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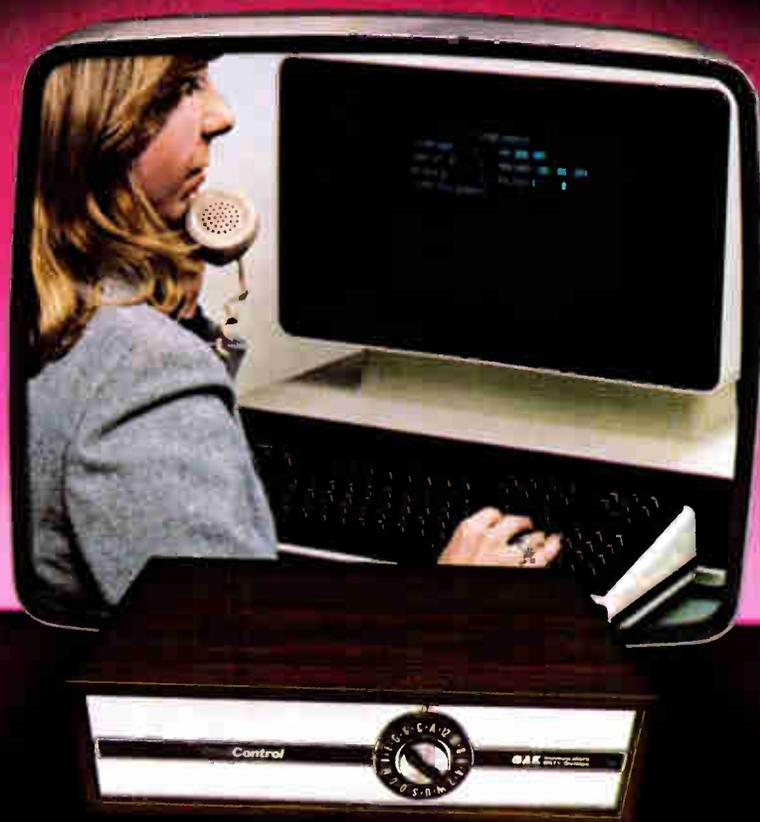


**Communications-Engineering Digest**  
Reporting the Technologies of Broadband Engineering

September 1980  
Volume 6, No. 9

# Addressability

# Addressability



## With the Oak addressable converter/decoder system, you get TotalControl.

Addressability is the central ingredient of this computer-based system from Oak. It gives you a new degree of control, not possible with ordinary decoders or simple on/off remote taps. The sophisticated TotalControl converter/decoder terminals are addressable to eight secure levels. This Oak system of tiering is so flexible, you can even offer "specials" on a pay-per-program marketing.

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### SWEEP TEST CABLE, AMPLIFIERS, PASSIVES ALL WITH A SINGLE INSTRUMENT — NOW TO 450 MHz — AND ITS PORTABLE

The 9900 Series of sweep test systems has been used for testing CATV cable for more than 12 years. The newest, and best yet is the 9900D, incorporating a 4 to 450 MHz sweep generator, oscilloscope, return loss bridge, attenuators, frequency markers, and dual trace comparator to provide comparison sweep testing. The 9900D sweep system has been specifically designed for the CATV applications described. There are no extras and no frills so that the price is affordable for the smallest system operator.

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# C-ED News at a Glance

## **Multiplex Technique Stretches Transponder Capacity**

WASHINGTON, D.C.—A technique for transmitting two video, four audio, and one test signal over a single satellite transponder has been demonstrated by RCA Laboratories and the American Forces Radio and Television System (AFRTS).

Shown at the recent National Association of Broadcasters show in Dallas and simultaneously at the Armed Forces Communications Electronic Association trade gathering in San Jose, California, the system uses the Vidiplex system of transmitting every other frame of alternate video programs on a common line. The Vidiplex system, developed initially by CBS laboratories and Thompson-CSF, incorporates the two sets of even or odd-number frames from two sources into one continuous transmission, genlocking each signal to the other or to a common source. The discrimination between signal streams is accomplished during the vertical blanking interval.

The NTSC-quality signal can be recorded, transmitted, and displayed by all conventional video equipment, except for the decoding of the two images. The decoding is accomplished by the Vidiplex decoder, which takes the two previous lines of information for each video frame and "interpolates" the missing information.

The four audio channels are multiplexed with the DATE (Digital Audio for Television) system developed with the Public Broadcasting Service by Digital Communications Corporation. In addition, the system provides a text management and display system for graphic and alphanumeric information, which is carried in four unused lines of the video field. The text information is used as a directory for the video and audio channel programming in the application proposed by AFRTS, which involves distributing programming to U.S. Armed Forces around the western hemisphere via satellite, and worldwide through secondary links.

## **Comtech Awarded Torus Contract**

SMITHTOWN, NEW YORK—Comtech Antenna Corporation, has announced the receipt of a contract from Communications Satellite Corp. (COMSAT) for the manufacture of the first multiple beam Torus antenna for commercial use. The Torus antenna, allows one earth station to communicate with more than one satellite simultaneously.

## **Japan Approves Tymnet Access**

CUPERTINO, CALIFORNIA—The Japanese government has approved access to the Tymnet and Telenet networks in Japan via international record carriers. The approval came July 15 and access in Japan to the U.S. public packet communications networks will become available during early September.

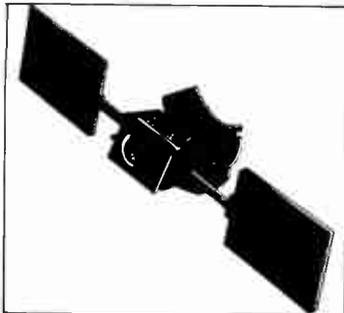
The main node in Tokyo will provide the access to Tymnet, making local access to Tymnet available in 29 countries. The node also will provide access to Telenet.

Costs for the new service will include: one-time contract fee of 300 yen (about \$1.40 U.S.), connect charges of 3300 yen per hour (about \$15 U.S.) and 165 yen per 1000 characters (about \$.75 U.S.)

## **Laser Memories Reach 181 MegaBits Per Square Inch**

Data document storage and retrieval, an important component of home and business information systems, has reached 181 MegaBits per square inch in a technology developed by Omex, successor to Precision Instrument Corporation.

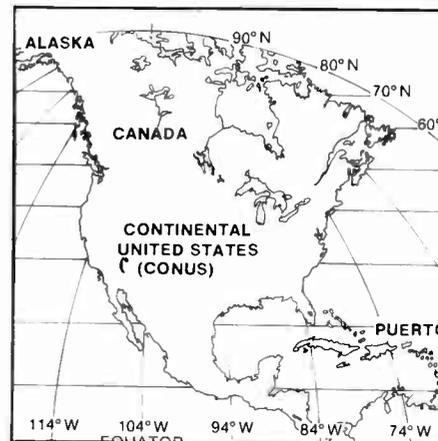
The information is stored by a series of three-micrometer holes ablated into a sputtered rhodium layer on a polyester slide. The holes are made by a 514.5-nanometer argon laser.



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**Cover:** Satellites are leaving big footprints in the history of American communications development. NASA photo interpreted by Lisa Delano and Dale Waters, C-ED Artists.

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Does cable television have enough of a lead in "wiring" the country to prevent other distribution technologies from gaining a foothold in the marketplace, or will DBS, MDS, and Teleco technological developments come along as dominant commercial entertainment media?

While coaxial cable now passes over 20 percent of the TV homes in the U.S., it by no means has a permanent position of security in the market, especially in light of technological advances that will enable other types of distribution systems to be consumer-marketed.

This issue of *C-ED* takes a look at one of those areas, satellites, and considers some of the impacts of current national R&D policy on communications. The next issue of *C-ED*, October, will consider another of those technologies, MDS.

With this issue, we welcome aboard Glenn Chambers, former executive vice president of SCTE, and projects engineer for American Television and Communications (ATC) of Englewood, Colorado. Those of our readers who know Glenn and may have had the opportunity to work with him in the past, no doubt, will realize how delighted we at Titsch Publishing are to have him on our side. Glenn will be contributing a regular column (see "InterMod" on page 22), will review the occasional technical book, and will serve as technical guru to the rest of *C-ED*'s writers and contributors. In addition, he is advising the editorial staffs of other Titsch publications, *CableVision*, *Mobile Times*, and *Two-Way Radio Dealer*.

*Paul A. FitzPatrick*



**"Now I can reach population pockets without emptying my own."**

"Loleta had 195 potential subscribers, Hydesville, 190. That's plenty if you can reach them economically." And that's exactly what Sam Shults, President of Redwood Cable Vision of Fortuna, California did. He serves several small communities profitably with a Hughes AML microwave system feeding 50 1/2 miles of aerial distribution.

Hughes AML receivers are cable powered, designed to work outdoors, and feature 40-channel capacity with VHF input and VHF output. There are more than 6000 video channels being distributed by Hughes AML systems around the world.

If you'd like to know more about how you can make small population pockets fill your pockets, call or write Hughes Communications Products, P.O. Box 2999, Torrance, CA 90509; (213) 534-2146. And in Canada: Micro-Sat Communications, Ltd., (416) 839-5182.

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# SCTE "Call For Papers" For 1981 Conference

How does the engineering leadership in the broadband/cable television industry size up the major challenges that lie ahead? What ideas do they have for coping with them?

The Society of Cable Television Engineers is asking that question at its 1981 SCTE Spring Engineers Conference. This 1981 program promises to be thought-provoking and SCTE is inviting your participation.

Suggestions for topics are invited. Abstracts of formal papers to be presented must be kept to 300 words. All submissions will be reviewed by the SCTE Conference Committee. Receipt of all abstracts will be acknowledged. Papers accepted for presentation will become the property of the Society of Cable Television Engineers, Inc., for publication in the 1981 Spring Conference Record.

All papers should be in keeping with the 1981 conference theme, *Challenges For The '80s*. Upgrading of current technology, advanced system design, expanding bandwidth and channel capacity, fiber optics, satellite reception or transmission, computers, data, addressability, testing techniques and manpower are but a few of the topics to be considered.

Upon acceptance of the abstracts, each participant will receive an Author's Kit and production schedule. Coordination and assistance of the SCTE staff is available.

SCTE is also inviting a limited number of engineering management papers for presentation at the 1981 Spring Conference. These topics include inflation, energy, productivity, regulations, standards, and trade.

SCTE 1981 Spring Conference abstracts must be received no later than September 15, 1980 for consideration as a part of the program. Submission of abstracts, or of proposed conference topics must include a complete name and address, as well as a daytime telephone number. When submitting conference topic suggestions, please offer potential speakers as well, and where they may be located. The conference will be March 16-17, 1981 at the Opryland Hotel, Nashville, Tennessee.

The Opryland Hotel is one of the finest modern hotel meeting complexes in the United States. The 1981 SCTE Spring Engineering Conference promises to be the place for the exchange of information about the expanding broadband/cable television industry.

Please mail all abstracts and suggestions for conference topics to: Society of Cable Television Engineers, Inc., 1981 Conference Program Committee, 1900 L Street N.W., Suite 614, Washington, D.C. 20036.

The deadline for submission of abstract and suggestions for conference programming is September 15, 1980.

## Election Draws Near

Three regional chairs, and three at-large directors, will become vacant in early 1981, according to the Society of Cable Television Engineers.

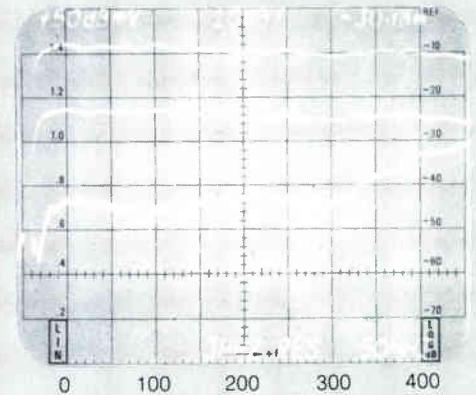
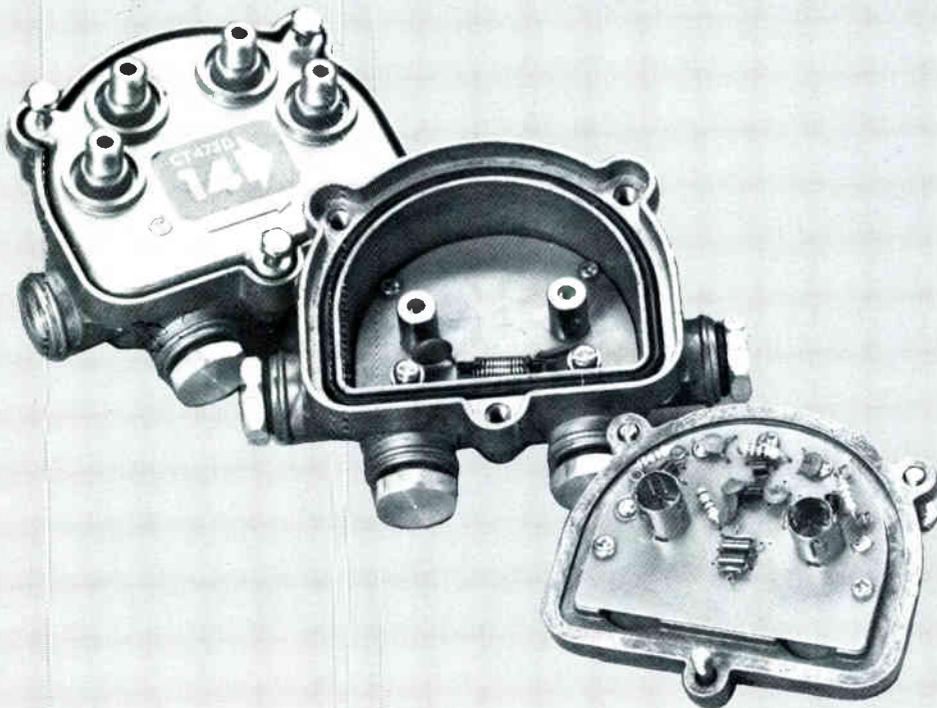
Retiring from regional chairs are Ken Wall (Region 1), Michael Gardner (Region 3) and Ralph Haimowitz (Region 5). Retiring from at-large positions are Michael Jeffers, Marty Moran, and Abe Sonnenschein.

Any of these retiring directors may announce a wish to run for office. All board members who have served at least one year of their term may also announce candidacy for office.

The SCTE nominating committee will be appointed soon. At that time, an official call for nominations from the general membership will be released. After the nominating committee develops the slate of candidates, the task of accumulating biographies will be accomplished by the SCTE staff, and the ballots will be printed and into the mail soon after.

Approximately 20 days will be allowed for the membership voting process, and then another ten days to validate and count the ballots. Results of the elections will be announced before the end of 1980, and new officers and directors will be installed March 17, 1981, at the annual membership meeting.

# ICM 2 AND 4 OUTPUT MULTI-TAPS



Typical tap down response and tap-to-tap isolation are shown in the swept analyzer print above.

- Corrosion resistant aluminum alloy housing
- Captive stainless steel hardware
- Moisture sealing gaskets, O-ring sealing
- Puncture sealing rubber membrane on "F" connectors
- Aerial or pedestal mounting
- Color coded db value
- Modular construction, interchangeable tap plates
- Low insertion loss
- High tap to tap isolation
- Full 5-300 MHz frequency range

The ICM series of multi-taps provide 2 or 4 way subscriber taps over a broad range of tap values. Modular design enables the operator to remove the base plate and circuit board as a unit without removing the center seize or the strand mounting. Changing the base plate will not affect downstream operation. The housing is fabricated from a corrosion resistant aluminum alloy. Stainless steel hardware is used throughout, including the strand clamp. The housing and all ports have separate moisture sealing gaskets and the subscriber ports have a puncture sealing rubber membrane. All connector ports, including subscriber ports, have large shoulders and anti-slip ribs for use with shrink sleeving. Housing and cover plate as well as the subscriber taps have drip skirts. The unit can be either messenger or pedestal mounted. The ICM is color coded to denote the db value of the component unit.

#### Specifications:

Bandwidth	5-300 MHz
Return loss	20 db min.(all ports)
Tap-to-Tap Isolation	30 db min.
Response flatness	± .25 db
Power Passing	6 amp. AC/DC
Tap loss	± 1 db of assigned value
Impedance	75 ohms
Input/Output ports	5/8" female
Subscriber ports	F type female
Tap plate torques	12 ft./lbs. removal torque 15 ft./lbs. securing torque

Model No.	Tap Loss* (db)	Max. Insertion Loss (db) 50 MHz	300 MHz	Tap to output isolation (db)
ICM/2-8	8	3.4	3.8	23
ICM/2-11	11	1.4	1.8	26
ICM/2-14	14	1.0	1.3	29
ICM/2-17	17	0.6	0.8	32
ICM/2-20	20	0.4	0.6	35
ICM/2-23	23	0.3	0.6	38
ICM/2-26	26	0.3	0.6	41
ICM/2-29	29	0.3	0.6	47
ICM/2-32	32	0.3	0.6	47
ICM/2-35	35	0.3	0.6	50
ICM/4-7	7	—	—	21
ICM/4-11	11	3.4	3.9	26
ICM/4-14	14	1.5	2.0	29
ICM/4-17	17	0.9	1.4	32
ICM/4-20	20	0.6	1.0	35
ICM/4-23	23	0.4	0.9	38
ICM/4-26	26	0.4	0.8	41
ICM/4-29	29	0.3	0.4	44
ICM/4-32	32	0.3	0.4	47
ICM/4-35	35	0.3	0.5	50

\*Average tap loss is within ± 1 db of assigned value.

## INTERCEPT

Intercept Corporation, 215 Entin Road, Clifton, New Jersey 07014  
Telephone 201-471-2212

## Cox Installation First

ORLAND PARK, ILLINOIS—Cox Cable became the first company to energize a 400 MHz cable system when it turned on their new installation here July 17.

The first of many 54-channel systems planned in the United States, the Cox installation delivered programming to a few subscribers on the seven completed miles of trunk and feeder.

Jerrold became the second manufacturer to turn on a 400 MHz system just a few days later in East Detroit, Michigan, when they energized 25 miles July 28, according to Jerrold's Sam Compton. "We have 25 miles of 400 MHz cable strung," he said, "and are planning to install about 100 miles total."

## Tocom Sees \$20 Monthly Security Service

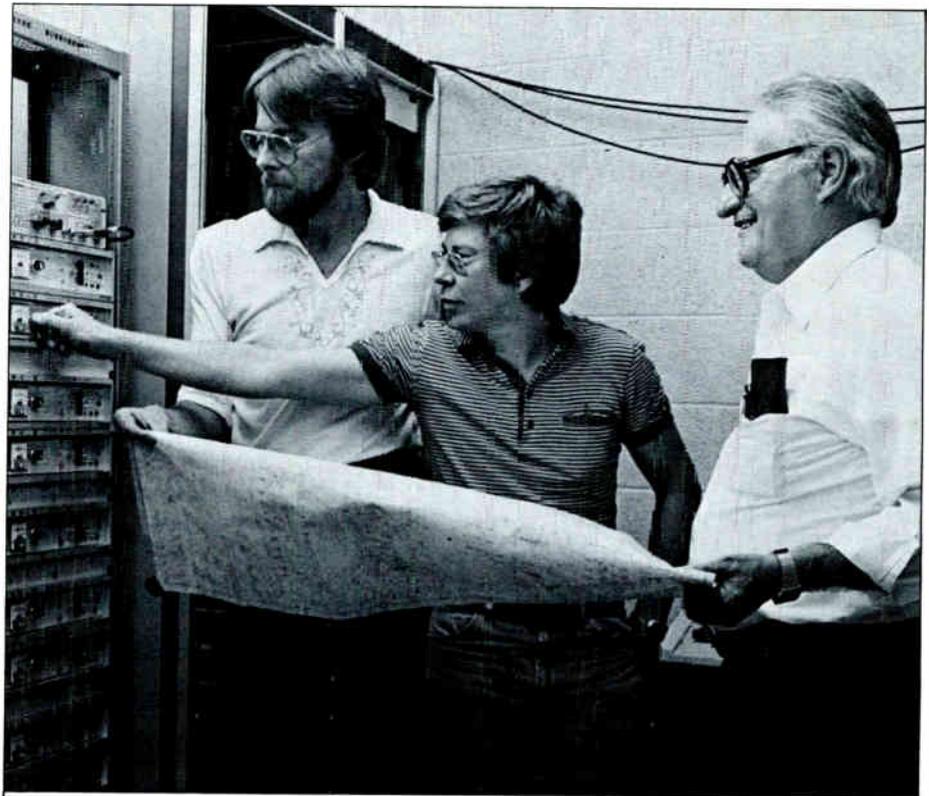
IRVING, TEXAS—Tocom, Inc. predicts that security services being added to CATV systems may find little price resistance all the way up to the \$20 per month level, according to Tocom President Mike Corboy. Tocom has tested services ranging from \$12 to \$17 with good success.

