Hitachi HR-200/HST 1" Type-C VTR; Hitachi SK-91 Camera; Hitachi FP-40SS Camera; Hitachi FP-21 Camera; Sony BVU-200 Edit System; Sony VP-2011 ¾" Player; Sony VO-2610 ¾" Recorder: Sony DXC-1640 Camera; DVS DPS-1 Time Base Corrector; CVS 504 Time Base Corrector; Panasonic WV-9240 ¾" VCR; Panasonic WJ-5500P SEG; Jatex USEC-42T Edit Controller; Monochrome & Color Monitors; Call Bob, Ted or Terry, 518-449-7213. 10-82-3t

2 TK-45A CAMERAS, one with Schneider TV-14 and Vinten pedestal. One with Varotal and RCA field tripod and dolly. Cables and CCUs included. Need plumbicons. $15,000 each or best. Call Bill Ellis, 417-865-2100. 11-82-1t

AUDIOCORD TAPEDECK 126S, less than 50 hours, factory recalibrated, with specification sheet. Best offer. Tel. (919) 799-7329. 11-82-1t

GE UHF KLYSTRON XMTR. 12KW for 300KW ERP. In service now; available January. $50K F.O.B. Huntsville, AL, or $95K installed at your site. Call or write M.D. Smith, Gen. Mgr. 205/533-3131, P.O. Box 2555, Huntsville, AL 35801. 11-82-2t

WANTED TO BUY

WANTED: Pre-1928 radio equipment and tubes. August J. Link, Surcom Associates, 305 Wisconsin Ave., Oceanside, CA 92054, (714) 722-6162. 3-76-tf

HIGHEST PRICES PAID for 112 Phase Monitors and for clean, 12 year old or less, 1 KW and 10 KW AM Transmitters. All duty and transportation paid. Surplus Equipment Sales, 2 Thorncliffe Park Dr., Unit 28, Toronto, Canada M4H 1H2, 416-421-5631. 2-79-tfn

INSTANT CASH—HIGHEST PRICES: for your broadcast equipment. Urgently need towers, transmitters, antennas, transmission line, studio equipment. Call Bill Kitchen, Quality Media Corporation 404-324-1271. 11-82-1t

WANTED: STATION LIBRARIE'S OF MUSIC, 6" ET's, 12" Transcriptions, 45's, 78's, LP's. Boyd Robeson, 2425 W. Maple, Wichita, KS 67213, (316) 942-3673, 722-7765. 5-82-tfn

$1,000 REWARD FOR UHF TRANSMITTERS: For information which leads to our purchase of any UHF TV Transmitter. Call Bill Kitchen (404) 324-1271. 11-82-1t

NEED TO BUY CAMERA PEDESTALS, Television Products, TVP-P-50. Contact: Ernie Rinaldi, 800-423-3640 or (213) 843-2288. 11-82-1t

WANTED FM TRANSMITTING EQUIPMENT—nonprofit Christian group. Tax receipt for donations. Christian Life, 4131 N.W. 13th Street, Gainesville, Fla. 32605. 11-82-1t

BUSINESS OPPORTUNITIES

IDEAS, INVENTIONS, NEW PRODUCTS WANTED now for presention to industry. Call free 1-800-528-6050. Arizona, 1-800-352-0458. X831. 10-82-3t

NEW TV STARTUPS—Let us show you how to save a fortune when building a new TV station. Bill Kitchen, Quality Media Corporation, 404-324-1271. 11-82-1t

HELP WANTED

DIRECTOR OF ENGINEERING

Communications consulting firm located in Knoxville, Tennessee, specializing in the preparation of all aspects of FCC application filings, is seeking a Director of Engineering. B.S. in Engineering required. Experience in preparing complete applications for AM and FM radio, Low Power TV and full service TV stations. P.E. registration desirable. Enjoy the atmosphere of a small, specialized professional firm with an established nationwide practice.

