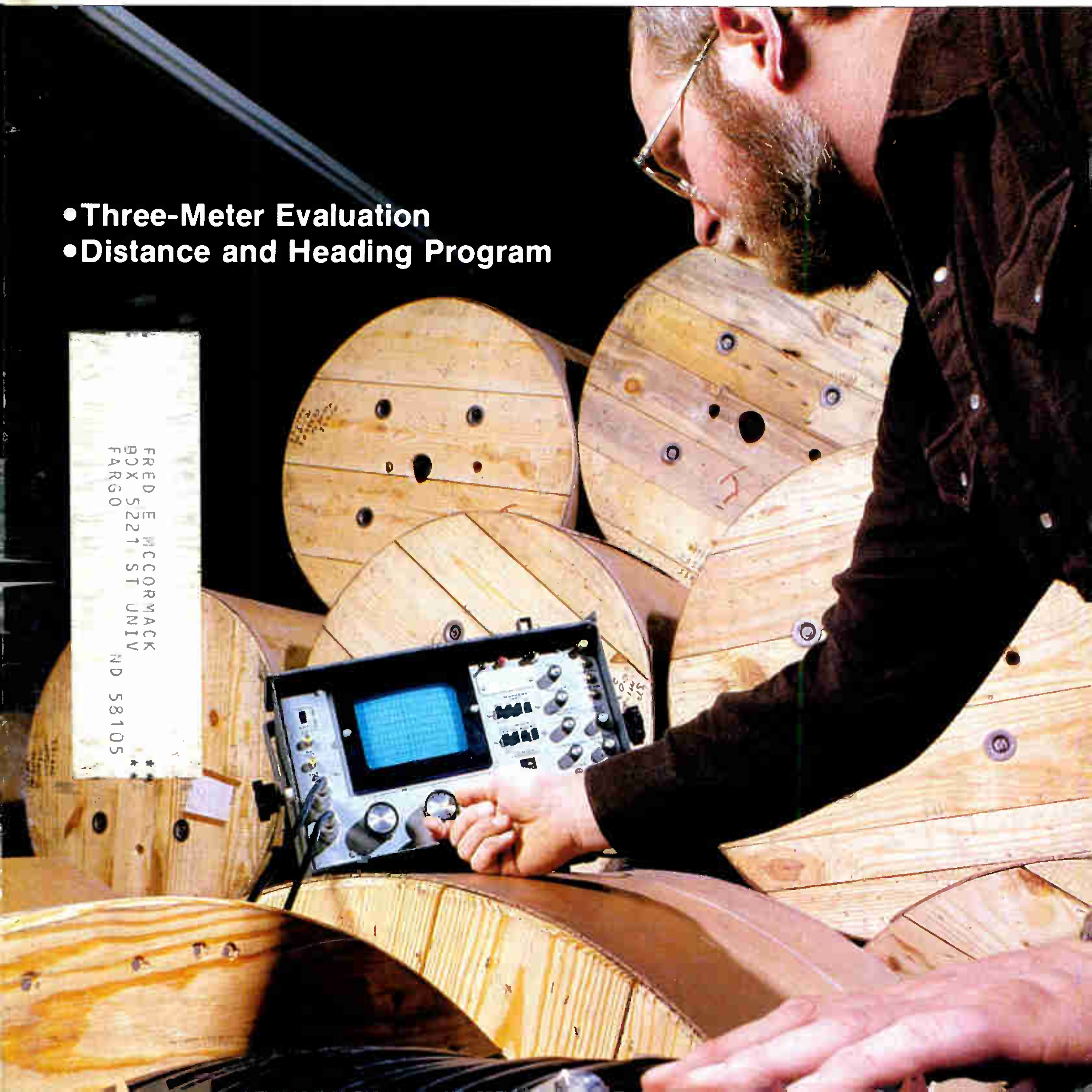
# CED™

Testing Series Starts

Communications Engineering Digest/The Magazine of Broadband Technology February 1981



- Three-Meter Evaluation
- Distance and Heading Program

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# Look beyond 400MHz


## Oak home terminals have much more to offer than 400MHz coverage.

With a flood of 400MHz home terminals hitting the market, you need to look at more than channel capacity. Take a close look at performance, reliability, features and the company behind the promises.