## Fiber Optics Cable Systems Now Cost/Effective Says Times-Fiber

WALLINGFORD, CONNECTICUT—Fiber optic cable systems now can feature signal superiority, ease of installation, reliability and cost-effectiveness according to A. C. "Dyke" Deichmiller, Director of Technical Services-CATV Marketing Group at Times Fiber Communications, Inc., speaking before the Philadelphia Cable Club.

He told the monthly gathering of owners, managers and operators of three typical CATV system applications where fiber optics cable is cost effective today—satellite down links, hub-to-hub super trunks, and local origination links. In all three cases, he said, fiber optics provides significant transmission distance with no measurable distortion in image quality."

Links of up to 10 miles (16 kilometers) with better than 52 dB signal-to-carrier noise can be reliably achieved with today's electronics and semiconductor lasers. Deichmiller cited the Times super trunk installed for Tele-



*Metro-Cablevision's Jim Beer and Jerrold's Tom Shrink and Len Ecker pose with the East Detroit system's harmonically related carrier phase-locked headend prior to the start-up.*

prompter at Lompoc, California in 1978. Originally designed to carry 12 channels for a distance of 8.4 kilometers with three repeaters at 50 dB S/N, the system has been upgraded to need only one repeater with 52 to 56 dB S/N. He predicted that even the one remaining repeater can be removed within a few years.

## Zenith Seeks Teletext Futures

CHICAGO, ILLINOIS—Zenith is polling members of the CATV industry to find which areas of information services are of interest to system operators and manufacturers. To be used to help Zenith in determining future commitments and plans in the teletext area, the poll results will be available this fall.

## Sat Com Network Moves On Comstar Cable Plans

NEW YORK, NEW YORK—Satellite Communications Network (SCN) has placed its order for a minimum of 300 earth stations to be installed at cable

systems throughout the U.S. in an attempt to position Comstar DZ as the second all-cable satellite.

SCN plans to install the dishes at the rate of 25 per week, so that 200 will be in operation by September, the kick-off month for the two cable services SCN will distribute over its Comstar transponder: Cineamerica and the Las Vegas Entertainment Network, according to *CableVision* magazine. The remaining 100 earth stations are scheduled to be in place by December. SCN intends to offer use of the stations to any future Comstar programmers on a shared-cost basis. Cable systems will have to pay for foundation and cable installation costs, but SCN plans to reimburse the systems.

Five- to seven-meter dishes will be used and, according to Al Parinello, SCN corporate development vice president, the earth stations are technically adequate for reception from the Comstar satellite. "We are not cutting corners or experimenting with small, unproven hardware," Parinello said. "We fully expect these facilities to be around for a long time."

## M/A Com Buys Valtek

BURLINGTON, MASSACHUSETTS—M/A Com Inc., has agreed to buy Valtek for approximately \$135 million, according to spokespersons for M/A Com. Formerly Microwave Associates, the company agreed to the purchase at a rate of one share to one. Valtek has 4.6 million shares outstanding. M/A's stock is trading near \$30, with Valtek's stock near \$26. The combined companies are expected to have sales in excess of \$61 million for the third quarter of this year.

## Japan Switches Yuri Off

TOKYO, JAPAN—Japan's experimental direct broadcasting satellite has been retired from service after reporting a failure in its final traveling wave tube (TWT). The satellite's two other TWTs had failed earlier.

The satellite, designated YURI, was launched in April of 1978, and was used extensively by the Japanese in experiments with small earth receiving antennas. The Japanese have successfully demonstrated 40 and 60 cm dishes, using signals from YURI.

A second broadcasting satellite for Japan is being constructed, while engineers try to restore service aboard YURI.

## Communications R&D Rises 22 Percent

WASHINGTON, D.C.—Research and Development by eleven civilian agencies will rise an estimated 22 percent, according to the House subcommittee on transportation, aviation, and communications. The subcommittee reports that civilian communications R&D spending will hit \$71.8 million in fiscal 1981, with the National Aeronautics and Space Administration leading the way with expenditures of \$30 million, an increase for NASA of 45 percent.

The Transportation Department, which includes the Federal Aviation Administration, will receive an additional \$16.7 million, bringing their spending up by a whopping 60 percent. The Commerce Department, which funds the National Bureau of Standards and the National Oceanic and Atmospheric Administration, will spend \$9.5 million, the same as 1980, while the U.S. Postal Service budget of \$7.5 million is down by 16 percent.

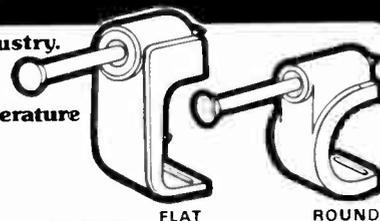
## Tower plastic cable clips. Plated, hardened, flat headed steel masonry nails, pre assembled ready for use.

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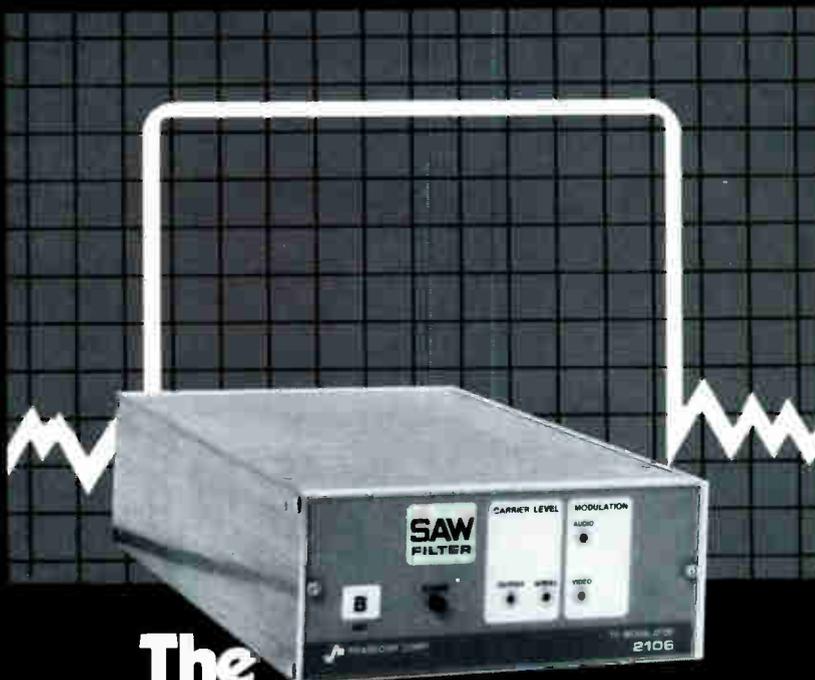
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So now, every Phasecom Modulator has a SAW Filter at IF. For a perfectly shaped vestigial sideband signal. For flat group delay. Without tuning or

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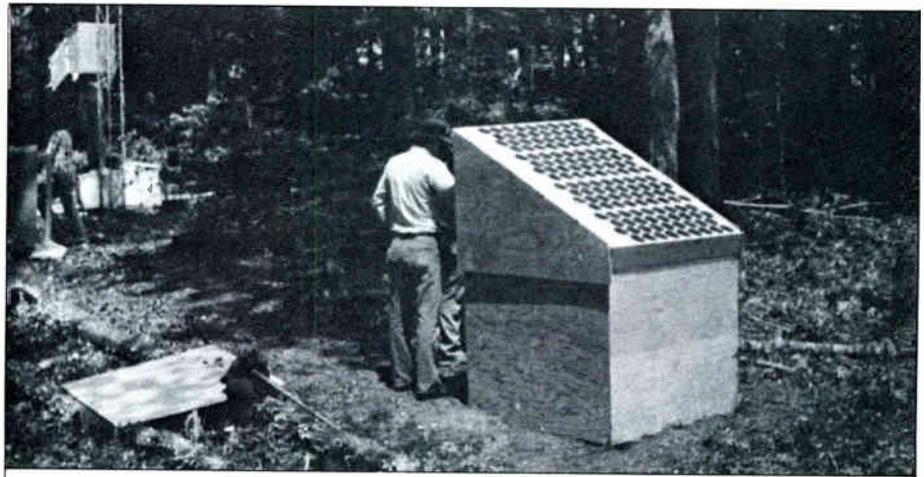
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Los Angeles, CA 90045  
Tele: (213) 641-3501

## SSS, Zenith In Cable Teletext Experiment

NEW YORK, NEW YORK—Tests are underway on the first satellite-fed teletext system on a cable TV system, according to *Videotex Teletext News*. A joint venture of Zenith Radio and Satellite Syndicated Systems (SSS), the signal will be inserted on the vertical blanking interval of WTBS-TV, Atlanta, which is carried nationwide to cable systems by SSS.

Zenith's Virtex decoders are being installed at several hundred cable systems to pick up the teletext signals, which will total about 800 pages by the project's end. The cable systems will feed the signals downline to subscribers on an empty cable channel; individual subscribers won't be able to grab specific pages, but will view the information stream.

SSS has been trying to develop a teletext service for more than a year, according to the newsletter. It is now involved with Scientific-Atlanta in a "CableText" project, with S-A developing an encoder for the up-link. SSS also delivers Reuters and UPI Newswire services via subcarriers on its transponder aboard RCA Americom's Satcom I.



*Solar unit under construction with CATV tower in background.*

## Solar Headend In Kentucky

TROOPER'S ISLAND, KENTUCKY—OVC Telecommunications of Richmond, Kentucky, has installed what may be the world's first solar-powered CATV headend on Trooper's Island, Kentucky.

OVC Vice President of Operations Joseph Taylor said that the solar-powered head-end replaces a series of inadequate power supplies for the system. Trooper's Island is a summer boy's camp and retreat operated by the

Kentucky State Police on the Tennessee-Kentucky border in Dale Hollow Lake.

The solar gear was designed and manufactured by the Solar Power Division of Exxon Corporation. OVC Telecommunications ordered the system after successively using batteries for the first year, a gasoline generator the second year, and a propane generator the third year with a battery system.

The installation was accomplished in two days with a crew of eight, Taylor said.

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## DuBé, Chambers Named To C-ED Staff

DENVER, COLORADO—Dennis DuBé and Glenn Chambers have been named to head the editorial department of *Communications-Engineering Digest*, according to Bob Titsch, President of Denver-based Titsch Publishing, Inc.

DuBé has been appointed managing editor of the magazine; Chambers has been named technical editor, according to Titsch. "*Communications-Engineering Digest* is the premier technical publication of the cable television industry," Titsch said, "and it requires the best editorial talent in the business."

Executive Vice President Paul FitzPatrick noted, "As the companion publication to *CableVision*, *C-ED*'s role in covering developments in communications technology will be vital to the health of the cable industry in the years to come."

DuBé is a journalist with experience in newspaper, magazine and specialty publications. A graduate of the University of Colorado School of Journalism, he has managed or edited nearly a dozen publications. His cable background began when he served as a citizen advisor to the City of Boulder, and

has continued through private consultation work.

Chambers, Project Engineer for American Television and Communications (ATC) at the corporate offices in Englewood, Colorado, has been involved in the CATV industry since 1957. He joined ATC in 1972 as chief engineer for their Appleton, Wisconsin system, and has served in several capacities.

## ON TV Wins Injunction Against "Pirates" In Phoenix

SAN DIEGO, CALIFORNIA—Oak Industries Inc. said today it has won a preliminary injunction against subscription television "pirates" in Phoenix, Arizona.

The injunction was granted by U.S. District Court Judge Valdemar A. Cordova in a lawsuit in which an Oak subsidiary, National Subscription Television/Phoenix, is charging piracy of its over-the-air ON TV subscription television signals.

The injunction is against defendants John Sampson and Ralph Heller, owners and operators of Pirate Electronics of Phoenix.

Under the judgment, the defendants are enjoined from manufacturing or selling any device capable of decoding

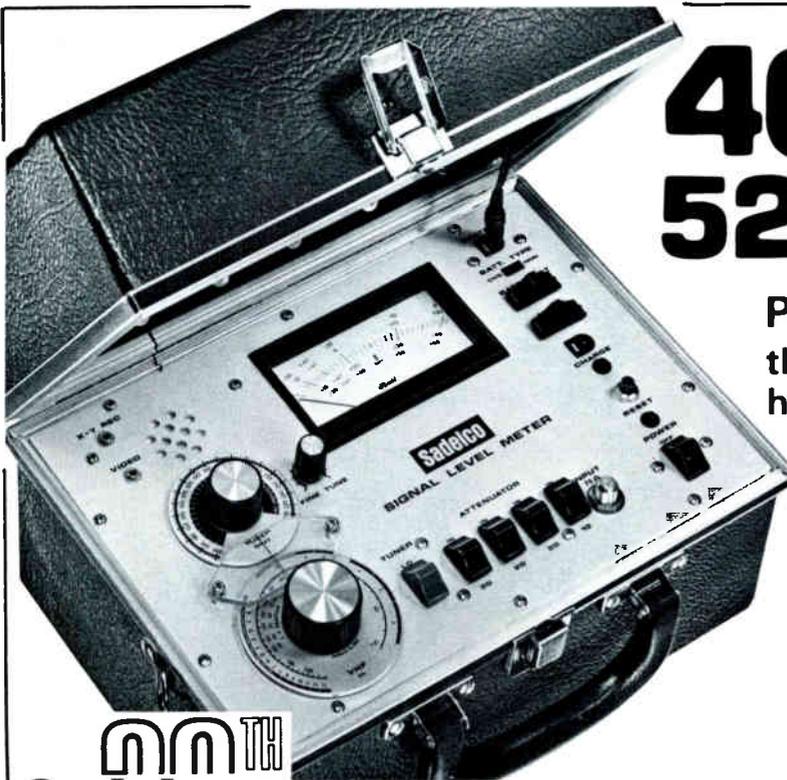
the ON TV signal or rendering the signal decipherable to ordinary television receivers and from otherwise assisting persons not subscribers to ON TV programming.

The injunction was granted after a hearing in the federal district court in Phoenix. Oak said that at that hearing defendants Sampson and Heller declined to testify. Oak also said that the two defendants refused to answer questions during the taking of depositions, pleading the Fifth Amendment against self incrimination.

The preliminary injunction will be in force until a trial has been completed. A trial date has not been set.

Oak Industries is the country's largest operator of subscription television services. In addition to the Phoenix lawsuit, the company is involved in two lawsuits in California against individuals and companies which Oak says are illegally manufacturing and selling equipment which can be used to receive scrambled television signals which ON TV broadcasts.

Oak said that a similar lawsuit in Detroit has resulted in criminal charges being filed against the defendants by the U.S. district attorney.



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## Swiss DBS Plan Told

GENEVA, SWITZERLAND—A commercial satellite broadcasting system for Switzerland has been announced that will broadcast in German, French, and Italian. Pending before the Swiss Broadcasting Corporation, the system will be financed by Swiss and British investors. Total price tag for the satellites and system hardware has been placed at \$140 million.

## SPCC Plans Domsat System

WASHINGTON, D.C.—Southern Pacific Communications Company (SPCC) has filed an application with the Federal Communications Commission (FCC) for permission to build its own domestic satellite system.

Aiming at the 11 and 14 GHz bands, SPCC's plans call for the construction of three satellites, and the launching of two, with the third maintained as a ground spare. The company had requested orbital assignments of 83° and 132° west longitude, and a company spokesman said that the SPCC system is designed to take advantage of current communications technology to relieve space congestion.

"SPCC's proposed satellite system

design provides transmission capability in both the C-band and Ku-band, resulting in increased transmission quality of the satellite and lower cost per unit for transmission capacity," the company said. "In addition, the two frequency bands are interconnected to permit flexible system expansion."

The system proposed by SPCC will have greater capacity over any other domestic satellite presently in orbit or under construction, including advanced Westar, Westar IV, or the satellites proposed by Hughes Communications, American Telephone & Telegraph Co., GTE Satellite Corporation, Comstar, or RCA American Communications, according to SPCC.

The FCC reports that there are already several other applications pending for the two orbital positions requested by SPCC.

## SSS Selling \$2,500 TVRO Sets To Affiliates

Satellite Syndicated Systems will be selling 300 3-meter TVRO stations to the company's SPN-2 affiliates, according to Satellite News (July 14, 1980). Featuring a Prodefin dish, an Amplica 120 degree LNA, and 100 feet of cable,

the \$2,500 deal is for affiliates that couldn't qualify for the company's earlier-announced "give-away" of 100 earth stations to affiliates.

The sales deal is to promote SSS plans to begin programming over their Satellite Program Network II service, which started in July. Affiliates who don't wish to buy an earth station can enter a leasing agreement, a company spokesperson said.

## Electronic Information System Test Due

DALLAS, TEXAS—An electronic information system experiment is about to get under way in Park Cities, Texas, according to Sammons Communications. Awaiting only the de-bugging of their central computer (supplied by Digital Equipment Corporation), the experiment will include just over 200 homes in a test distribution of several information services.

Subscribers will be able to view data from Dow Jones, the *Dallas Morning News*, and Merrill Lynch and Co. Requiring home computers as terminal equipment, subscribers will hook into the cable system's infonet through the use of decoders supplied by Tocom.



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## Satcom III Loss Blamed on Motor, Solar Array

CAPE CANAVERAL, FLORIDA—RCA, JPL, and NASA specialists studying possible reasons for the disappearance of RCA's Satcom III have identified the two most likely causes. In two possible scenarios, the study groups concluded, the satellite suffered extensive damage to its communications and power systems shortly after the ignition of its apogee kick motor.

The motor was ignited after the satellite had been launched into its transfer orbit to place it in its correct geosynchronous position. In the most likely scenario, the motor's exhaust cone broke shortly after ignition, spewing hot rocket gas over electronics and power component parts. The parts would have been seriously damaged instantly.

In the second scenario, the motor ignited and functioned properly, but the spacecraft deployed its solar and communications arrays while the motor was still firing, causing uncontrolled tumbling and spinning of the spacecraft. Specialists speculate that the violent forces caused by the spinning tore the craft apart.

The loss of the satellite cost RCA over \$48 million in hardware, developmental and launch costs, and \$20 million in lost revenue. RCA has filed insurance claims on the project totaling \$77 million.

To cover for the loss of the satellite, RCA has leased 11 transponders on the Comstar satellite system.

## EuroSpace Loss Puzzles Agency

PARIS, FRANCE—The unsuccessful launch of the European Space Agency's Ariane rocket was "probably" caused by an improperly manufactured engine part, according to ESA spokesmen.

The failure was caused by the malfunction of one of the launcher's four main engines. The engine developed instability and fluctuating temperatures and pressures after 11 seconds of flight, resulting in the automatic initiation of the self-destruct sequence. The vehicle plunged into the sea 26 kilometers downrange of the launch site.

The rocket was carrying two German experimental communications satellites, as well as a CAT instrumentation package.