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Director of Personnel
Buford Television, Inc.
P.O. Box 9090
Tyler, Texas 75711

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ENGINEERS, TV Sy ıs Engineers, Electronic Technicians, Technica ervisors, Maintenance. Immediate openings. · rienced. Full time. Full benefits, plus Pension cellent salary plus commissions. Send resume to hnical Operations, Inc., P.O. Box 840, New Hyde Pa. N.Y. 11040, or call Personnel Mgr. (516) 352-2238. 9-80-tfn

CAREER OPPORTUNITY WITH A GROUP-OWNED STATION: Maintenance Engineer for U.S. Virgin Islands TV Station. 1-2 years experience as Broadcast Maintenance Engineer required. Salary commensurate with background. Two-year Associate Degree or equivalent in job experience desirable. Contact Joe Potter (809) 774-0300. We are an Equal Opportunity Employer. 10-82-2t

CHIEF ENGINEER TV/AM/FM operation. Must be strong on maintenance all phases of operation with supervisory ability. UHF construction experience desirable. Contact Charles Perkins (601) 373-6311, collect. An Equal Opportunity Employer. 10-82-2t

DIRECTOR OF ENGINEERING: Immediate opening on ground floor in Southern post-production facility. On line: GVG 300-2B, 1" C format VTR's, CMX, Chyron IV; Film-to-Tape with computerized color correction; off line suite as well. Applicants should have demonstrated skill and experience with sophisticated te'evision and digital systems, ability to build and lead a .rong technical staff and be willing to handle (ating responsibilities and hands-on maintenance. 5 years experience necessary. Equal Opportunity E .ployer. Send resume and salary history to Dept. 578, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. 11-82-1t

ENGINEERING TV TECHNICIAN Requires FCC General License, preferably with 2-5 years' experience in studio broadcasting demonstrating strong electronics and maintenance background. For prompt, confidential consideration, please send resume to Employee Relations Department, 7 Bulfinch Place, Government Center, Boston, MA 02114. WNEV-TV A New Day Dawning An Equal Opportunity Employer

HELP WANTED (CONT.)

RAPIDLY GROWING METROMEDIA in eleventh market needs a maintenance engineer. Excellent working conditions and benefits. New transmitter and tape equipment. Five years experience and F.C.C. license required. Send resume or call: Wendall Wyborny, Chief Engineer, KRIV-TV, P.O. Box 22810 Houston, Texas 77227, 713/626-2610 E.O.E. 11-82-2t

ENGINEER/TECHNICIAN WITH EXPERIENCE in studio maintenance. Familiarity with RCA Quad; Ampex 1"; Sony, JVC; Panasonic ¾"; and TBCs. Salary DOE. To work in beautiful Alaska contact Dick Engh, KTVA-TV, 1007 West 32nd Ave., Anchorage, AK 99503, (907) 272-3456. 11-82-1t

TELEVISION REMOTE ENGINEER – RESPONSIBLE FOR OPERATION AND MAINTENANCE of new multi-camera, multi-VTR mobile unit. Must have strong electronics/maintenance background. Thorough knowledge of television camera, VTR switching, audio and terminal systems. Minimum 5 years experience. Must work as integral part of production team. Send resume to Mike Arnold, Chief Engineer, Scene Three, 1813 8th Avenue South, Nashville, TN 37203. 11-82-1t

LARGE NEW STATE OF THE ART POST PRODUCTION COMPANY HIRING PROJECTIONISTS, COLORISTS, FILM EDITORS, TAPE EDITORS, AUDIO MIXING ENGINEERS, CG GRAPHIC ARTISTS, SCHEDULERS AND COORDINATORS. RESUME SHOULD INCLUDE GOALS, JOB HISTORY, EQUIPMENT FAMILIARITY (NAME AND MODEL), AVAILABILITY AND SALARY REQUIREMENTS. DEPT. 577, BROADCAST ENGINEERING, P.O. BOX 12901, OVERLAND PARK, KS 66212. 11-82-1t

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Computer Sciences Corporation, the world's largest information services company, has an exceptional opportunity for a Video Electronics Engineer to join our Ft. Eustis, VA operation.

You will be involved in developing prototype microprocessor based video disc systems.

To qualify you must have a BSEE, preferably with knowledge of video disc systems, microcomputers and TV production hardware, as well as the ability to conduct surveys, research and analysis studies in new video technologies.