Oak TotalControl and Moduline home CATV terminals offer microcomputer-controlled synthesized tuning. Also featured are a bright LED 56 channel readout, and crystal-controlled frequency stability and wide dynamic range to assure better reception. The touch-sensitive keyboard is spill resistant. In addition, there's a ten position "favorite channel program" memory and an optional electronic lock for parental control over selectable channels. Other options include an infrared remote control with a fully redundant keyboard and an electronic A-B switch for 112 channel dual-trunk systems.

For free information on Oak 400MHz terminals, call our Locator Operator toll-free at 800-323-6556 (in Illinois, 800-942-6345) and ask for the CATV information desk.

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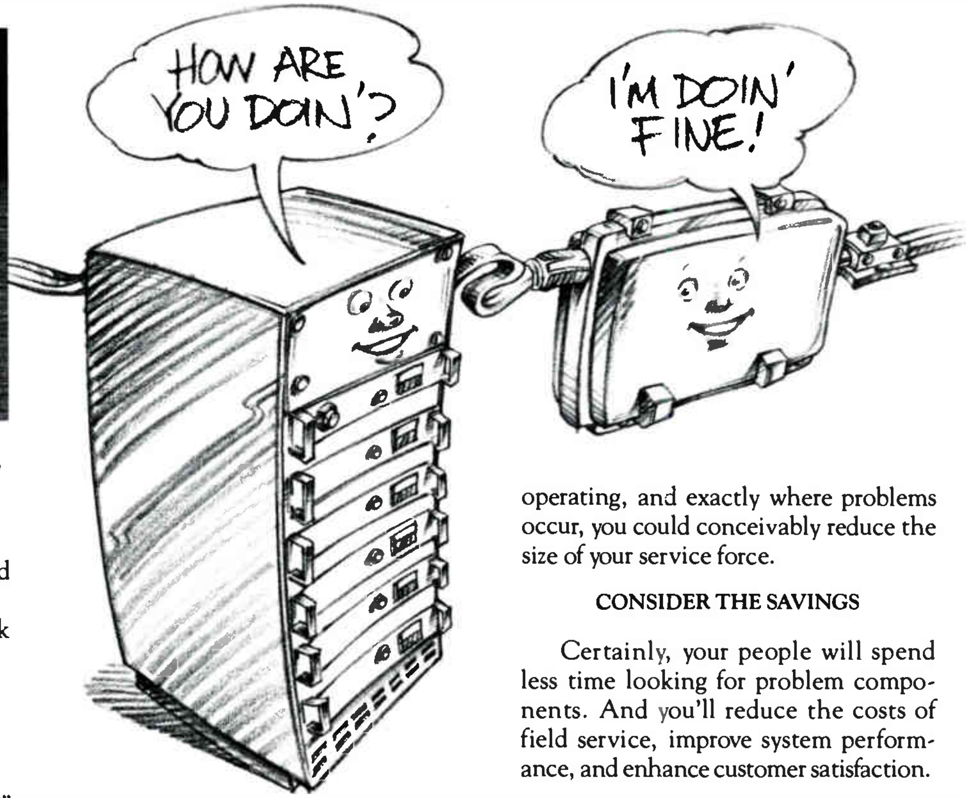
Crystal Lake, Illinois 60014 Telephone 815/459-5000 TWX [illegible]

# Scientific-Atlanta introduces the cable system you can talk to

*Want to check on signal levels and power throughout your entire system? Just ask the system.*




"How are you doing?" asked the Headend.

"I'm doing fine," the Trunk Amplifier replied.

"Are you getting enough power?"

"No problem."

"Signal strength OK?"

"Fine."

"Anything else you want to tell me?"

"Not right now."

At last, you can monitor signal levels and power throughout the *entire* trunk system, from headend to neighborhood bridging station, on a 24-hour basis.

The Scientific-Atlanta Series 6500 Status Monitoring System literally opens up an on-going dialog with your cable system.

You can interrogate, give reverse bridger switching commands, and evaluate the replies of as many as 2048 amplifier status transponders.

When there's a problem, the system provides a visual and audio alarm to your headend, hub or office. It identifies the failure, and tells you exactly where it's located.

And unlike the bulb in the Christmas lights, you don't have to test the whole system for trouble. You can dispatch service crews directly to the problem area.