## National To Open Japanese Design Center

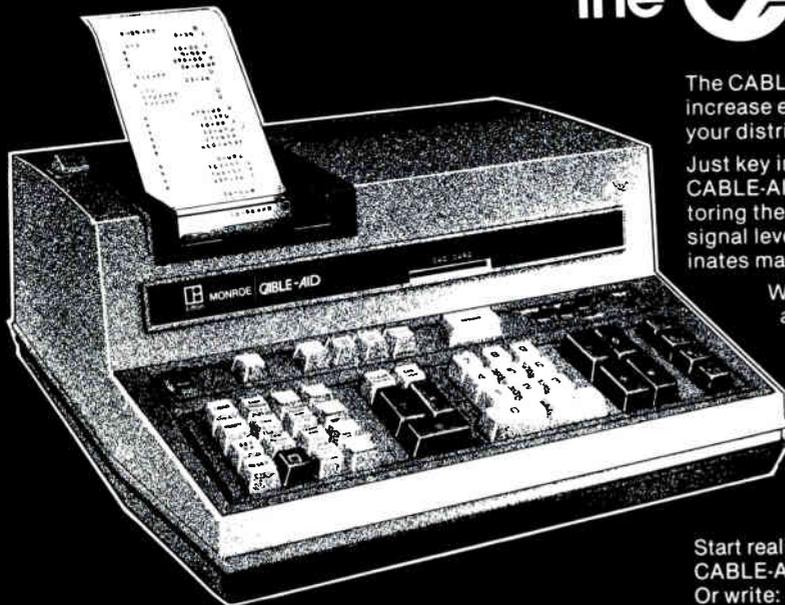
SANTA CLARA—National Semiconductor Corporation has announced plans to establish a new bipolar linear design center in Japan. The Japanese Design Center (JDC) will focus initial design concentration on the circuits for the high quality music market, with plans for future expansion into other linear market applications.

National expects the JDC to be a fully operational design facility within two years, performing all breadboarding, simulation, layout, datasheet, and application support. Additional plans to expand the JDC are being considered as well.

National currently has design centers in Salt Lake City, the United Kingdom and Israel, with construction underway for a facility in Vancouver, Washington. The JDC will join these facilities in their efforts to increase the successful design of integrated circuits for localized markets.

National Semiconductor is an industry leader in linear design, pioneering many linear technologies, including the first three terminal regulator, super beta transistors and bifets.

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**MONROE**  
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by Glenn Chambers

Ever noticed how often the same old names keep showing up in print? The maxim about history repeating itself must be true. It just happened again.

Several years ago, I wrote a series of "how to do it/when to do it" articles on FCC proof of performance testing for a fledgling magazine called *Communications/Engineering Digest*. Now here I go again, this time on the mature C-ED as Technical Editor. I have a feeling that I'll enjoy it just as much this time as I did before.

For some time, some of us have felt that C-ED might be losing sight of its original purpose; serving as a voice for the technical people in the communications/engineering field. Titsch Publishing Company executives agreed with us and decided to make some extensive changes in C-ED personnel and format.

C-ED's new managing editor, Dennis DuBe' (pronounced DuBay) and I are dedicating ourselves to converting C-ED into a magazine by and for technical people. Bob Titsch, president, and Paul FitzPatrick, executive vice president and editor-in-chief, have pledged their full cooperation and support.

Several changes in format have been discussed and tentatively adopted. You are presently reading one change. This column, which will be a monthly feature, will cover a wide range of topics. Primarily, it will help to keep you informed of any changes or additions to the magazine and to help you keep up with industry happenings which will affect you.

Two other proposed features are a return of the Out of Sync column, and a regular technical book review. Out of Sync will attempt to find and provide solutions to your technical problems.

We have been assured of help from communications industry experts to solve those tough problems which we all seem to encounter at one time or another. All you need to do is give us a call or send us the questions and all

pertinent information. We will do the rest. Names and systems will not be published to save any possible embarrassment. Urgent requests will be handled by phone prior to publication. We also especially welcome hearing about problems which you have solved.

The book review will report on new books which may be of interest to technical personnel. Well over 100 publishers have been contacted to request catalogs and lists. We hope to review about four books in each issue.

We also plan to get back into grassroots "how to do it" articles as well as to continue the high-level engineering articles. We will continue to report on new products and technology, and to bring you news which may affect how you will do your job.

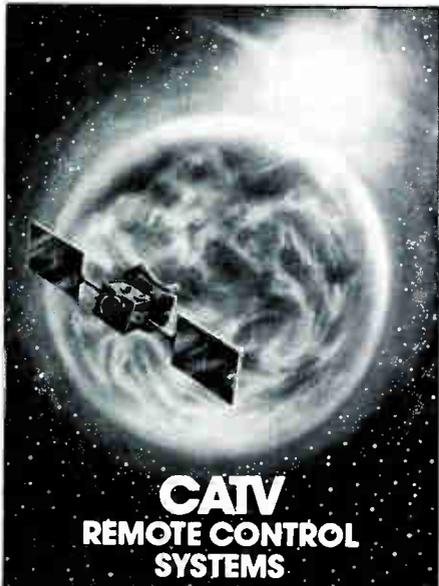
Making C-ED a more effective technical communications medium is going to take a lot of thought and effort on our part. It will also take a lot of help and support from you, the reader. To make it reflect your needs and desires, we need your input.

Let us know the kind of magazine you want, and we will do our best to provide it. Your comments, suggestions, and recommendations are earnestly solicited. All technical manuscripts submitted will be read and, if they are applicable to communications engineering or technology, they may be published. If you have ideas for an article but just don't have time to write it out, submit the ideas with as much documentation as possible. We will write the article for you and give you credit. Send all written material to C-ED, P.O. Box 5400 TA, Denver, Colorado 80217.

If you just plain hate to write anything, call in your information, comments or suggestions to Dennis at (303) 573-1433 or to me at (303) 773-3411, Ext. 241.

We would love to hear from you and to have your help. After all, C-ED is your magazine.

*Glenn Chambers*



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**ANTENNA  
CORPORATION**

# Communications Research Continues To Challenge CATV

by Dennis DuBe'

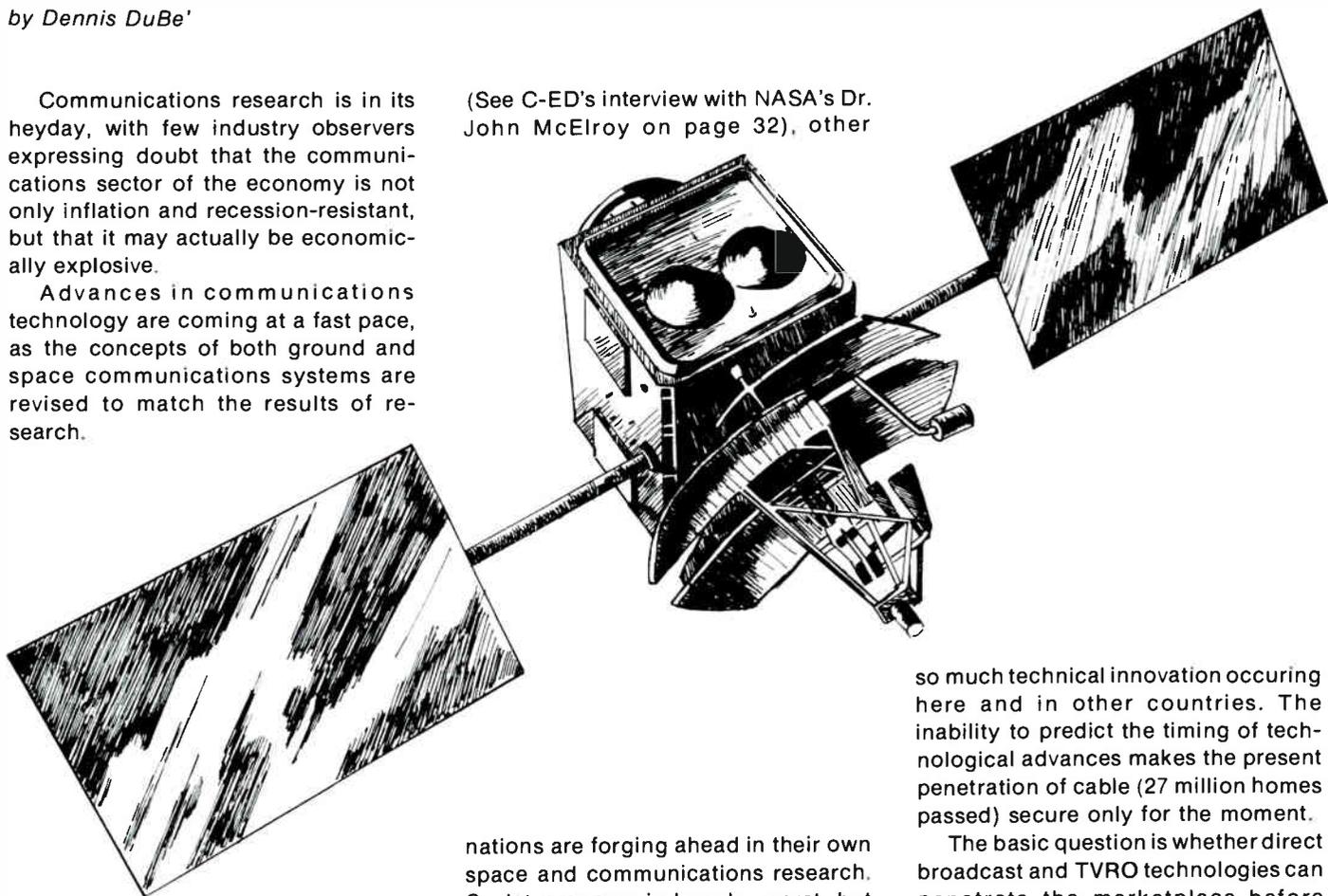
Communications research is in its heyday, with few industry observers expressing doubt that the communications sector of the economy is not only inflation and recession-resistant, but that it may actually be economically explosive.

Advances in communications technology are coming at a fast pace, as the concepts of both ground and space communications systems are revised to match the results of research.

Fueled by initiatives from both the Department of Defense and the National Aeronautics and Space Administration, the era of effective satellite communications was ushered in just a few years ago. The development of satellite TV breathed new life into the CATV industry. There is a youthful exuberance demonstrated by system operators, equipment manufacturers and representatives, and programming sources. But the bubble could be burst, some warn, by the same wave of technological development that made cable's fortune.

While NASA continues to push satellite communications research

(See C-ED's interview with NASA's Dr. John McElroy on page 32), other



nations are forging ahead in their own space and communications research. Soviet progress is largely secret, but the Japanese, among others, are making visible progress in developing community level earth stations based on relatively small dishes. The 60 cm dish system displayed by Japan's NHK research center picked up a suitable signal from the Japanese BS satellite before its failure and it is reported that they are working on a smaller 40 cm dish for home TVRO applications. The European Space Agency has announced plans for a multi-nation direct broadcast system (DBS), and the Canadian Hermes/CTS DBS experiments were largely successful at 40 cm.

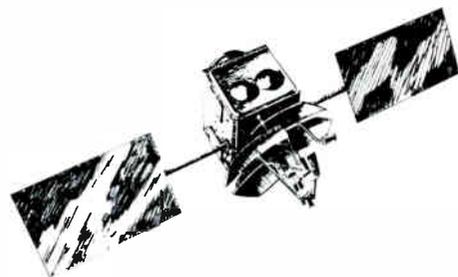
The American market for CATV is not necessarily secure, some feel, with

so much technical innovation occurring here and in other countries. The inability to predict the timing of technological advances makes the present penetration of cable (27 million homes passed) secure only for the moment.

The basic question is whether direct broadcast and TVRO technologies can penetrate the marketplace before cable companies completely sew up the urban markets.

Yet, American and foreign industries are rushing into the home receiver market since the deregulation of reception equipment by the FCC.

CATV operators should not be



lulled to sleep with their new-found Pay-TV riches, warns Bell and Howell's Robert Pfannkuch. There are other ways of providing cable-type services, including DBS. "When we talk about two-way, we mean that there are many ways, not just pay cable, to get a return line," he said. "When we think of two-way systems, all we tend to think of is Warner's QUBE. Satellite to home can also be two-way. A lot of people are unaware that the little one-meter dish can also go back up with a low data-rate signal."

"There is work being done on a

simple unit that attaches to a phone line and effectively uses existing phone lines to provide data return links," he said.

"We should not kid ourselves that it must be two-way cable to get two-way information."

The forefront of DBS research, of course, is the coordinated research program being shepherded by NASA on multi-beam antennas and on-board switching systems for the 30-20 GHz bands. The NASA program in space communications was revitalized by Presidential order in 1978 following a

series of government and industry studies. The NASA effort attempted to incorporate viewpoints and information from all governmental and many private communications concerns in formulating the outlines of the research program.

"We achieved a firm consensus among the communications industry," said NASA's Dr. John McElroy, describing the process that led to the research effort. NASA's program defined the high-tech development areas necessary to launch a demonstration satellite by 1986, and has farmed the research work out to several large companies.

Among the primary areas of research being pushed in the NASA program are multiple-beam and scanning antennas (see related story on page 37), on-board switching systems, and low-cost ground terminals (see related story page 28).

NASA selected the 30/20 GHz bands for development because technology applicable there would be transferable down to the 14/12 bands. By utilizing scanning spot beams, video compression techniques, and on-board switching and signal-processing capabilities, NASA planners hope to achieve a greater use efficiency on existing bands. Observers feel that channel space utilization in the 14/12 bands could increase by 50 to 300 times with the appropriate technological advances.

The NASA report on the research program, delivered to subcommittees of the House Committee on Science and Technology, concludes that development of the 30/20 bands could satisfy "traffic growth requirements well into the next century."

NASA's push to develop multiple beam antennas is responsive to the seemingly obvious goal of the American space program, which is to utilize space systems to develop and keep an American edge in vital communications technology. Vital to the U.S. defense posture, the development of direct broadcast technology, coupled with addressable antenna designs, could give American tactical electronic war planners a decisive advantage over Soviet electronic war measures. The inevitable push of the Department of Defense for this communications technology advantage will have significant fallout for the communications industry.

And it won't be the first time.

# Keeping Up?



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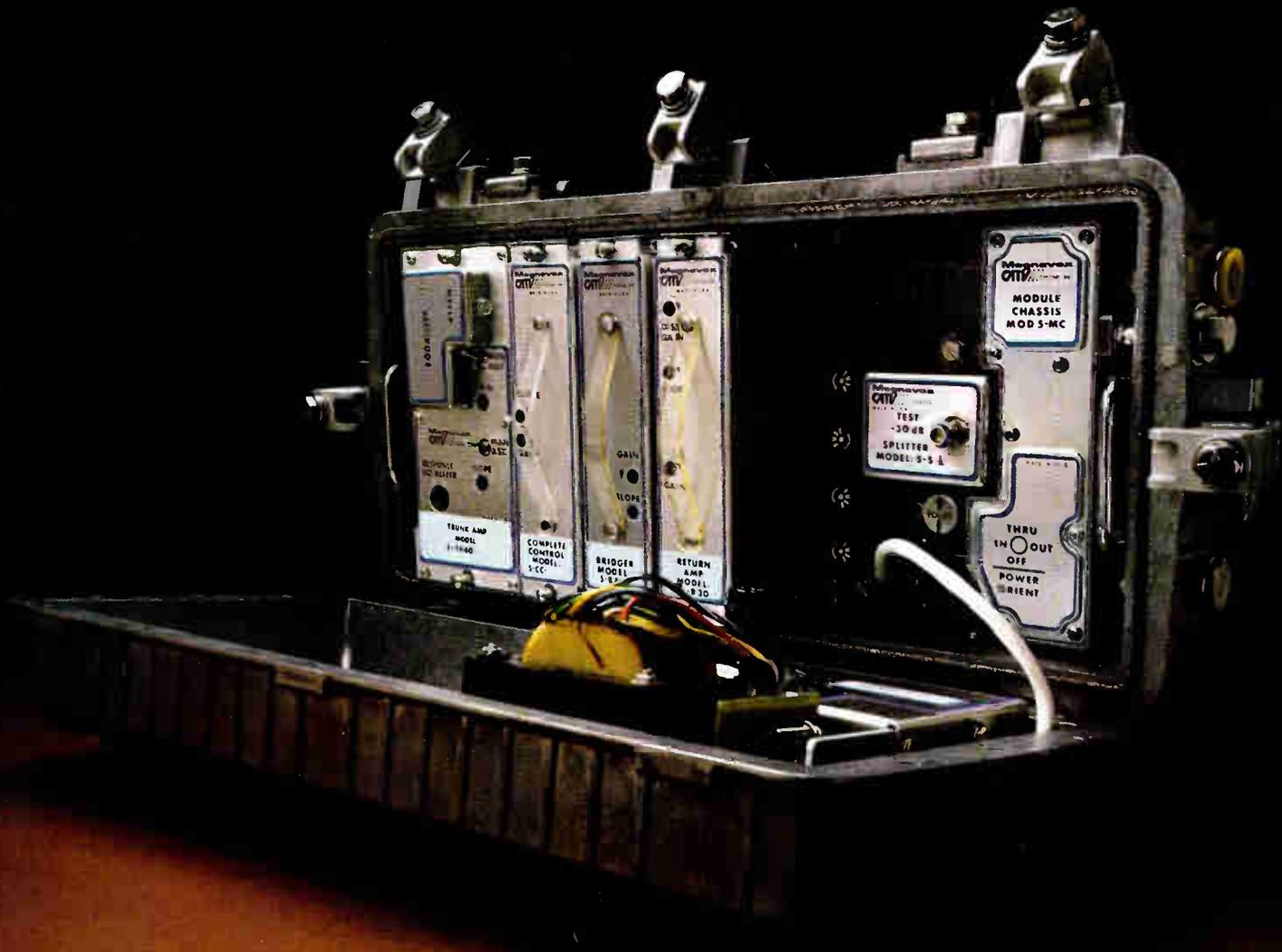
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# DEREGULATION SPURS TVRO INTEREST

## CONSUMER MARKET WARMS UP

by Glenn Chambers  
and Dennis DuBe'



There were varying degrees of surprise around the communications industry when the FCC announced its recent satellite reception deregulation decision. Although many expected some sort of deregulation, few expected it to come so quickly, or to have such sweeping effects.

Going from a mandatory approval system that included equipment specifications, site selection, construction permits, and full licensing and logging, to a system of voluntary frequency coordination and no licensing, the Commission's changes in the legal status of home satellite earth stations has caused a flurry of activity among some manufacturers and distributors of the TVRO equipment.

Getting an earth station into operation once took three to six months, mostly consumed in seemingly endless exchanges of paperwork and phone calls between the user and the Commission. Now they can be installed as soon as the concrete can dry. The freedom from bureaucracy, plus lowering prices brought by advances in earth station technology, has moved TVRO installation into a position of prominence in the CATV industry.

There is an increased awareness in the consumer world, as well. Over 600 people attended a recent conference in

California aimed specifically at home TVRO dealers and users. More than 25 manufacturers displayed lines of dishes, receivers, LNA's, and other home station equipment.

George Jones of American Value, Inc., reported that their consumer TVRO booth at the Consumer Electronics Show in Chicago in June was very popular. "We were swamped by over 500 prospective dealers from almost every state and some 40 countries," he said.

Home TVRO units are projected to hit 5,000 units in 1980, according to Marty Laven, former marketing director for Denver's Videophile, a distributor of home TVRO equipment which carries Gardiner's Starscan line. "New lines of equipment and expanded marketing might help annual sales reach 15,000 units next year," he said. "It's potentially a very hot market," Laven added. "For a low-awareness video product with a high ticket price, it has excellent potential. It would have even better potential if the design and complexity of the systems were simplified, and if prices were lower."

The appearance of lower-cost home TVRO equipment at the Consumer Electronics Show and the Satellite User's Conference has many program suppliers and their attorneys quite

concerned, especially in light of TVRO deregulation. They feel that home TVRO reception of their products could have a significant adverse impact on their penetration into CATV, MDS, and STV markets. They are also concerned about possible extreme complications in light of new copyright laws.

Other industry sources do not agree. Many feel that home satellite reception will never achieve the pricing and simplicity needed to be accepted by significant numbers of potential subscribers.

These sources feel that the majority of urban homes will be passed by coaxial cable, or served by MDS or STV, within the next five years. This is the soonest that industry experts expect super-cheap earth stations to be available in any quantity. Even with greatly reduced prices, systems in the \$500 range for example, the vast majority of people still will not buy home TVRO systems, CATV experts predict. Rural or sparsely settled areas, which may never have access to cable, are expected to provide the majority of home TVRO sales.

The home earth station shows signs of becoming the status symbol of the 1980s, some consumer marketing experts predict, since they may be-

come a fad sales item. Some retailers expect them to enter that segment of the market where home video recorders and hot tubs have done so well. Prices for home TVRO systems now range from a low of about \$2,000 to a high of almost \$16,000.