CSC offers competitive salaries, excellent benefits, and relocation assistance. For prompt consideration, please call Gordon Palmer at (804) 887-1677, or send your resume with salary history/requirements to his attention at: CSC, Defense Systems Division, P.O. Box M, Fort Eustis, VA 23604.

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COMPUTER SCIENCES CORPORATION

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HELP WANTED (CONT.)

IMMEDIATE OPENING FOR TV broadcast maintenance engineer...general class FCC license required plus a minimum of 1 year experience maintaining studio equipment. KBIM-TV is an Equal Opportunity Employer. Send resume to Gene Rader, KBIM-TV, P.O. Box 910, Roswell, N.M. 88202-0910. 11-82-3t

ENGINEERING POSITIONS
($15,000.00 - $60,000.00)

We specialize in the placement of TECHNICAL ENGINEERS with TV Stations, Groups, Networks, Satellite Programmers, Production Facilities, Corporate and Industrial TV, Mfrs and CATV. All levels and positions: Director, Chief, Asst. Chief, Studio Supervisor, Maintenance and Technical. (Our service does not include operational or program personnel). All locations nationwide. Employers pay all fees - Confidential, Professional. Over $4,000,000.00 in Salaried Positions Placed. Employee and Employer inquiries invited.

Phone/Resume - ALAN KORNISH
(717) 655-1458

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Video Engineer for Saudi Arabia and Engineers/Technicians for U.S.

A growing designer and builder of TV and A/V systems, has several openings.

One immediate opening is for a single-status individual to work for six months in Saudi Arabia. Enjoy generous living and travel expense accounts while banking your salary. Working without direct supervision, but with the support of our resident staff, you will maintain a sophisticated, non-military TV system at the capital city of Riyadh. You must be able to diagnose, service and repair at the component level. Since this is an immediate opening please call Mr. White at (201) 288-6130.

Additional U.S. openings: Senior Systems Engineer, Video Engineers, and Technicians at all levels. Send resumes to Avtec Industries Inc., 39 Industrial Ave., Teterboro, NJ 07608.

HELP WANTED (CONT.)

TV/RADIO MAINTENANCE ENGINEER: Looking for a relaxed atmosphere? Paid health, dental, life ins. and retirement plan + 14 paid holidays a year? This might not sound possible to you, but it is. We can also boast of current up-to-date equipment at our television production facility and FM radio station. First phone – min. 3 yrs. current broadcast maintenance experience. Filing deadling 12-17-82. Contact: Personnel Services, SAN DIEGO COMMUNITY COLLEGE DISTRICT, 3375 Camino Del Rio South, Rm. 330, San Diego, CA 92108. (714) 230-2110. Equal Opportunity Employer. 11-82-1t

TELEVISION MAINTENANCE ENGINEER: Immediate opening for a maintenance engineer. Applicant should possess a general FCC license with at least one year experience. Send resume to Ray Felchowski, Director of Engineering, WUTV-TV, 951 Whitehaven Road, Grand Island, New York 14072. WUTV-TV is an equal opportunity employer. M/F. 10-82-2t

REMOTE OPERATIONS CHIEF ENGINEER for top Southeast Production Facility. Applicant must possess good client relations ability and management skills as well as a solid maintenance background. This position requires the technical management of four remote units with their respective equipment and crews. Some travel required. For more information, please contact: Mike Orsburn, Director of Engineering, Video Tape Associates, Hollywood, Florida. (305) 920-0800. Equal Opportunity Employer. 10-82-2t

BENCH TECHNICIAN. Growing Video Systems Dealer in South Florida needs experienced bench technician who desires growth opportunity. Exellent salary, health plan, good hours, minimum travel. Employer will invest in current technology training schools. Send resume and salary requirements to: Dept. 581, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. 11-82-2t

VIDEO SALES – Major N.J. video dealer offers a challenging opportunity for professional video sales people. Previous industrial and/or broadcast experience required. Salary commensurate with experience. Commission, car, excellent fringe benefits. Reply in confidence to: Video Corporation of America, 1913 Route 27, P.O. Box 697, Edison, N.J. 08818. 11-82-2t

HELP WANTED (CONT.)