### IT STARTS WITH OUR COMMUNICATIONS CONTROL UNIT

The communications control unit is installed at your headend or any central distribution point. Then, amplifier status transponder modules are installed in the trunk amplifier housings.

The control unit (combining CRT terminal, microprocessor, message transmitter and receiver) interrogates and evaluates replies from each status transponder, and sends reverse bridger switching commands.

Reverse bridger switching means that specific reverse feeders can be connected or disconnected so you can identify the particular trunk station involved. (RBS also reduces reverse system noise by turning off all feeders not being used at that time.)

Monitoring continues 24 hours a day. When acceptable signal or power levels aren't met, the alarm sounds and vital information is displayed simultaneously.

A glance at the CRT screen identifies the problem amplifier and explains the fault. Your operator can then take the appropriate action to correct the situation.

And that's the basic system. It works now, and can easily be expanded with plug-in memory boards, hardcopy printer, even a floppy disc system. Also, by knowing just how your system is operating, and exactly where problems occur, you could conceivably reduce the size of your service force.

### CONSIDER THE SAVINGS

Certainly, your people will spend less time looking for problem components. And you'll reduce the costs of field service, improve system performance, and enhance customer satisfaction.

### READY NOW FOR OUR 300 THROUGH 400 MHz SYSTEMS

The 6500 Status Monitoring System is technologically advanced, yet simple to understand and use. It's available now on our 300 through 400 megahertz systems—which we're currently supplying *in quantity* for cable systems across the country.

For more information, contact Solomon Webb at Scientific-Atlanta, (404) 441-4111. Or send this coupon.

**Scientific Atlanta**

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☐ Please send details on your 6500 Status Monitoring System
☐ Other cable television products

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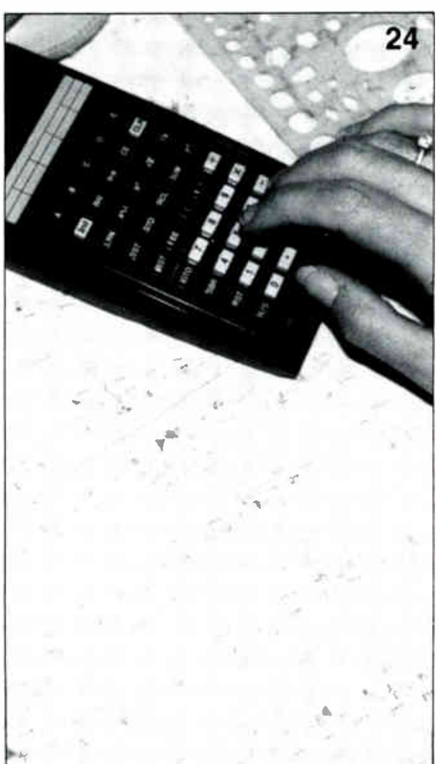
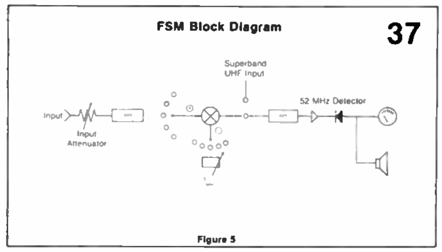
# CED