Although home earth stations may be too expensive for the majority of TV set owners, consumer retailers feel that they are well within reach of those who have already invested \$3,000 or more in a good TV set, a video tape recorder, and a stereo system. As a status symbol, a gleaming white satellite dish may have no current peer.

All may not be roses for home TVRO users and vendors. Most premium programmers are investigating or developing secure signal scrambling techniques for their products. Decoding devices will be supplied only to paying subscribers to the service.

In line with this, Oak, Inc., through its affiliate, National Subscription Television/Phoenix, has filed an injunction against Pirate Electronics of Phoenix. The injunction seeks to prevent Pirate Electronics from manufacturing or selling "any device capable of decoding" pay TV signals. A similar case in Detroit earlier resulted in a preliminary injunction being placed, then lifted. Although not directly related to home reception of satellite signals, these cases are seen as a first step in protecting premium programming from unauthorized reception.

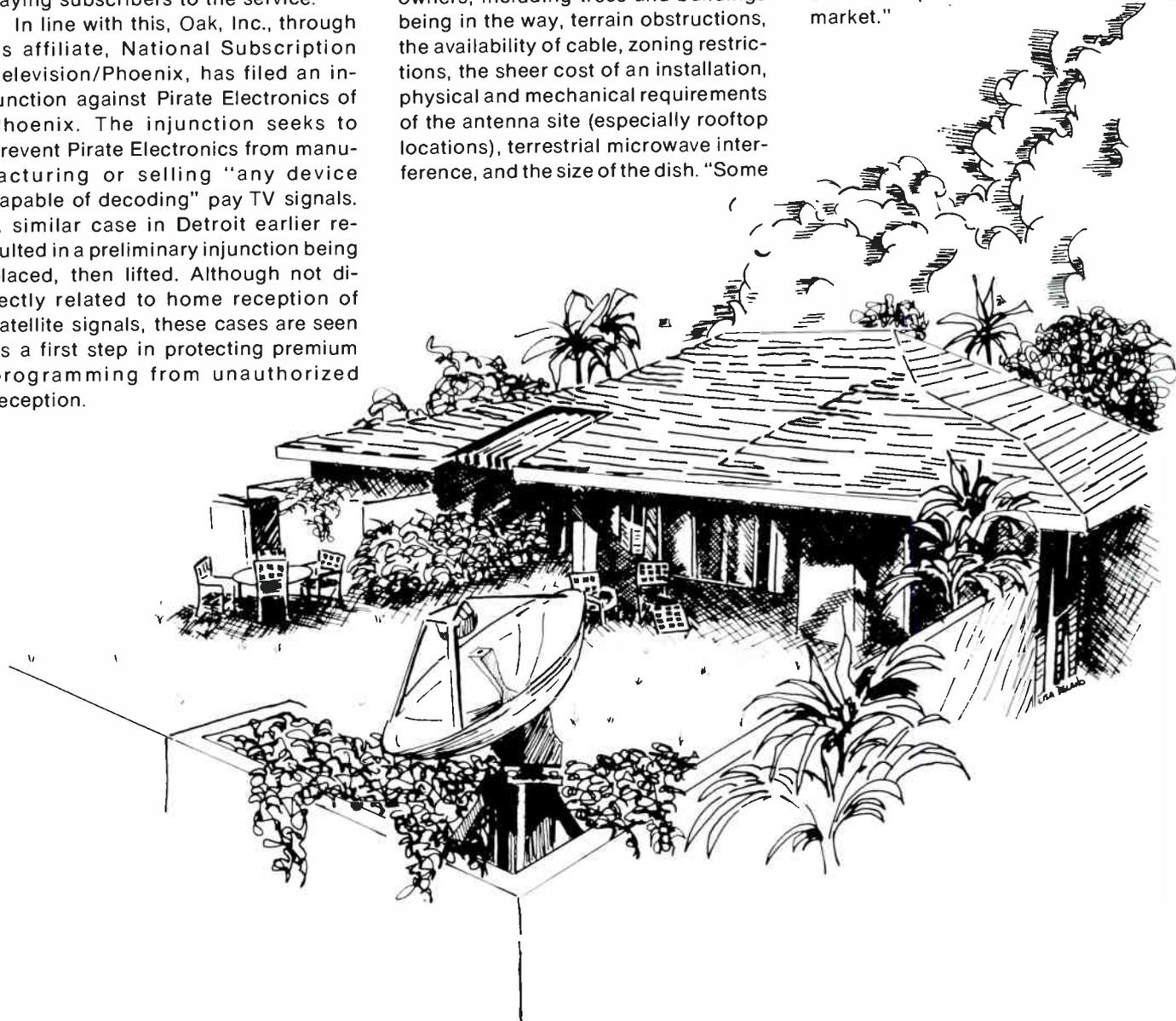
Fred Hopengarten, President of Channel One, Inc., feels that the CATV/MDS fear of home TVRO is groundless and that programmers should be looking at the benefits of MATV instead of worrying about a few people pirating signals. Prevented from speaking at the recent NCTA convention due to protests by Home Box Office (HBO), Hopengarten urged programmers and system owners to look to the potential new markets instead of worrying about a few experimenters and tinkerers. "At four GHz, the number of private earth stations will always be tiny when compared to the number of Cable TV subscribers," he said. "The potential for home earth stations is severely limited."

Hopengarten cited the fact that the same problems which face cable system owners will also face home station owners, including trees and buildings being in the way, terrain obstructions, the availability of cable, zoning restrictions, the sheer cost of an installation, physical and mechanical requirements of the antenna site (especially rooftop locations), terrestrial microwave interference, and the size of the dish. "Some

wives won't permit a big white round antenna in their back yards," he said.

Hopengarten feels that the CATV industry should not oppose home reception, since the same legal barriers that would prevent home reception would prevent some MATV applications as well. "Any attempt to prevent home reception will have a negative effect on the potential for spreading services to the condos and bars," he said. "Since home users will always represent a tiny fraction of the total population served, it seems illogical that such great attention should be paid to frustrating their reception."

"Time, effort, and money would be better spent in promoting satellite TV programming services to the paying customers," he said. "New tariffs should be filed. New contracts should be written with program providers. Direct reception MATV is the next big market."



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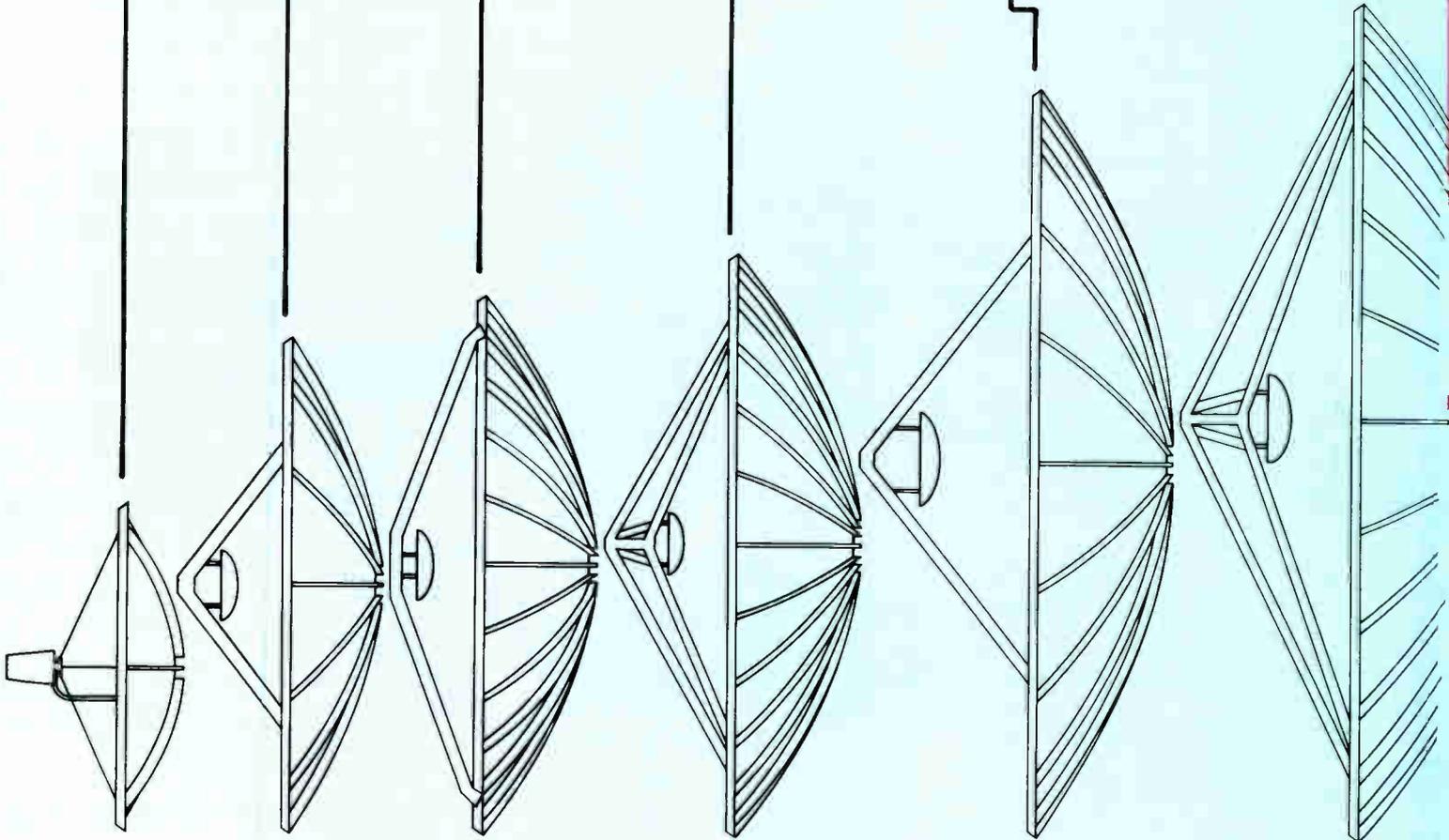
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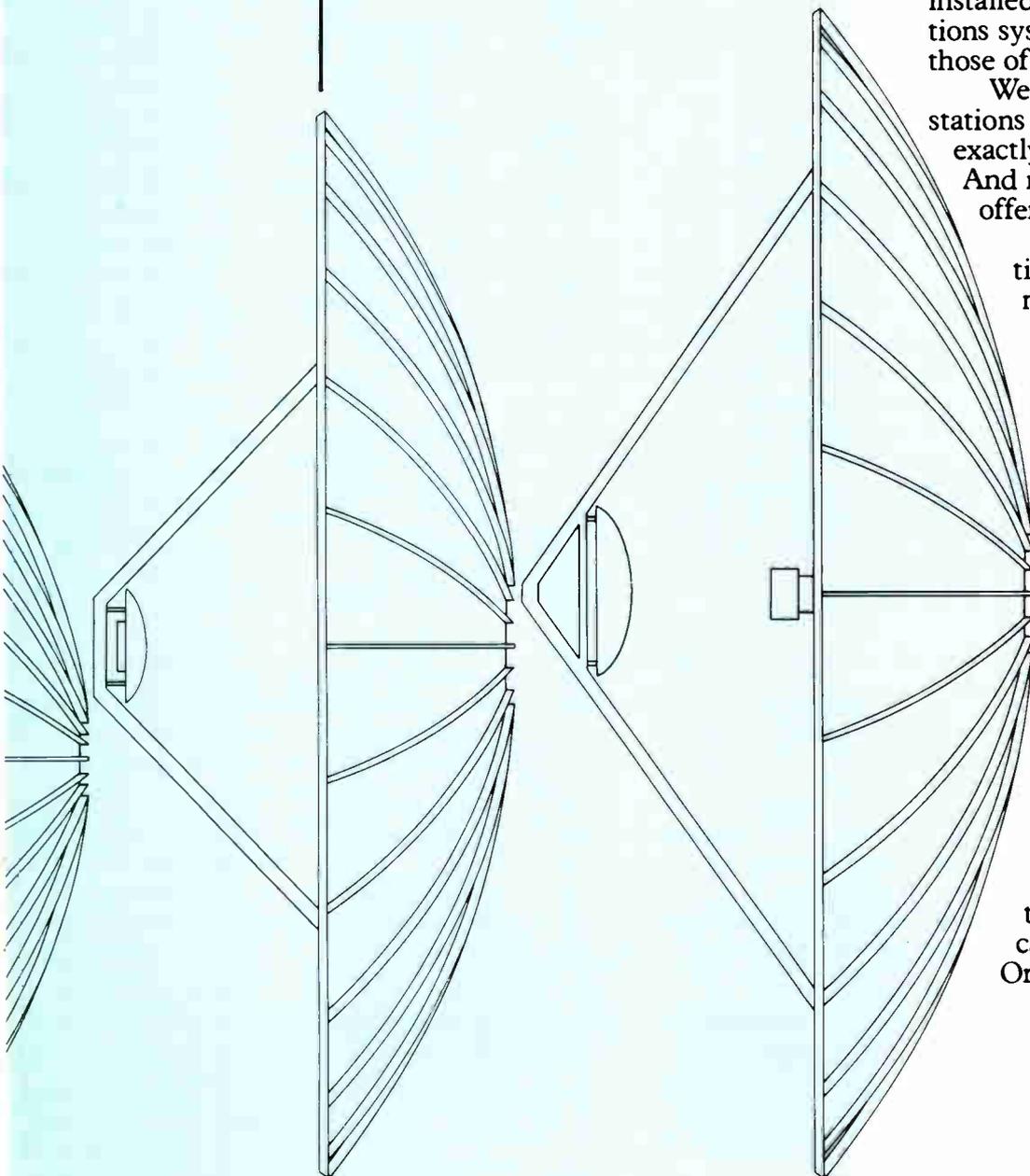
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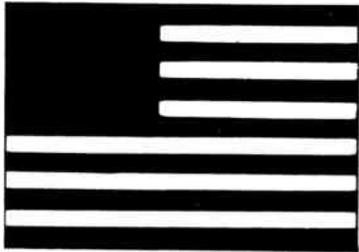
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# Foreign Progress Spurs NASA Research



## UNITED STATES

Foreign potential to enter the American communications market is "pretty good," according to John McElroy, Director of the Communications Division of the Office of Space and Terrestrial Applications at NASA.

"If you look at the various developments in the international telecommunications area, and at the market initiatives in world telecommunications, then you have to say that other nations now pose a serious concern to the U.S. telecommunications market," he said.

McElroy headed an internal study at NASA that gave initial direction to the thrust of space communications research in 1977 and 1978. NASA had been forced in 1973, by an extreme budget crunch, to carve space communications out of their budget and concentrate on earth resources research. Pressure from congress, industry, and the media finally caused presidential order to NASA to get involved in "carefully selected communications technology R & D."

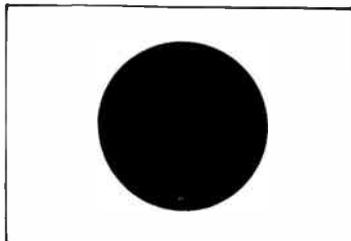
During the period from 1973, when NASA dropped communications, until they picked it up again in 1979, some other countries were able to make significant progress in their research, McElroy said. That factor was one element in spurring American industry to push for a larger federal role in hi-tech research.

Awareness of the eroding U.S. position resulted in a reaffirmation of the

agencies communications policy by the President, who stated that NASA should resume the development of advanced satellite communications technologies. The consensus of both government and private studies of the communications research policies of the U.S. was that, in areas of high-risk technology development for advanced systems, "it is appropriate and necessary for the Government to contribute to research and development activities."

There are major factors forming the basis of NASA's revived communications program, McElroy said. The rapidly growing use of the electromagnetic spectrum, and the growing congestion of the geosynchronous arc in space, define the physical limits of space communications. The possibility of developing technological solutions to the spectrum and orbit problems are the major challenge, and can be achieved by the development of multi-beam antennas, on-board switching systems, high power traveling wave-tubes, and the opening of new frequency bands, he said.

The increasing competition from foreign industries, which are usually government-subsidized, must be a major concern, he said. "Take traveling wave tubes for example. The Europeans are the leaders the TWT business because they have had a large effort in the 12 GHz area. It is quite clear that Thompson-CSF and Telefunken are world leaders in that area," he said.



## JAPAN

"If you look at Gallium Arsenide field-effect-transistors, which are a key element in future space communications, you have to acknowledge that the Japanese are the leaders.

"If you look at innovative new space systems, at direct broadcast satellites, if you look at the German DBS and the French DBS systems, if you look at the new 30-20 GHz activity being proposed by the Italians, and being studied by Germany, France, and England all semi-independently, then you have to admit that the international situation poses a very serious concern for American industry."

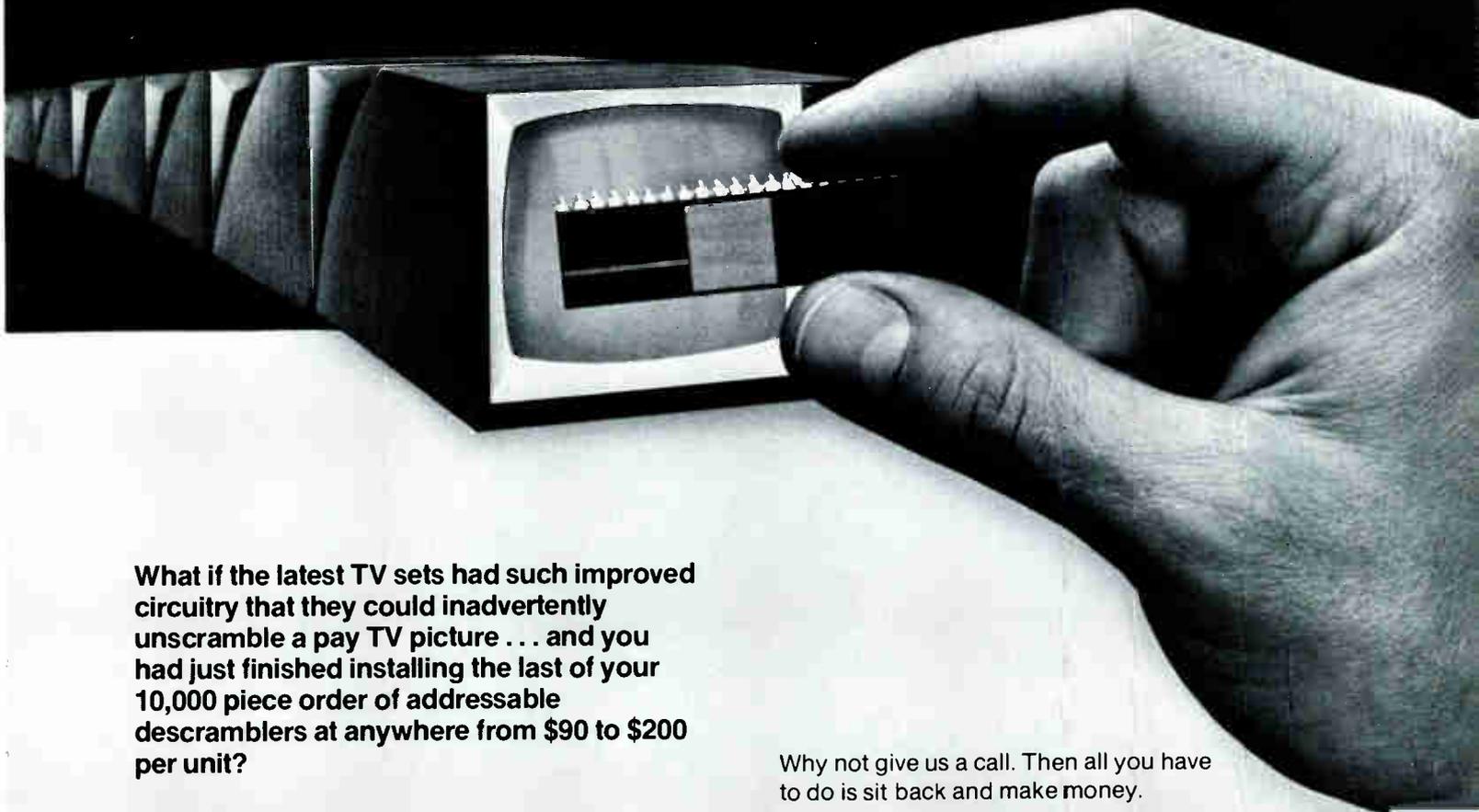
"You can't rack all these programs up together and say that they are definitely ahead of the U.S.," McElroy said. "That would be a bit controversial. Certainly, many of the other nations feel that they are ahead, and their advertising in this country reflects that attitude. And some American manufacturers feel that way also.