VIDEO TECHNICIANS – N.J. Professional video dealer offers a challenging and diversified service position troubleshooting and repairing state-of-the-art video equipment. Salary commensurate with experience. Fringe benefits. Reply in confidence: Video Corporation of America, 1913 Rt. 27, P.O. Box 697, Edison, N.J. 08818. 11-82-2t

IMMEDIATE OPENING FOR CHIEF ENGINEER. Group owned 100,000 watt FM. Experience in transmitters, audio, recording required. Salary commensurate with ability. Send resume and salary requirements to: Steven Bridges, P.O. Box 2727, Longview, TX 75606, (214) 757-2662. 11-82-1t

POSITION TITLE: CHIEF ENGINEER, KYUK AM/TV. RESPONSIBILITIES: Overall responsibility for equipment maintenance of public AM and TV station. Assures compliance with FCC Rules and Regulations. Monitors maintenance contract of extensive TV translator system. Budget management. Supervises maintenance engineer and assistant. Plans for future equipment needs and capital projects. Files license renewals/applications for translators, earth stations, microwave et. al. as required. **QUALIFICATIONS:** Five years experience in repair and maintenance of broadcast equipment required. Some management experience helpful. Valid FCC license. **SALARY:** High 30's, D.O.E. **CLOSING DATE:** November 30, 1982. **TO APPLY:** Request application from Bethel Broadcasting, Inc., P.O. Box 468, Bethel, Alaska 99559. ATTN: Carol Schatz, General Manager. Phone: (907) 543-3131. BETHEL BROADCASTING, INC. IS AN EQUAL OPPORTUNITY EMPLOYER. 11-82-1t

HELP WANTED (CONT.)

SYSTEM DESIGN ENGINEER – CCTV. Must be able to specify, design, supervise installation and de-bug top quality industrial CCTV systems. Experience required. SYSTEM ENGINEER – AUDIO VISUAL and PROFESSIONAL AUDIO. Hands on experience with audio/visual equipment a must. Digital knowledge helpful but not required. Responsibilities include complete job oversee and client interface. Both positions provide paid health, life insurance, vacation, etc. Please call collect 201-288-6130, Stylist Systems, Teterboro, N.J. 9-81-tfn

DIRECTOR OF ENGINEERING

SOUTHERN CALIFORNIA – Small commercial audio equipment manufacturer has immediate need for a hands-on DIRECTOR OF ENGINEERING. Successful candidate must have proven managerial abilities and successful track record in total systems design (digital and analog). Position offers high visability, attractive salary and generous benefit package. Send resume with salary requirement to: Dept 579, **Broadcast Engineering,** P.O. Box 12901, Overland Park, KS 66212. 11-82-2t

POSITION WANTED

TECHNICAL DIRECTOR EXPERIENCED IN AM & FM broadcasting is entertaining new offers for a responsible technical management position in present or related field. 20 years experience in directional arrays, construction, transmitters, antenna proofs, etc. Desire to be home based in Southern California. Dept. 580, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. 11-82-2t

CMX 340X CERTIFIED EDITOR, 22 years creative video/film experience, NBC, ABC, NASA. Brochure available from Dan Canaan, 7295 Oakland Mills Road, Columbia, Maryland 21046. 11-82-1t

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All metalwork is of welded, heavy-gauge steel construction with durable, textured epoxy paint. Dark blue finish.

McCurdy turntables are engineered for broadcast use, incorporating rugged construction, specialized features and weighted, isolating shock mounts.

Convenient housings in matching woodwork are available in a range of sizes for cart machines, auxiliary equipment and jackfields.

This modular stereo audio console (SS8670) is available in 16, 20 and 22 channel standard versions. Custom designs can be produced to meet specific requirements. The control panel is made of mar-resistant, heavy gauge, vinyl-coated steel strips set into aluminum extrusions.

Sloping, front-hinged mounting panels are available for all popular reel tape machines.

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Technical harmony is essential to clear professional audio. All the components have to get along before the system can deliver its full potential.

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