"But other American companies feel we can compete against them very well, very effectively, and are ready to challenge them," McElroy said.

"There are certain component areas where they are certainly ahead, and they are doing some awfully innovative things right now. I'd say their potential to capture business in the U.S. is pretty good."

McElroy cited a growing public demand in the U.S. for more innovative, low-cost communications services, especially emergency and medical services, as a major impetus in the satellite communications research. He also pointed to the increasing cost of transportation as a factor leading to the congestion of communications channels. Studies done for NASA by Western Union and U.S.T.&T show that, projecting communications use in all categories allowing for cross-impacting, American communications demand will require the equivalent of 1,000 full-bandwidth video transponders in space by the year 2000. Current transponder technology and orbit congestion only allow around 670, while multi-beam antenna and on-board switching technology could raise that figure to 2,352, he said.

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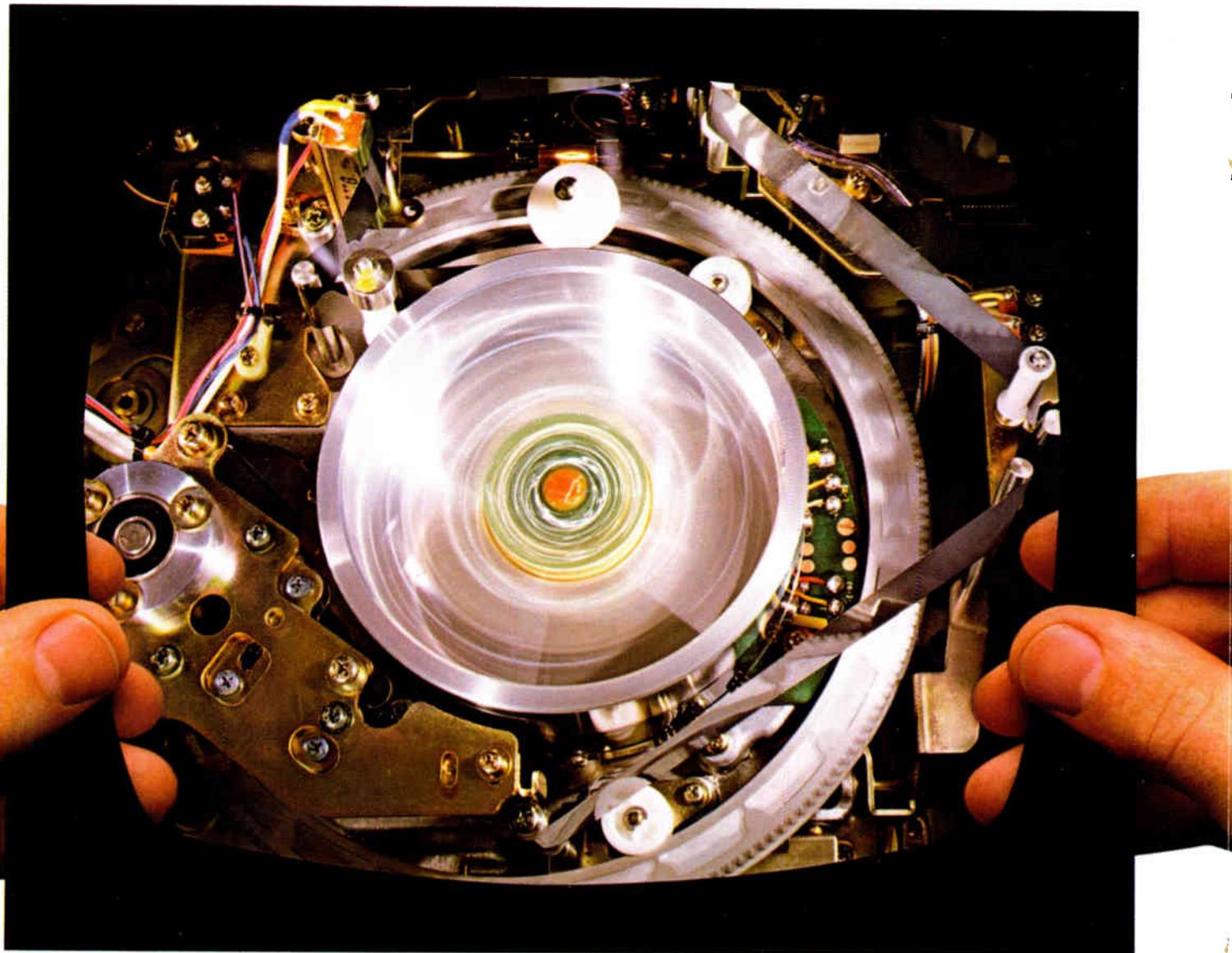
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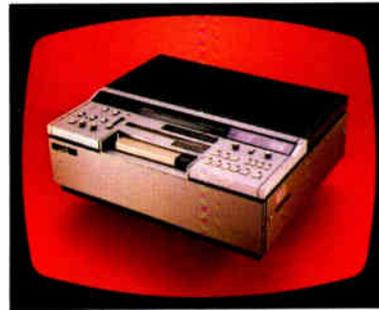
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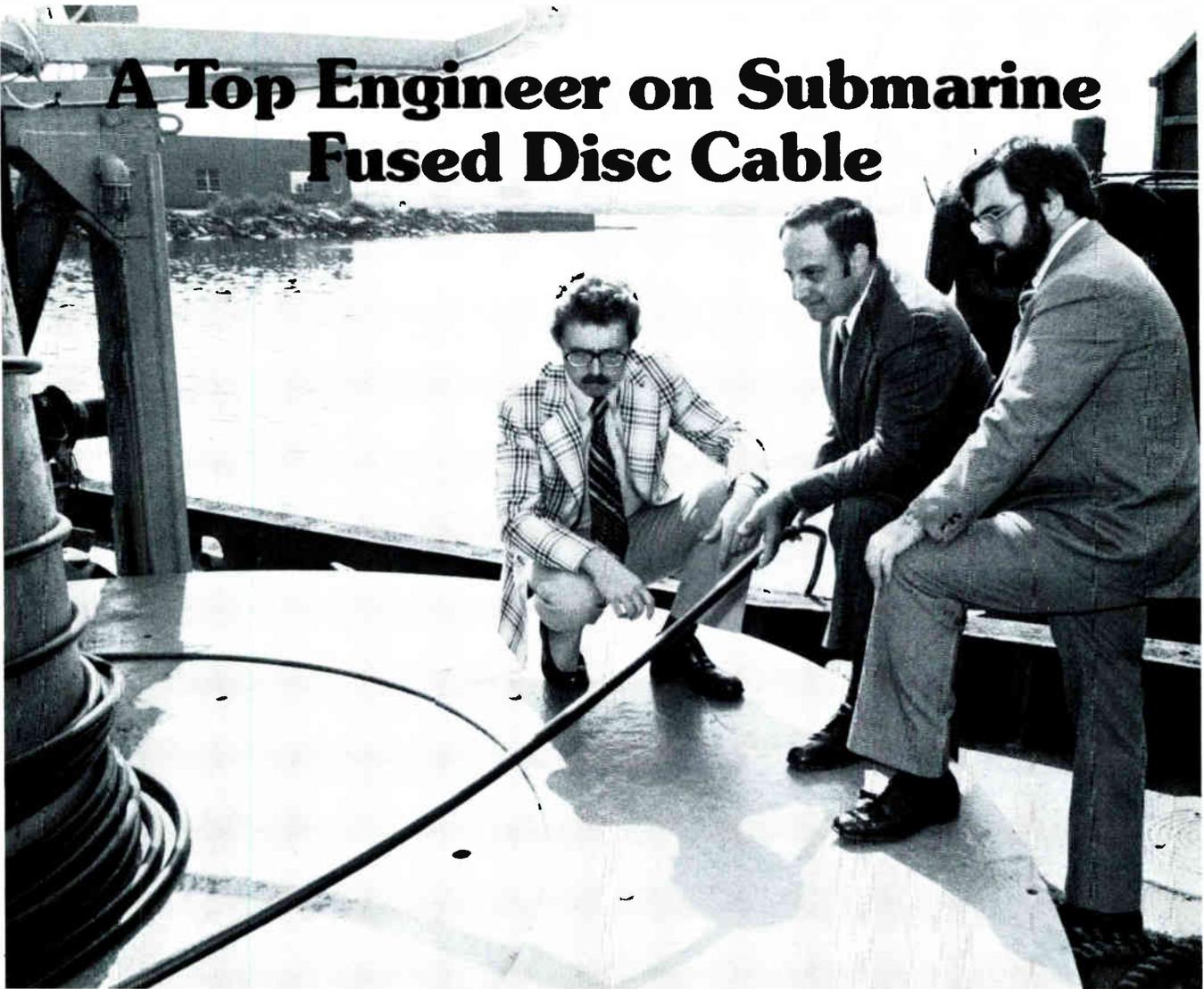
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# PC Antenna Coming for Home, Business Markets

By Dennis DuBe'

A not-so-new technology for antenna design may be creeping toward the Television Receive-Only market, thanks to recent interest in consumer-priced earth stations spurred by the deregulation of reception by the FCC.

Developed at Ball-Aerospace over a decade ago, phased-array antennas etched onto printed circuit boards may be heading for a wide variety of applications in the consumer and CATV markets. Used extensively for years on military and NASA satellites, the technology is being actively considered by Ball, Comsat, RCA Americom, Bell, Scientific-Atlanta, Hughes and TRW.

The push in antenna design, and in wave-propagation research, has been a high priority for American companies for years. Most research has been done in the past in connection with the space program, although the National Bureau of Standards has maintained a permanent wave-propagation research facility for decades.

But the interest in PC antennas has been recently sparked by the booming interest in the MDS and DBS areas. In interviews conducted over the last two months, *C-ED* has learned that several large companies interested in both the commercial and consumer aspects of MDS and DBS technologies have been giving PC-array antennas a close look.

Developed originally by George Munson of Ball Aerospace, the antenna design is based on having hundreds of quarter- or half-wavelength strips etched onto a printed circuit board. Each antenna element is coupled directly to a low-noise IC pre-amplifier. The combination of multiple antenna elements and multiple pre-amps gives the antenna a powerful, clean characteristic. That, at least, is the goal of current development work on the technology.

"I don't want any publicity now," Ball's Munson said, and he was soon echoed by researchers at Comsat, who said, "We are basically not even talking to the press on this subject." But

sources within both companies, and others, indicated that planners and researchers are interested in moving the technology to the production phase.

"It's safe to say we are interested in it," said a Comsat employee, who asked not to be identified. "We are interested in the technology, the associated areas of receive-only terminals," he said. "But you know that already. Obviously, we are looking at what's already been done, trying to evaluate new thoughts. I guess it's safe to say that some types of array antennas are candidate thoughts."

"In the general scheme of things, you can put two and two together," said a worried source at RCA Americom. "Any prudent organization looking into this area would examine the obvious possibilities. We don't yet have a single preferred model, but anyone who stops for a couple of days and asks 'How many ways are there of making antennas?' will have to come up with the PC board as one very logical candidate. It can be made for pennies.

"Beyond that, I can say nothing."

Comsat and others allege to have no contract for technology rights from the holder of most of the patents in the area, which is Ball-Aerospace. There is no formal relationship among the corporations on the subject, but most seem positive that the direct broadcast technology will have ample applications for the PC antenna.

"This stuff is real explosive," said Ball's Munson. "It's a toss-up whether it will be a success at the larger dish sizes or not. The real applications for this technology in the past have been NASA and the military, who need to conserve weight on board spacecraft.

"Large aperture antenna in the sky will really simplify problems on the ground," he said. "If Comsat puts up the more powerful satellite that they have been discussing, then it's really going to happen. The technology is being developed, and someday we are going to build a really large antenna in space.

"It might be a year or two until we get one working that could replace the three-foot dish," he said. "The efficiency is higher for the PC board than for the dish at that size, but for larger dishes . . . I don't know.

"I think it will probably be competitive in the three-foot variety dish, less expensive, and a heck of a lot nicer to look at," he said. The PC antenna designs so far have covered the same surface area as the equivalent dish, Munson said, although they are flat and can be mounted vertically or horizontally. The working concept for the antenna shows it mounted under the eaves of a house or on the roof of a building, instead of being a conspicuous dish installation on the front lawn or in the parking lot, Munson said.

"It's just futuristic at this point, though," he said. "There is no hardware built yet."

Scientific-Atlanta's Jim Farmer predicted that there won't be much of a market for this particular technology in the U.S. because "the nation will be pretty much wired for cable by the time this stuff comes down the pipe.

"There won't be much of a market for direct satellite-to-home because I don't see the total cost of an earth station coming down where you could justify that compared to the cost of a cable hookup," he said. "There might be enough support to sustain a service aimed at amateurs and experimenters,"

he said, "but the major market for that kind of thing would be people who can't get cable now and aren't likely to ever get cable because they are located in very remote areas.

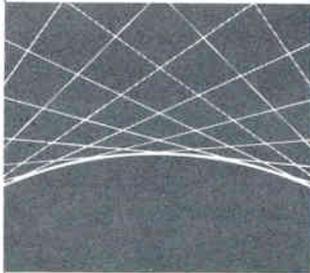
"The most expensive component of an earth station is the LNA," he said, "and I don't see the cost of the LNA coming down very rapidly. Sure, you can pick up a cheap dish or invent a new type of antenna, but I kind of look with a jaundiced eye at reducing the cost of the electronics right behind the antenna. Maybe there are some breakthroughs on the horizon that could change, but right now we are talking about a fairly severe problem, especially at the higher frequencies like 12, 14, 20, and 30 GHz.

"We have been selling TVRO equipment to individuals through cable systems, primarily to remote subscribers hooked up to whatever programming sources are willing to sell on an individual basis. We have stayed out, and are going to stay out of the market of people who are trying to sell earth stations to people who are going to pick up HBO and things like that without paying a subscriber fee."

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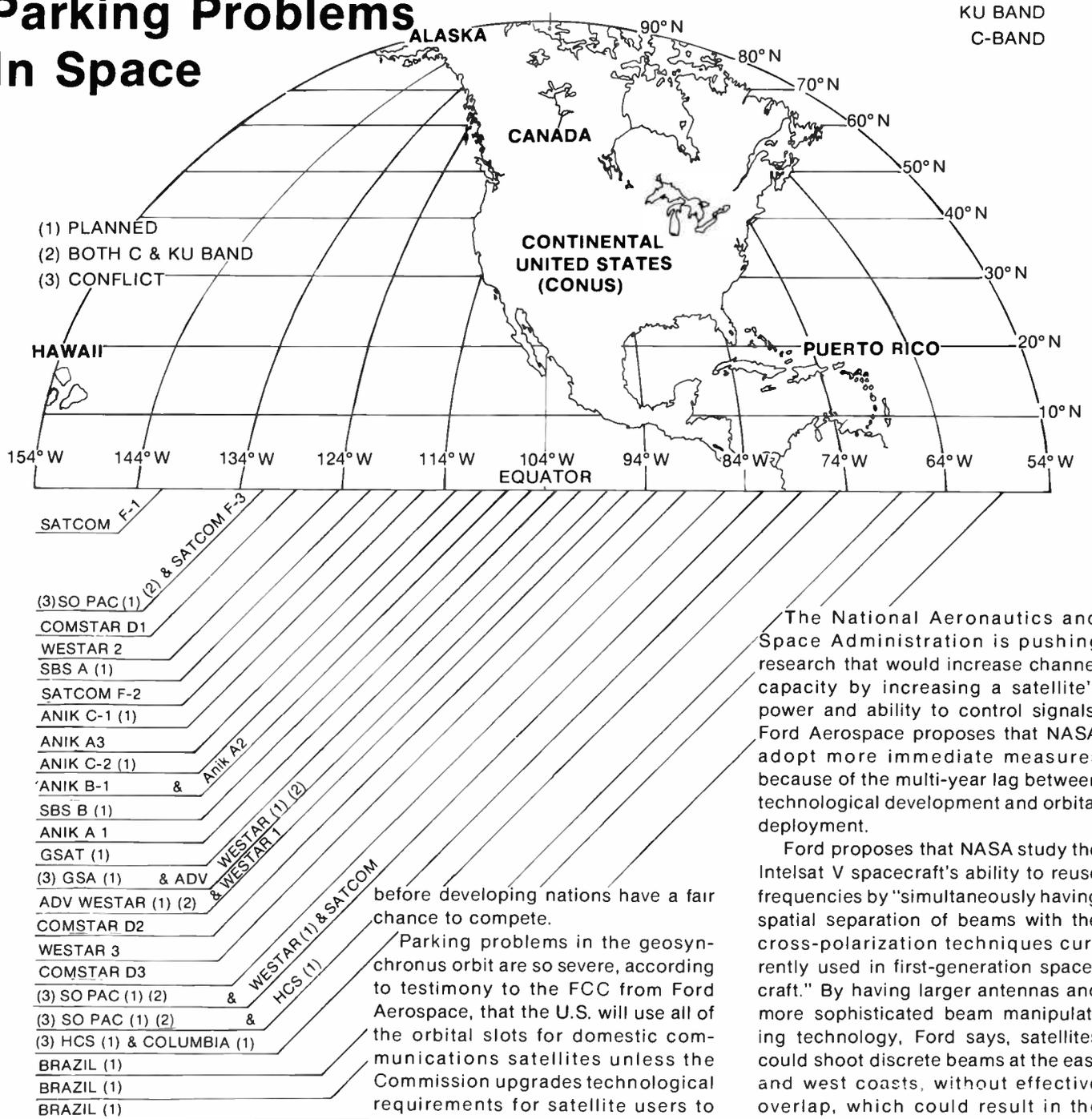
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# Geosynchronous Orbit Congestion Parking Problems In Space



The National Aeronautics and Space Administration is pushing research that would increase channel capacity by increasing a satellite's power and ability to control signals. Ford Aerospace proposes that NASA adopt more immediate measures because of the multi-year lag between technological development and orbital deployment.

Ford proposes that NASA study the Intelsat V spacecraft's ability to reuse frequencies by "simultaneously having spatial separation of beams with the cross-polarization techniques currently used in first-generation spacecraft." By having larger antennas and more sophisticated beam manipulating technology, Ford says, satellites could shoot discrete beams at the east and west coasts, without effective overlap, which could result in the ability to utilize a single frequency up to three times at once.

Ford also urges that the U.S. switch its launch priority over to the Atlas Centaur class rockets, instead of the Delta class, which have a much larger payload capacity (4,800 lbs. vs. 2,750 lbs.).

The chart shows actual and proposed satellites, and their orbital parking spots.

NASA calls geosynchronous orbital positions "precious"; Ford Aerospace & Communications Corp. calls for quick changes in communications satellite technology to prevent a "crisis"; the International Telecommunications Union is worried that U.S. satellites will take up all the "parking" spots for the Western Hemisphere

before developing nations have a fair chance to compete.

Parking problems in the geosynchronous orbit are so severe, according to testimony to the FCC from Ford Aerospace, that the U.S. will use all of the orbital slots for domestic communications satellites unless the Commission upgrades technological requirements for satellite users to increase channel space.

The incredible growth in satellite channel demand, triggered in part by the success of pay-TV services and cable networks, has caused a large number of new applications for satellite transponder licenses to come in to the FCC. If the commission grants all the requests on their docket now, it will preclude Canadian or South American participation.

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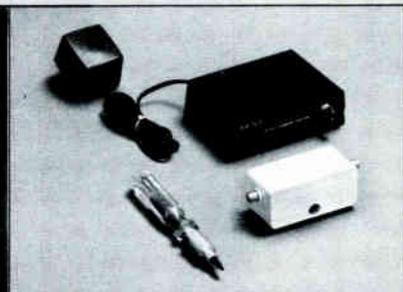
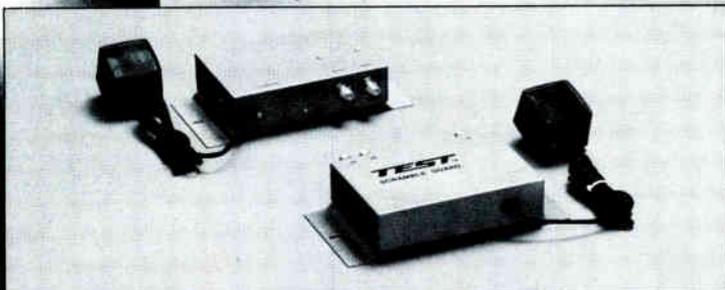
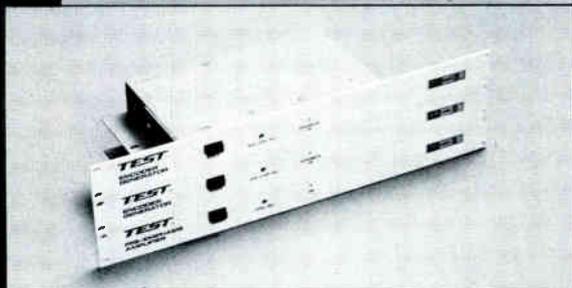
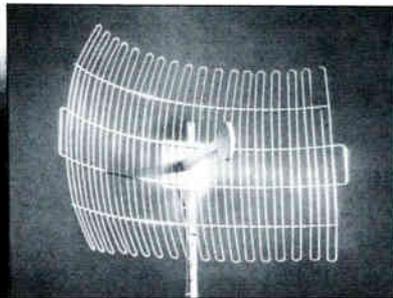
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# DOMSAT CAPACITY ADEQUATE THROUGH 80 FREQUENCY AND SLOT PROBLEMS PREDICTED FOR 90's

Citing the poor history of communications technology forecasting, speakers at the 2nd Annual Satellite Communications Users Conference predicted adequate but tight transponder capacity aboard domestic communications satellites through the end of this decade, but warned of both frequency and orbit congestion problems for the 1990s.

Winston Himsworth, vice president of Salomon Brothers, said that there would really be no severe capacity problems on the second generation satellites, which will start going into orbit this year, but that "there is an excellent chance that there is going to be frequency or slot constraints when we get to the third generation of communications satellites."

Speaking in a panel on the future of satellite communications, Himsworth compared the performance history of the first generation satellites with the plans and predictions for second and third generation birds. "I am humbled by the poor history of technology forecasting," he said. "We have seen a lot of technology proceed faster than predicted, and we have also seen the phenomena of futuristic shock, of techniques that are projected and never really quite developed," he said.

The opportunities for the future are dependent on the transponder capacity of the satellites and the number of vendors actively using satellites, he said, based on the history of communications transponder space through the end of the decade. The perceived shortage of capacity on the satellites now is due to the unexpected development of CATV programming in space. "It is interesting now to look back and say that without the development of CATV applications and other broadcast markets, the actual traffic we see today would not have supported existing systems."

"Very little was known in the early 70s about the real demand for satellite services. There were questions about

whether the demand could support the six systems that were originally proposed despite some relatively optimistic expectations of demand growth and the development of new business services."

Himsworth noted that the existing satellites would have a lot of excess capacity now if some of the CATV services hadn't come along. He raised planning questions about the next generation of satellites based on the experiences with the first. "SBS will be the first of those launching and will be followed by systems from AT&T, RCA, and Western Union. There are three other proposals," he said. "The questions you have to ask yourself now are exactly the same as those we asked, or should have asked, for the first generation," he said.

"Will demand expand to provide profitable loading on all seven systems? How serious are all the applicants and will additional proposals arrive? We must consider the demand and capacity considerations," he said. "We are at a stage now where there is a much greater understanding of the role and advantages of satellites. Terrestrial transmission is obviously far from dead, but the large number of applications for satellites is natural."

There is a perception that a company with a domestic satellite in place in an orbital slot and with a base of customers, will be allocated an appropriate slot in subsequent generations of satellites," he said. "Therefore those who want good spots in the 1990s, when things are going to be a little tighter, are going to have an incentive to launch systems now, regardless of their initial profitability," he said, pointing out that such advance work will be the primary cause for adequate transponder capacity through this decade.

"I think at least six applicants are going to go forward with their systems. I think that there will be excess capacity. Capacity is tightening right now

due to the lack of ground facilities, not due to the technical capacity. The real crunch on capacity and orbital slots is expected in the 1990s, which is a problem for the third generation satellites."

"It is at that point we are going to need some technology to optimize the C and Ku band utilizations, and we may then need some 20-30 GHz systems."

"There will be a rush to stake out market and orbital slots, which is going to free excess capacity," he said, "in the 1983-88 time frame." If demand grows unexpectedly, you may see some other things, like frequency reassignment and a narrowing of the spacing between satellites in orbit, he said.

"For users with carrier aspirations, there will be multiple opportunities for joint ventures," he said, "especially if this excess capacity holds down prices for basic services."

Walter Morgan of Comsat labs expressed a similar view on satellite demand. "It's like a snowball rolling down hill," he said. "The snowball has already picked up some private line services, cable television and remote broadcasting."

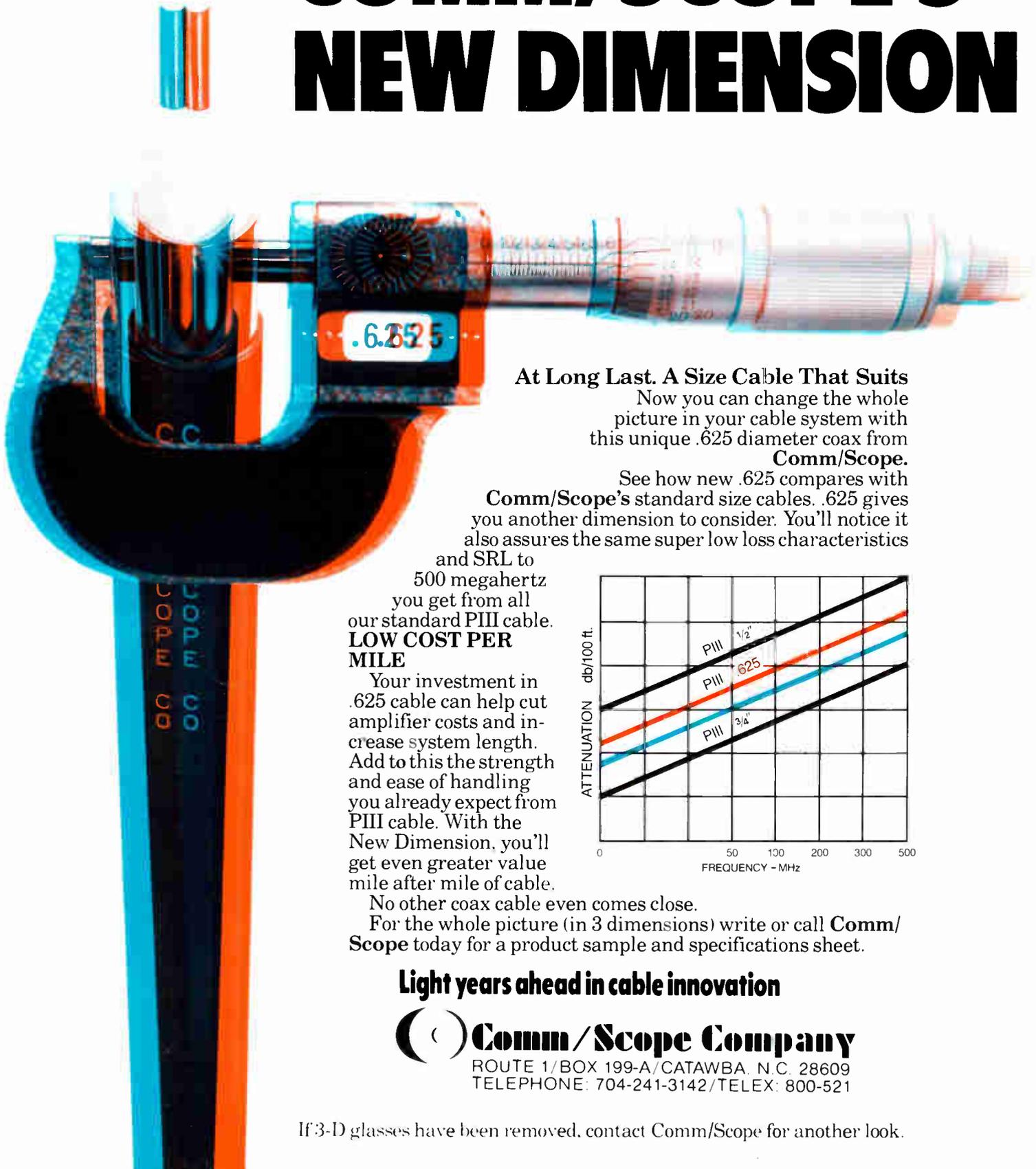
"In less than five years we have gone from the case where there was plenty of transponders to the point that people are fighting over the few that are available," he said.

"The space shuttle, when, if, where it flies, will have a profound impact on this industry," he said. "Weight will no longer be a constraint which we have had for years. Power will not be the constraint. In fact, the constraint becomes something called density."

"This is a very dynamic, a very growing business," he said. "There is so much business to share among so many participants, it seems foolish to engage in backbiting, counterproductive competitive efforts."

"I think we ought to move forward in this whole business. There is just plenty of it for all of us."

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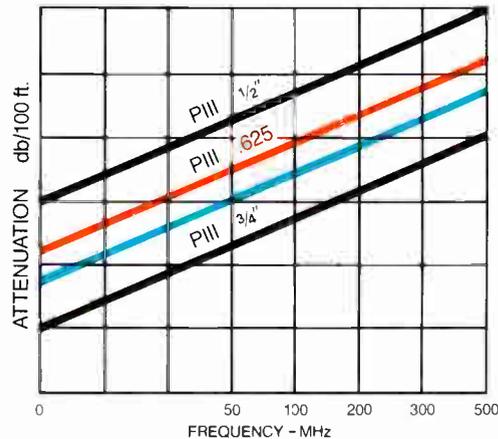
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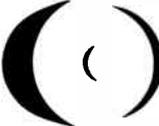
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# Underground

## Cheaper, Quicker

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Undergrounding cable plant is both quicker and cheaper than aerial construction, due mostly to the delays and "Mickey Mouse stuff" from utility companies, according to Wayne Sheldon, who led an energetic seminar on Underground Construction at CATA's CCOS '80.

Held the week of July 27 at Snowmass, Colorado, this year's gathering featured several educational sessions in addition to the construction seminar and business sessions, which included a live video teleconference with Rep. Tim Wirth (D-Colo.), live from Washington via satellite.

"There are two reasons for going underground," Sheldon said, "Franchise reasons, especially where all the other utilities are under. But in many situations it is actually cheaper to build underground than overhead. It's cheaper to go down than to go up."

The actual construction is more expensive, he said, but added that the mitigating circumstances in aerial construction actually make undergrounding an economic alternative. "You take a five year picture and you find quite often that undergrounding is cheaper," he said. "Further down the road it can be even cheaper yet."

"The first and foremost cost consideration is the make-ready. In addition to that, it's the delays and the Mickey Mouse kind of stuff you have to put up with from the utilities that is a major cost factor.

Make-ready is a factor," he said. "There are very few poles that have room for CATV. In a lot of parts of the country, make-ready would be a minor thing, but one horror story on a system on which we were once building, they wanted twelve thousand dollars to change one pole. As it turned out it would have been a very expensive pole

to change, so you can run into these things."

Sheldon, of Sheldon Electronics in California, said that the key to successful undergrounding is pre-construction engineering. Locating underground services and obstacles can save much time and money later. "If you don't do it right, you can't build it right," he said. "The first thing you do, before you even do your plant layout, is to go the local underground information service... and tell them where you plan to dig. They will alert anybody who is registered with them that has anything underground in that area," he said. He added that the types of services to watch out for include the power company, the gas company, the telephone company, the water company, the "various and sundry" pipeline companies, and often the wiring for street and traffic lights.

"When you get the maps from these companies, and get all the important stuff together you will know which streets they are in and quite often which sides of the street they are on," he said. "Then you can do your layout on your system, because in many cases you can avoid major conflicts of underground services. If you've got to go down six inches from a 12,000-volt, or a 60,000-volt power line, you've got major problems. But if you know that that line is going down first street, then you can take your cable down third street."

He pointed out that the situation with insurance is different for undergrounding than it is for aerial. Any time you tell an insurance agent that you are digging a trench, the first thing he visualizes is a trench four feet wide and eighteen feet deep, and sees it caving in and killing the whole crew. "I've had to take the guy by the hand and take

him out to a job site," he said, to show him a trench "six inches wide and no more than three feet deep. The worst thing that could happen is some guy can step in it and twist an ankle or break a leg."

He also advised maintaining a high deductible on the construction policies, insofar as damage to property is concerned. "There are two reasons for this," he said. "It's a lot cheaper, and it keeps me a little bit careful about cutting into their people's services." He recommended a \$1,000 deductible, because "It's a very rare case that you'll have a claim that will go over \$20 or \$30. If you cut a water pipe or something it takes a bandaid which costs ten bucks and a few minutes to fix it."

Property easements are another trick for undergrounding, he said. "In most cases utility easements will not apply for CATV. In many cases they will, but in most cases they will not."

"I know of several cases where land owners have fought and won not allowing cable to go on where power and telephone already were. If you have a county franchise it depends on the fathers of the county, what their easements say. But in aerial construction do not assume that their easements will apply."

"We get an encroachment permit (from the property owner) which is just a piece of paper that says 'Yes, they gave us their right to go in there and do it.'"

"It's considerably less than an easement, because it is not really a formal lien on the property. But I've never had any trouble with it," he said:

The CCOS also featured sessions on computers, cable system basis, low cost system update, personnel management, antennas, and selling cable

# Small Lifts Handy Aerial Baskets Useful To CATV Crews

The small aerial units have come of age, thanks to the incredible price of gasoline. Composed of a "cherry-picker" mounted on a panel or service truck, these units have become predominant in the cable and electrical contracting industries.

While both the telephone companies and the electrical contractors represent an older, more established market, it was the CATV industry that first adapted the aerial baskets as their major installation and maintenance tool.

How important are the new hydraulic units? That, of course, depends on where your system is located. Don Mackan, Pullman TV Cable Co., serving Pullman, Washington and Moscow in Idaho, estimates that only 25 percent of his installation work requires an aerial device. Because of the nature of this college market, most of which is apartments or underground, small weight pick-ups do the majority of his installation. The heavier units, using pump power take-off methods of operation, have for all practical purposes been placed on standby, required only in emergency aerial construction.

"Electric over hydraulic is the best way to operate," reports Mackan, past president of the Northwest CATV Association. "We faced the gasoline situation 5 years ago, knowing it would never be cheaper. We examined the electric over hydraulic systems. They have measured up to our specifications in every way."

Pullman uses his aerial units 100 percent of the time, but on only 25 percent of his installations and maintenance, while Gary Wightman of Kalamazoo, Michigan, uses his aerial devices on 90 percent of his work.

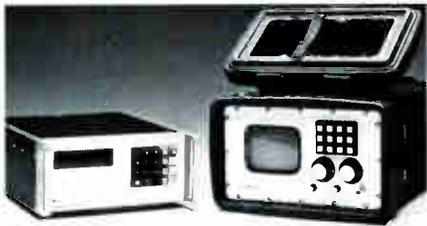
They are also efficient, according to

Ken Young of Teleprompter Corp., Kalispell, Montana. Ken has been with the cable business long enough to be called a veteran, and says "I can still get up a pole as fast as anyone using an electrical and mechanical ladder, aerial lift or hand ladder. But you have to consider two things. First, why train anyone to go up a pole on spikes when the aerial units are available; especially since aerial units have a basket that carries tools, meters and the other things you need. Pulling up a meter on a handline just doesn't fit into our concept of efficiency. And something else we consider carefully: We've never had

an accident with the aerial units, while anyone who has depended on spikes over a period of time will sooner or later have an accident of some sort."

The best figures on the subject of operating costs, are obtained from Earl Ake, Cox Cable, Atlanta, Georgia. "Several years ago, when it was apparent gasoline was going out of sight, we experimented with the electric over hydraulic systems," he said. "They were most successful. We're now saving 40 percent overall maintenance costs, electric over hydraulic, versus pump power take-off. We recommend, however, that you be sure the truck





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manufacturer installs a special heavy duty alternator, in the vicinity of 100 amps."

Earl adds that Cox Cable is considering converting completely to the electric-over-hydraulic units. Purchase of pump-power take-off units are not being considered at this time. And, as an aside, the elbow units are the most practical for their territory.

One final note from Earl Ake, whose notice of figures has come to the attention of more than one: "An aerial basket will just about double the working output of one man per day." Any comparison of past tools shows that prior to the aerial baskets, any other way of getting up in the air was either grossly inefficient, or had far too many maintenance problems. Most systems now have aerial baskets for installation or maintenance.

The CATV industry's uses of the aerial baskets are interesting. The elbow, or articulating, units are used

most often for installation. The telescoping, or "squirt" booms are used more for maintenance by the technical crews. Wightman prefers the articulating units. "The elbow units can get in and out of tight places far better than the telescoping units," he said. "Of course, the telescoping units have a longer lateral reach, but the elbow units get into and out of more of the tight places we have to work."

Teleprompter's Ken Young prefers the telescoping units. "Whether a basket should be telescoping or articulating depends on the area of operation, and a good bit on personal preference," he said. "High theft and heavy traffic areas need telescoping units to keep all tools, especially systems analyzers, out of sight and out of the weather."

The small aerial unit industry is little more than a decade old. The electric-over-hydraulic system is even younger than that, coming into the fore so predominantly of late because of skyrocket-

ing gasoline prices. The unit puts in a full day's work, while charging the power pack from the heavy duty alternator while driving from point to point.

It was UEC Manufacturing Co. that brought the electric-over-hydraulic to its present state of the art. The Oklahoma City firm has been assembling the big aerial units for the utility industry for over 20 years, so it was natural that they develop the small units when it became apparent in 1973 that gasoline would continue to become scarce and much more expensive. Today Skyjackers and Skyvans are number one in the electric-over-hydraulic aerial lift industry.

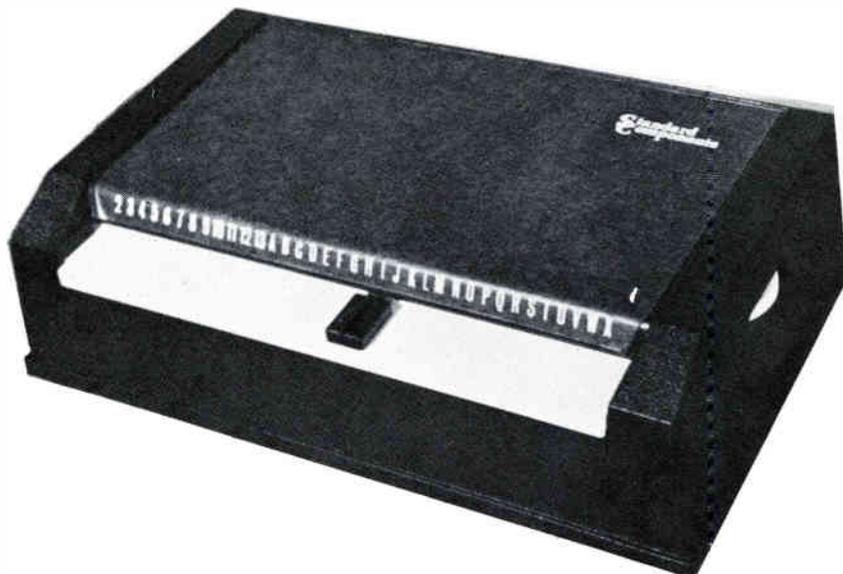
"We think the CATV industry will continue to lead the way in the use of the small aerial devices," said Leroy Hatfield, general manager of UEC Manufacturing. "They were the first to adopt the units completely, and the CATV industry isn't going any way but up."

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# Coherent Headend Beats Distortion

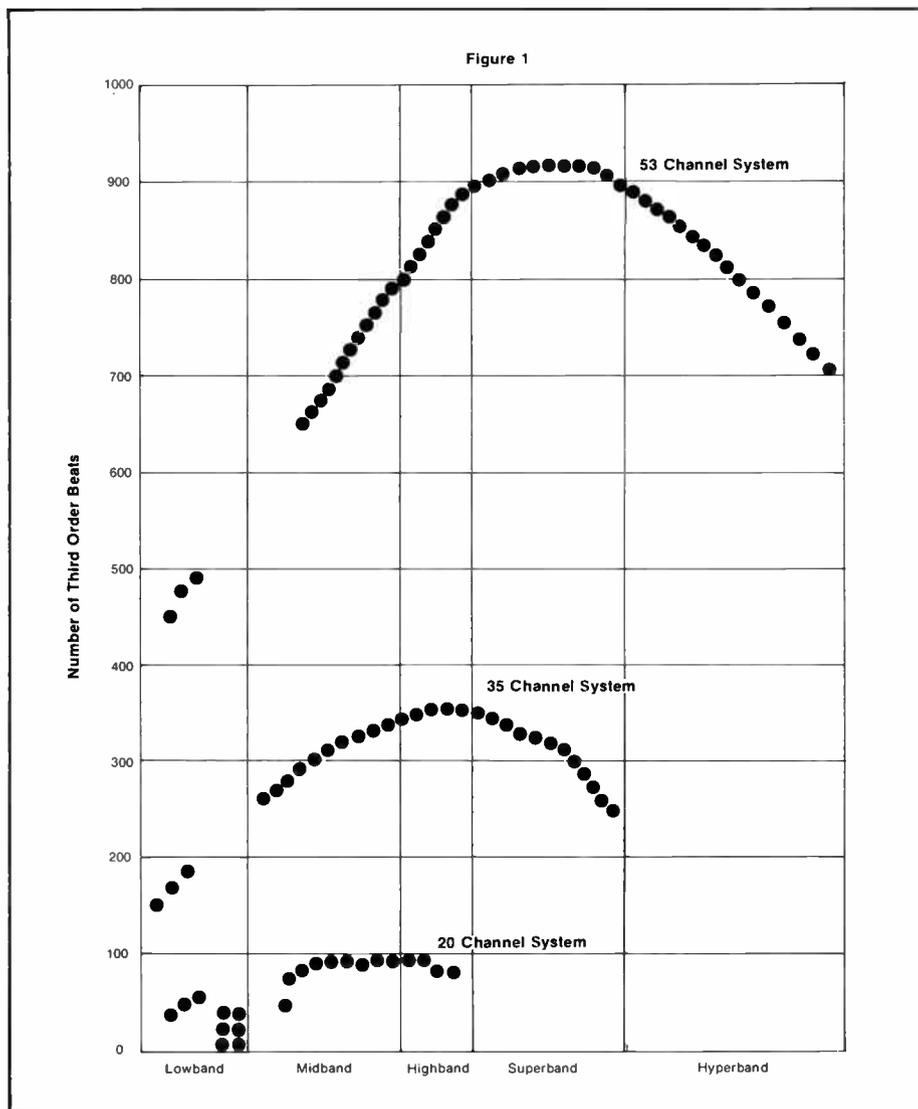
by Bert Rosenblum, Phasecom Corporation

A quiet legal battle over patent rights rages as Phasecom, Scientific-Atlanta, and Jerrold maneuver to control the Coherent head-end technology. Phasecom, Inc., a California-based CATV equipment manufacturer, claims to have developed the technology with the aid of Israel (Sruki) Switzer. That claim is being challenged by Jerrold, through a suit attempting to quash the patent rights.

The technology was first marketed by Phasecom in 1973, offering it to cable systems as an alternative to open-ended amplifiers. Essentially, an HRC headend completely eliminates the effect of intermodulation distortion in a multi-channel system, according to Phasecom. Coherent modulators have eliminated the instabilities associated with complex phaselock loops and have added the capability of reducing cross modulation distortion through phase optimization techniques.

Amplifiers are imperfect—they are not absolutely linear in their normal operating range. These non-linearities produce distortion—the presence in the output of unwanted frequency components that were not present in the input.

The most limiting type of amplifier distortion is called intermodulation distortion, defined as impaired fidelity resulting from the production of new frequencies that are the sum of, and the difference between, frequencies contained in the input. Since the strongest component of a TV signal is the video carrier, it is the sum and differences of the various video carriers carried in a multi-channel system that dominate as distortion products. The most important ones are of "second order" and "third order"—i.e. the new signals are at frequencies corresponding to all the ways that the input video carriers can be



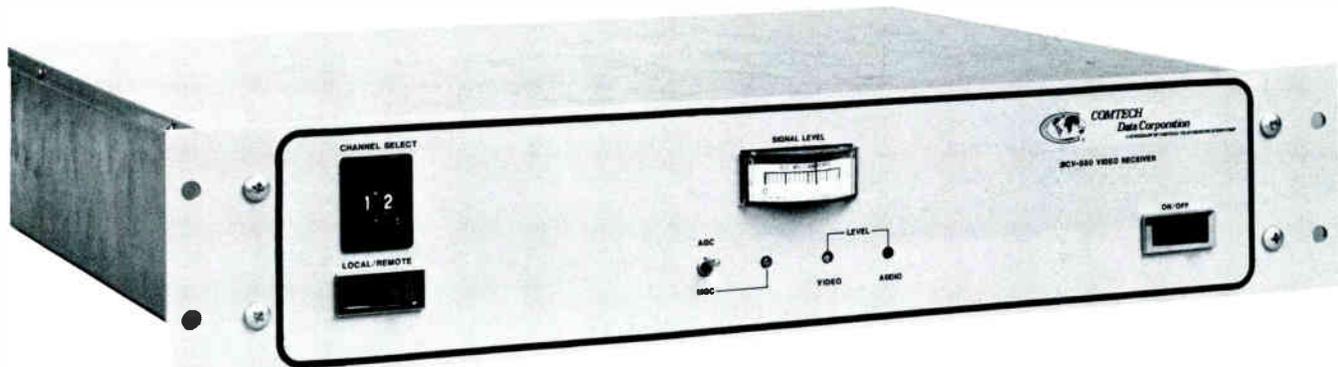
combined when taken two at a time (second order) and three at a time (third order). These include double and triple beat products and second and third order harmonics. Other amplifier distortion products are the result of cross modulation between video modulation sidebands.

Historically, CATV amplifiers were designed to minimize third order distortion products, particularly, cross modulation, with little regard for second order distortion (as they fell "out of band"). As the number of channels increased,

improved amplifier designs with push-pull configurations were introduced to reduce second order distortion and to permit the use of mid-band and super-band channels. Now, as the demand for increased channel capacity continues to grow, it is the third order intermodulation products that have become the dominant system limiting distortion.

In a 10 channel system, third order products number 176 "in-band"; that is, they are at frequencies in the occupied channels. When 20 channels are distributed, the number rises to 2,137 in-

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band third-order products, and for 35 channels, the number reaches 9,840. The accumulation of so many unwanted products strains the capabilities of larger multi-channel systems. For systems distributing more than 35 channels, the beat pile-up becomes intolerable, severely limiting the number of amplifiers in cascade.

A superior alternative to the "brute force" approach of amplifier design and replacement lies in advanced headend technology, where signals to be delivered are arranged in a sequence that is better suited to the characteristics of a broad band coaxial transmission system.

A coherent headend is one in which the various video carriers are derived from a common oscillator (are frequency coherent). Since the carriers in a standard system have independent frequency tolerances, none of the possible distortion products will be exactly the same or fall exactly at carrier frequencies. Coherent headends rearrange the video carriers such that they are not independent of each other but related in such a manner that all, or a portion of, the intermodulation products exactly coincide with video carriers. This is

called "zero beating" the distortion product.

The HRC headend has coherent visual signals which are harmonics of their unit's 6 MHz oscillator. All the visual carriers therefore are harmonically related, and all such undesired signals will fall zero-beat on carriers. Thus the visual effect of all second and third order intermodulation products are eliminated.

Operational experience with HRC carriers has shown Phasecom that the effective distortion "reduction" affects all active system components, including amplifiers, AML links, and set top converters. The phase optimization capability has been shown to provide a 6 dB improvement in distortion levels, Phasecom says.

Phasecom recommends HRC for any system with over 35 channel capacity, although HRC will cause picture improvement on all expanded headends regardless of amplifier type and length of cascade.

An HRC system requires a set top converter for every subscriber, as the new set of system carrier frequencies are different from the broadcast frequencies by 1.25 MHz (except for

channels 5 and 6 which move up .75 MHz.). In addition, it is important for the system to be RF leakproof to prevent off-air interference from entering the cable.

Phasecom manufacturers both Harmonically Related Carriers (HRC) and Incremental Coherent Carriers (ICC). Incremental Coherent Carrier has all channels at nominal broadcast frequencies, making it possible for subscribers to tune to ten of the twelve basic channels without a converter.

The ICC system has all visual carriers spaced by a uniform 6 MHz. This results in somewhat more than half of all third order intermodulation products to fall "zero-beat" on carriers. It has no effect on second order distortion and is recommended for those systems with 20 or more channels and push-pull amplifiers, according to Phasecom.

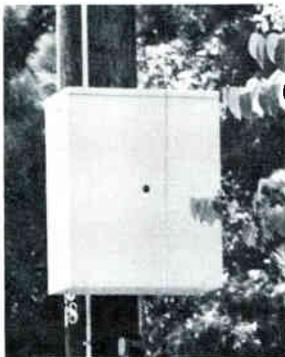
The ICC reference "comb" of frequencies can be generated in a manner such that it is coherent with one or two off-air channels, in order to minimize the possibility of co-channel beats.

Phasecom reports that an ICC system can be field converted to an HRC system when 100% converter penetration is achieved.

## LECTRO Standby Power FIVE YEAR WARRANTY

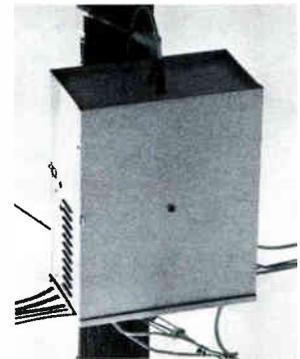
After five years of field operations in the heaviest lightning areas of the U.S.A., Puerto Rico and Mexico, where the most frequent power failures occur, we found by the records kept that Lectro Standby Power supplies had such a low failure rate we could offer a warranty unprecedented in power supplies in the cable industry.

That means there is no cost to you other than shipping charges to and from our factory, unless the unit has obvious physical damage. We will repair at no charge, and return the unit within one week of receipt.



Lectro has proven that you do not have to pay high prices for reliability.

Our five year warranty now gives you further proof of this. Sales over the past two years show that Lectro is now the leader in standby power.



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TOLL FREE (800) 223-8312

Canadian Representatives: Deskin Sales Corp.

# Cable Programming For September

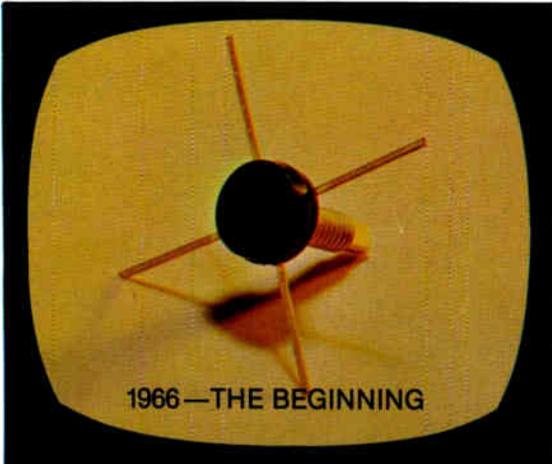
Signal	Day	Start/Stop	Alert Tones	Satellite/ Transponders	Signal	Day	Start/Stop	Alert Tones	Satellite/ Transponders	
<b>C-SPAN</b>	Monday-Friday	9:30 a.m. to 6:30 p.m.	195'/#	F1, #9	<b>Modern Talking Pictures</b>		12 pm-5 pm (weekdays) 7 am-12 pm (weekends)	048'/#	F1, #22	
					<b>Newstime</b>		24 hrs.	276'/#	F1, #6	
<b>CBN</b>		24 hrs.	No	F1, #8	<b>Nickelodeon</b>		9 am-11 pm (weekdays) 8 am-11 pm (weekends)	749'/#	F1, #11	
<b>ESPN</b>	Monday thru Thursday	6:00 p.m. to 4:00 a.m.		F1, #7	<b>PTL</b>		24 hrs.	No	F1, #2	
	Friday, 6:30 p.m., to following Monday, 4:00 a.m.				<b>Reuters</b>		4:00 a.m. to 7:00 p.m. Monday thru Friday	No	F1, #18	
<b>Front Row</b>		2:30 pm-2:30 am	461'/#	E,C F1, #12 P,M F1, #10	<b>SPN</b>	24 hrs. (Sun.)	429'/# auto switch to commercial, on/off respectively		F1, #21	
<b>HBO</b>	September 1	3:30	12:54	Program	F1, #24					
	September 2	5:00	1:48	729'/#	F1, #22					
	September 3	5:30	1:57	Scramble	F1, #23					
	September 4	5:00	2:18	835'/#	F1, #20					
	September 5	5:00	3:44	Duplication						
	September 6	3:30	4:52	940'/#						
	September 7	3:00	1:54	Take-2 E.						
	September 8	5:30	1:47	592'/#						
	September 9	6:00	2:17	Take 2 W.						
	September 10	5:30	1:45	681'/#						
	September 11	5:00	1:30							
	September 12	5:00	4:10							
	September 13	3:00	3:12							
	September 14	3:30	1:30							
	September 15	6:30	1:00							
	September 16	5:30	1:17							
	September 17	5:30	12:58							
	September 18	6:00	2:00							
	September 19	5:30	4:52							
	September 20	2:30	3:30							
	September 21	2:00	1:49							
	September 22	5:30	12:52							
	September 23	5:00	1:28							
	September 24	5:30	2:17							
	September 25	5:30	1:40							
	September 26	5:30	3:42							
	September 27	3:30	3:40							
	September 28	3:30	2:00							
	September 29	6:00	1:39							
	September 30	6:30	2:22							
<b>HTN</b>		8 pm-10 (11) pm	517'/#	F1, #21	<b>Showtime</b>	September 1	3:30	3:13	576'/#††	E, C, F1, #12; P, M, F1,
<b>KPIX (time permitting)</b>		2-4 hrs. per day	No	F1, #1		September 2	3:30	2:34		
<b>KTVU</b>		7 am-1 am (weekdays) 7 am-4 am (weekends)	No	F1, #1		September 3	3:30	2:50		
<b>USA Network</b>			438'/#†	F1, #9		September 4	3:30	2:36		
	September 1	7:00 p.m.		September 18	7:30 p.m.	September 5	3:30	2:48		
	September 2	8:00 p.m.		September 19	10:30 p.m.	September 6	1:30	2:05		
	September 3	8:00 p.m.		September 20	6:00 p.m.	September 7	1:30	3:18		
	September 4	8:00 p.m.		September 21	2:00 p.m.	September 8	3:30	2:12		
	September 5	8:00 p.m.		September 22	8:30 p.m.	September 9	3:30	2:48		
	September 6	8:00 p.m.		September 23	3:00	September 10	3:30	2:29		
	September 7	8:00 p.m.		September 24	3:30	September 11	3:30	2:40		
	September 8	8:00 p.m.		September 25	7:30 p.m.	September 12	3:30	3:03		
	September 9	8:00 p.m.		September 26	7:30 p.m.	September 13	1:30	2:32		
	September 10	8:00 p.m.		September 27	7:00 p.m.	September 14	1:30	3:22		
	September 11	7:45 p.m.		September 28	1:00 p.m.	September 15	3:30	3:09		
	September 12	8:30 p.m.				September 16	3:30	2:51		
						September 17	3:30	2:30		
						September 18	3:30	2:49		
						September 19	3:00	2:49		
						September 20	1:30	2:52		
						September 21	1:30	2:30		
						September 22	3:30	2:50		
						September 23	3:00	2:42		
						September 24	3:30	3:48		
						September 25	3:30	3:27		
						September 26	3:30	3:22		
						September 27	1:30	3:42		
						September 28	1:30	3:23		
						September 29	3:30	2:55		
						September 30	3:30	3:09		
<b>Calliope</b>		10:00 a.m. to 1:00 p.m. Saturdays and 6:30 to 7:30 weekdays. No Sunday.			<b>SIN</b>		24 hrs.	No	Westar II #6	
<b>English Channel</b>		Sundays 10:00 p.m. to 12:00 p.m. and Tuesdays following sports (approximately 10:00 p.m.)			<b>The Movie Channel</b>		24 hrs.	311'/#E. 519'/#W.	F1, #5	
					<b>Trinity (KTBN)</b>		24 hrs.	No	F1, #14	
					<b>WGN</b>		5:42 am-3 (3:30) am (Mon.-Thurs.) 24 hrs. Sat. & Sun. Ends 3 am on Sun.	No	F1, #3	
					<b>WOR</b>		24 hrs.		F1, #17	

E = eastern  
C = central  
M = mountain  
P = pacific

All program times are listed for the eastern time zone, unless otherwise noted.

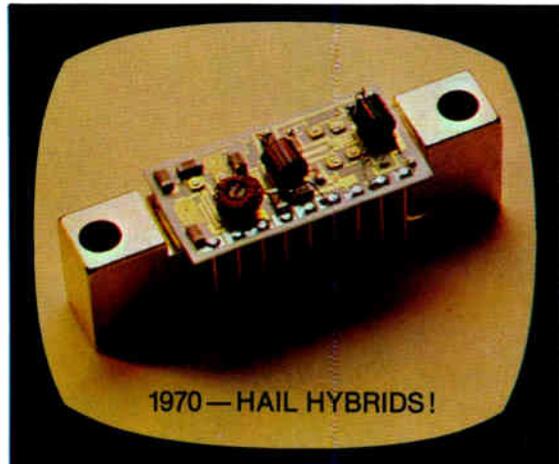
† Commercial substitution 601'/#; Thurs. baseball 706'/#.  
†† On-line 679'/#; off-line 753'/#; access 843'/#.

# Four Major Milestones in CATV Amplifiers.



First transistors made and characterized especially for CATV amplifiers.

**From TRW, of course.**



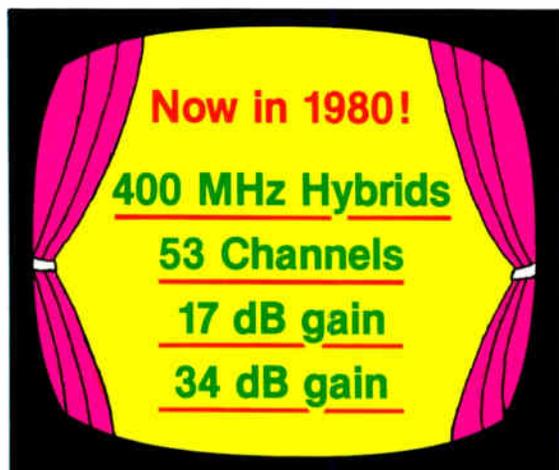
First hybrids for CATV. Elimination of interconnects provides inherent increase in reliability, ease of field repairs. Improved performance over discrete amplifiers.

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# The Tomco Printing Event Timer

We've added a printer to our PT-3000 Program Event Timer to give you something no other timer can. Key in a simple command on the typewriter keyboard and you can get a concise listing of all programmed control times in chronological order, you add a few messages via the alphanumeric keyboard and you have a usable print out for logs etc.



## Features

- Available with either 8, 16 or 24 output channels with a 208 stored times per channel.
- Programmed with extensive error checking to facilitate easy user data entry.

The unique printer, automatically prints time of power outages (time power went off and time power returns). Of course the PT-3000 has a built-in battery for power back-up to insure all control functions are activated during the power outage.

- Fourteen available program commands, example: LIST command prints contents of displayed channels in chronological order.
- Automatically prints time of power outages (time power off and time power returns).
- Audio beep can be used as a local alarm clock for a reminder of real time appointments, etc.
- Alphanumeric keyboard and printer, allows use to add comments to printouts for logs and messages.
- Keyboard override capability allows user to easily change any of the eight outputs.
- Display mode indicates the current status of all outputs and real time.
- The PT-3000 has been designed so that future add-on features can be field installed, as they become available.

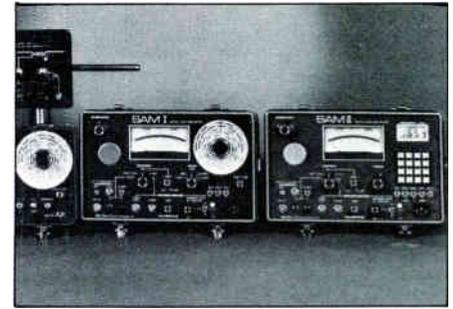
Write or call for information about this great new product from Tomco.

## Tomco Communications, Inc.

1145 Tasman Drive  
Sunnyvale, California 94086 408-734-8401

## Mid State Communications Releases New Product Catalog

Mid State announced its new 24-page catalog. The catalog describes several new products as well as the existing product line. A comprehensive technical section describes many of the important technical considerations to be reviewed in selecting the correct signal level meter for an application. Technical sections are also included on radiation detection and measurement, and meter calibration problems. To receive a copy, write to Mid State Communications, P.O. Box 203, Beech Grove, Indiana 46107, or call (317) 787-9426.



## Digital Switch Units Brochure Available From Spectron

A four-page brochure describing the functions of the DSU-2400 Series of digital switch units is available at no charge from Spectron.

The brochure spells out the features of each member of the DSU-2400 Series, describes typical applications and provides a configuration guide which enables the user to determine his equipment needs according to his unique applications. Photos of the DSUs enable the prospective user to visualize the appearance of the equipment in actual use, while functional diagrams graphically depict the internal operation of a typical switch. Up to 16 DSUs can be mounted in a single rack adapter in a standard equipment cabinet.

Complete information on rack mounting and gang switching is provided, along with a description of the RMS-104/108 Remote Monitor Switches. The RMS-104/108 are accessory devices for gang switching up to either four or eight racks of DSUs.

A complete list of digital switch units, rack adapters, cables and accessories is also provided. Prices on individual switches range from \$100 to \$180 depending on the model ordered. For a free copy, write Spectron at 344 Albany Road, P.O. Box 620, Moorestown, New Jersey 08057, or call (609) 234-5700.

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WIND	FROM	GUSTS	CHILL	
23	WSW	28	32	
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ITH A SLIGHT CHANCE OF THUNDERSH				

Full-screen digital weather displayed on first page. Weather information displayed in 2 line blocks on other pages if desired.

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CANADA THRU: Electrolime TV Equipment, Montreal, Quebec

## Earth Station

### New Petalized Lightweight Earth Station Antennas From Prodelin

Prodelin has just announced a brand new line of segmented fiberglass earth station antennas with reflectors ranging from 1.2 to 5 meters.

These petalized antennas feature strength with lighter weight. The 10 footer, for example, is segmented into 8 interchangeable petals weighing less than 15 lbs. each. The new reflectors are rated for winds up to 125 MPH, are MIL STD 810 B certified and simplified for field assembly by unskilled workmen. They feature rear polarization adjustment, unpressurized feed and U/L approved fire retardant in the fiberglass.

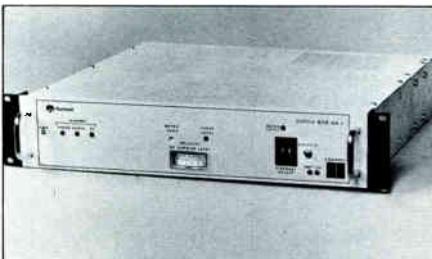
New production capabilities provide 100 antenna a day capacity for fast availabilities and deliveries. The new light weight reduces delivery costs without sacrificing any of the traditional strengths and advantages that are classic with Prodelin Antennas.

For information, contact Prodelin at P.O. Box 131, Hightstown, New Jersey 80520, or call (609) 448-2800.

## Receivers

### Rockwell Introduces Three New Satellite Video Receivers

Rockwell International's Collins Transmission Systems Division has introduced three new models to its family of SVR-4 satellite video receivers.



Rockwell's new receivers have certain common features which include threshold extension for both video and audio; two video outputs, plus a composite video and subcarrier output; and three standard audio sub/carrier frequencies.

62 C-ED September '80

The new SVR-4 units meet EIA RS-250B and CCIR Rec. AA standards. All models provide reliable wide-band video carrier reception via international and domestic C-band satellites.

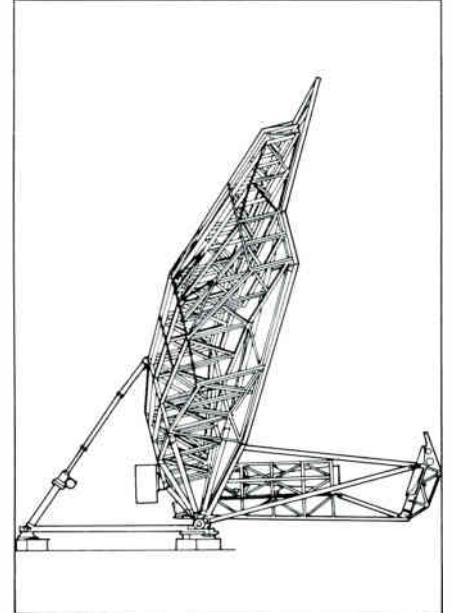
For further product information,

contact Rockwell International, Collins Transmission Systems Division Marketing Department, P.O. Box 10462, Dallas, Texas 75207, or call (214) 996-3898.

### GTE's Low-Sidelobe Antenna

GTE has developed an antenna system which utilizes an offset Gregorian feed to achieve excellent low sidelobe performance. The sidelobe levels are approximately 10 dB lower than typical CCIR and FCC requirements and more than 10dB better than equivalent existing cassegrain antennas. Such performance greatly reduces problems caused by adjacent satellite interference. In addition, the lower sidelobes reduce problems associated with frequency coordination with terrestrial microwave systems.

This allows a greater choice of sites and reduces the cost of interconnecting the earth station site and the local central office or TV facility. The lower sidelobe levels and the low physical profile of the antenna reduce or eliminate the need for artificial shielding, thereby reducing installation costs for many applications permitting rooftop locations.



For information, contact GTE International Systems Corporation at 140 First Avenue, Waltham, Massachusetts 02154, or call (617) 890-9200.

### New Generation of SLM's From Sadelco

Sadelco, Inc. has introduced a new generation of SLM's for the '80's.

The Professional Model FS 3D-VS with its expanded Super-Band range covers 216 to 400 MHz. Separate tuners, one for VHF and one for Super-Band are operated independently via separate dials, and in principal, operate as two meters in one case. This design configuration allows multiple testing. For example, the user may test one preset high and one preset low pilot-carrier simultaneously.

The new, larger microammeter with clearly marked scales, can be read at a glance. It employs passive automatic electronic shutoff, which eliminates dead batteries "the morning after".

The new High-Impact Carrying Case has foam lined accessory storage compartments which also includes a storage area for spare batteries for easy battery exchange.

The Model 733C Super incorporates design innovations that are normally included in more expensive signal level meters. Featuring expanded Super-Band frequency range (216-400 MHz/52 Channels) and separate tuners for VHF and Super-Band, a design feature that allows multi-testing simultaneously. Other features include a new over-sized microammeter with clearly marked scales for easy reading, plus extra long battery life (100 Hours or more).

This economy unit is packaged in Sadelco's new High-Impact Carrying Case, which has built-in compartments for adaptors, spare batteries (for easy exchange) and matching transformer. For additional information or literature, contact Sadelco, Inc., at 75 West Forest Avenue, Englewood, New Jersey 07631, or call (201) 569-3323.

### Tunable Video Receiver from Scientific-Atlanta

Scientific-Atlanta, Inc., has introduced its Model 6603 twenty-four channel frequency agile video receiver for receiving satellite programming. The new receiver permits cable television operators to select any one of 24 channels by tuning a single dial. The Model 6603 is an addition to the company's line of video receivers and is intended for applications which do not require remote frequency tuning.

The new unit offers dual conversion and threshold extension demodulation as standard features which provide high quality voice and picture reception. Threshold extension demodulation significantly increases the receiver operating range at low signal levels.

Scientific-Atlanta, Inc., is an international equipment manufacturer for the satellite, cable television, energy management and home security industries. The company's other area of concentration is the manufacture and sale of test and measurement instruments for industrial, telecommunications and government applications.

### Monroe Que Tone Receiver Line

Monroe Electronics, Inc., of Lyndonville, New York, is offering a line of que tone receivers for satellite reception. The 3000R Series Cue Tone Receivers are specifically arranged to decode CATV transponders.

Use of the Cue Tone Receivers permit unattended operation of channel switching functions at the head end site when programming begins, ends, or changes. These cue signals are sent to the signal at the beginning and end of a day's programming and to signal or cue special programming events. These Cue Tone Receivers also insure that unauthorized transmissions do not get onto subscribers' cables.

### Comtech Introduces 3.7-4.2 GHz Receiver

Comtech Data Corporation has introduced a new receiver for use in the Satellite communications band of 3.7-4.2 GHz.

Designated the RCV 550, the unit is designed for standard 19" Rack mounting and offers 24 channel thumbwheel selection, signal strength indicator, composite video and bal-

The Cue Tone Receivers are equipped with a dial-up telephone interface as a standard feature, which permits supervisory personnel to call the head end by telephone and duplicate or override the cue signal. It also permits other remote control switching functions at the head end to be activated using a Touch-Tone telephone or dial telephone and hand held encoder.

All units include a built-in Part 68 FCC certified telephone coupler Model 3137A-1.

For further information, contact Monroe Electronics, Inc., 100 Housel Avenue, Lyndonville, New York 14088, or call (716) 765-2254.

anced 600 ohm audio output. Optional features include your choice of the standard 6.8 mc. PGM demod and 5.8 mc, 6.2 mc. and 7.4 mc. subcarriers. The RCV 550 can also be remotely tuned via automatic timers or telephone controls.

For further information, contact Comtech at 613 South Rockford Drive, Tempe, AZ 85281, or call (602) 968-2433.

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The SAM I provides you these features for \$1,050.00.

- 4MHz to 300MHz
- Direct Reading Hum
- Light Weight
- Internal Audio
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- **WE** are an established firm (1971) which provides various services including research, cable system brokerage, publications and special reports, and we own and operate two cable TV systems.
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### DIRECTOR OF ENGINEERING

Major organization in a metropolitan area invites nominations and applications for the position of Director of Engineering. We are seeking an experienced CATV engineer with administrative capabilities as well as knowledge of all aspects of cable engineering including analysis, design and system theory. This is a great opportunity for a qualified professional to meet the challenge of technical problems facing the cable industry today. Submit resume, letter of interest with salary requirements and references, in confidence, to Box C-ED 0980-1.

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Headend experience. Houston area
- **REGIONAL ENGINEER** ..... Salary Open  
Midwest location
- **CHIEF TECHNICIAN** ..... To \$20,000  
Construction experience. Great Lakes area
- **TECHNICAL SUPERVISOR** ..... To \$20,000  
Georgia area
- **REGIONAL ENGINEER** ..... Salary Open  
South California area
- **OUTSIDE TECHNICIAN** ..... Salary Open  
Florida
- **MANAGER/TECHNICIAN** ..... To \$20,000  
Colorado
- **CHIEF TECHNICIAN** ..... \$18,000  
Good supervisory skills. Oklahoma
- **OUTSIDE TECHNICIAN** ..... Salary Open  
Small Texas town
- **PROJECT DIRECTOR** ..... \$40,000 + bonus  
Franchising experience
- **TECHNICIAN** ..... \$15,000  
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**Help Wanted****WANTED****Seminar Instructors**

Major manufacturer (EOE) wants individuals to conduct CATV training courses nationwide. Qualifications: BS or Assoc. Degree in electronics or equivalent experience in CATV system operation. Salary commensurate with experience. Send resume to: Box C-ED 0980-2.

**CATV OPENINGS**

Rapidly expanding Wisconsin area Cable TV company is seeking experienced personnel for the following positions:

- Chief Technician—3-5 years experience
- Manager/Technician—2-3 years experience
- Technicians—2-3 years experience

We offer competitive salary and excellent benefit plan. If you are interested in these positions, call or send resume to Personnel Director, Nor-Com Video, Inc., Subsidiary of North-West Telephone, 901 Kilbourn Ave., Tomah, Wisconsin 54660, (608) 372-4151.

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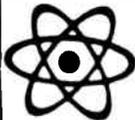
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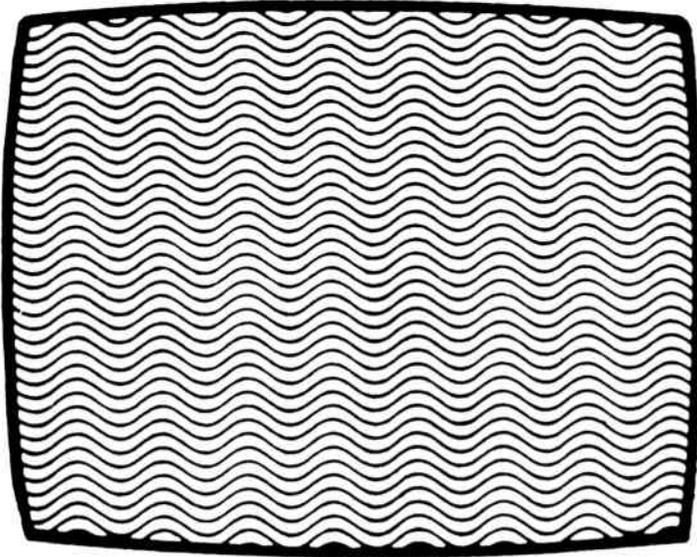
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**Q.** We keep hearing that satellite transmitters are "low power" devices. What is the actual output power?

**A.** Average output power for most RCA communications satellite transmitters (transponders) is approximately five (5) watts. Low power consumption is necessary since the transponders must operate continuously and efficiently on small solar batteries. High power outputs would require more current and/or voltages, which would deplete the batteries during periods when no sunlight can reach the charging cells.

Both higher power and higher frequency transponders are presently under development.

**Q.** Some amplifier manufacturers refer to the terms "RFD and Status Monitoring" in their ads. I know that this does not refer to Rural Free Delivery. Please explain.

**A.** The initials RFD usually refer to Remote Feeder Disconnect. This is fairly recent technology which allows up-stream (reverse) distribution signals to be selectively blocked from entering reverse amplifier modules in two-way cable television systems.

A coded signal is sent in the downstream (forward) direction to "tell" selected trunk/bridger amplifiers to block all upstream signals from one or more distribution lines. This helps to isolate and locate the source of undesired low-frequency signal ingress. It also helps to reduce upstream thermal noise combining.

Status monitoring allows semi-automatic monitoring of selected trunk amplifiers for deviation from established signal levels. Usually adjusted to monitor a  $\pm 3$ dB window, status monitoring energizes a visible and/or audible alarm at the monitoring point should amplifier output signal levels deviate beyond established parameters.

**Q.** We plan to add some more channels to our 12-

channel system soon and I want to calculate the expected cross-modulation addition to the system. I have seen a formula for this but can't seem to locate a copy. Can you help?

**A.** Sure can. The cross modulation derating formula to use when adding channels is:

$$20_{\log} (N_2 - 1) - 20_{\log} (N_1 - 1)$$

Where:  $N_1$  = Present number of channels, and  $N_2$  = Proposed number of channels

Example: To increase from 12 channels to 20 channels.

$$20_{\log} (N_2 - 1) = 20_{\log} (20 - 1) = 25.58$$

$$20_{\log} (N_1 - 1) = 20_{\log} (12 - 1) = 20.82$$

$$25.58$$

$$-20.82$$

4.76 dB increase, worst case.

Note: Be sure to check your other distortion product additions.

**Q.** What is the difference between MDS and STV? Don't they both supply non-cable Pay TV?

**A.** You are correct in that each can supply pay programming to subscribers without need for a direct connection.

There are a number of technical and operational differences between the two systems. The major technical difference is in the frequencies used. Multipoint Distribution Systems (MDS) operate at frequencies between 2.15 and 2.16 GHz (2150 to 2160 MHz) These are considered to be low frequency microwaves. Subscription Television normally operates at standard VHF and UHF Television frequencies.

**Q.** Are there any colleges or universities which grant four-year BSEE degrees in Cable TV engineering? If so, please send all information.

**A.** We have been unable to locate any accredited colleges or universities which list Cable TV as a major. There are a number of schools which have two year Cable TV courses and several other schools have indicated at least an interest in adding them. The major deterrent seems to be a lack of teachers and teaching information.

If any of our readers have information on a college or university which presently offers a BSEE in Cable Television Engineering, please let us know. We will pass along any information in this column.

*"Out of Sync" is a forum for and by engineers and technicians. If you have a problem, simple or sophisticated, please do not hesitate to submit your questions and/or solutions to C-ED, in care of Glenn Chambers. We'll do our best to provide as much assistance as possible.*

# LIGHTNING STRIKES.



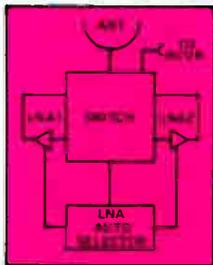
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- An Amplica representative to discuss a special requirement with me.

C9/0

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 **Amplica, Inc.**

★ **William M. Lynch** has been elected President of **Times Fiber Communications, Inc.**, and has predicted the company, one of America's largest producers of CATV and other coaxial cables, will soon enjoy significant revenues from fiber optic cables and systems.

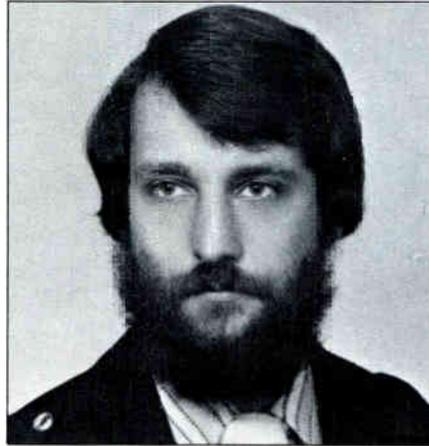
Lynch's election to his new post by the Board of Directors of Times Fiber Communications was announced by Lawrence DeGeorge, founder, chairman and chief executive officer of the company. Times Fiber Communications is a subsidiary of Insilco Corporation (NYSE). Mr. Lynch was formerly executive vice president of Times and will continue as chief operating officer.



★ **Continental Cablevision, Inc.**, has promoted **Randy L. Midkiff**, 28, to the position of field engineer for the company's Miami Valley region in south-western Ohio.

Midkiff began working with Continental in 1974 as a technician in Athens, Ohio.

From 1976 until the present, Midkiff built the south Dayton system as the chief technician. As the Miami Valley region's field engineer he is responsible for headend and microwave channel maintenance, FCC proof of performance tests, equipment evaluations and general system maintenance.



★ **Dr. Harold A. Rosen**, developer of the first synchronous communications satellite, has received the **National Cable Television Association's** Outstanding Technical Achievement Award in Development.

Dr. Rosen, vice president of engineering for Hughes Aircraft Company's space and communications group in El Segundo, California, was presented with the citation at NCTA's annual convention. The award is presented annually to an engineer who has made a lasting contribution to the technical advancement of the CATV industry through manufacturing, design or associated influences to the industry.



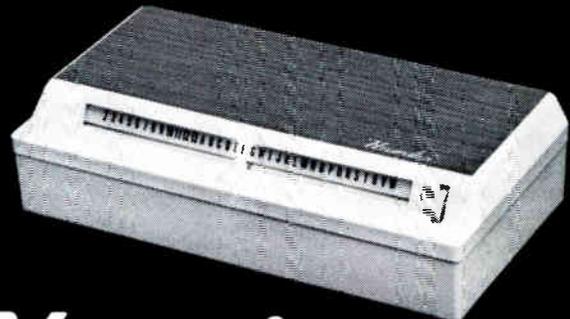
★ **Southern Pacific Communications Company (SPCC)** today announced the appointment of **Malcolm C. Gregory** to the position of manager, satellite systems.

Formerly the manager of network facilities, planning and engineering, Gregory will now assume responsibility for the implementation of the \$200-million satellite and earth station system which SPCC has recently proposed to the Federal Communications Commission (FCC)



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