## Contents

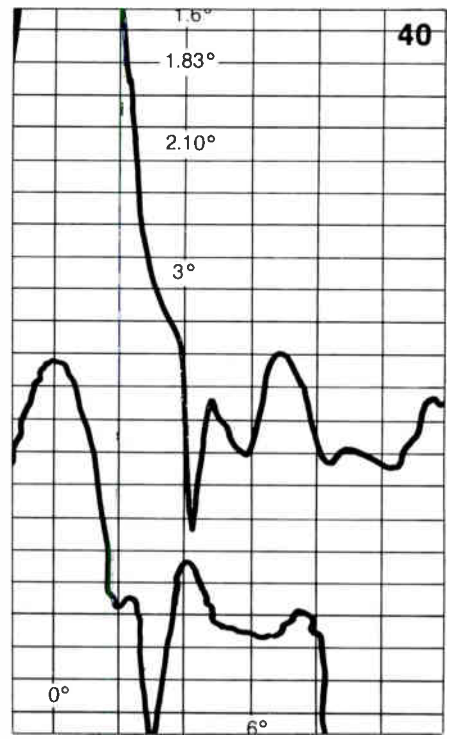









### About the Cover
Steve Mishler, an engineer at Indianapolis Cablevision, sweep tests cable before it is installed on the poles. He is using a 9900D sweep tester from Texscan. The photo was supplied by Texscan Corporation.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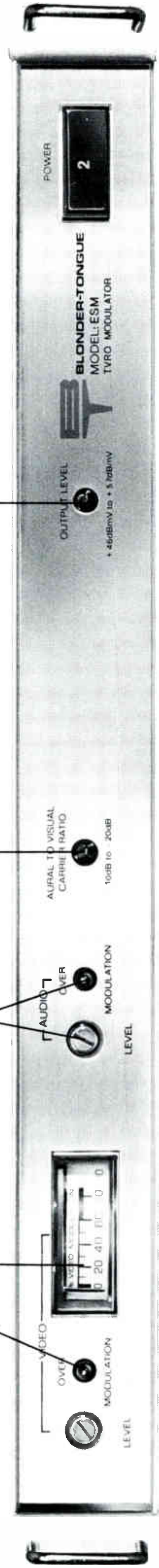


# New from Blonder-Tongue

# The ESM Earth Station Modulator

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The all-new B-T ESM Earth Station Modulator is designed specifically for TVRO use. It comes equipped to take the video and audio from a satellite receiver output.

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## Three-Meter Dish

More than 20 technical personnel showed up in Washington, D.C., last month for a meeting of the **National Cable Television Association's engineering committee**. The drawing card apparently was the desire to resolve much of the controversy surrounding NCTA's earlier warning that three-meter earth stations might not be adequate in the future if the FCC moves to 3° spacing for orbital slots. There has been disagreement among some manufacturers, program suppliers and association officials over the hypothesis. It was agreed, however, that there were no quick and easy solutions to this one. Most of the participants **agreed to work together toward the establishment of optimum values for earth station performance.**

## Friend or FOB?

The FCC's **Field Operations Bureau** (FOB) has advised the Cable Bureau that it **will fully cooperate in making sure that cable operators activating channels in the aeronautical bands** (108-136 and 225-400 MHz), for any purpose, have properly **notified the commission 60 days in advance**. Concern is mounting again over the potential for cable systems to interfere with flight communications and so monitoring teams from the FOB will be visiting cable systems with increasing regularity. Systems which have not notified the commission of their intention to use the aeronauticals will be ordered to cease operating immediately in those bands and will be subject to further disciplinary action.

## Shocking News

A **videotape compendium of information about the hazards of working around electrical power**, *Safety Awareness Around Electrical Conductors*, is being **released and distributed** by the Society of Cable Television Engineers through the cooperation of the New Jersey Cable Television Association. The tape was produced by the NJCTA with the support of the Office of Cable Television of the State of New Jersey, New Jersey Bell, Public Service Electric and Gas Company, Suburban Cablevision TV-3 and Maclean Hunter. Nearly one hour in length, the program uses slides, movies and live demonstrations in the process of reviewing amperage and its effects. It graphically depicts the dangers of working around energized conductors, reviews and identifies situations specifically related to cable television personnel. Distribution will begin in mid-March. The tape costs $75 prepaid. In keeping with the SCTE's get tough policy, orders received without payment will be returned and telephone orders will not be accepted. Order: *Safety Awareness Around Electrical Conductors*, T-1016, from SCTE, 1900 L Street NW, Suite 614, Washington, D.C. 20036. When ordering, specify format of ¾, ½ VHS, BETA I or BETA II.

## UHF Indifference

The **FCC's UHF Comparability Task Force has released a survey by Louis Harris and Associates on consumer attitudes and experience concerning UHF television**. The survey suggests that the inability to receive a UHF picture at all may explain much of the difference in audience between UHF and VHF television. The report says one reason viewers do not get good UHF reception is simply that they do not have the necessary antennas or other equipment. Examination of viewer preferences suggests that lack of interest in UHF programming may explain much of the difference in viewing between UHF and VHF and much of the unwillingness to buy UHF antennas.

## Foreign Training Responsibility

The FCC **has decided to shift the responsibility for administering international training and technical assistance programs for foreigners** from the Office of the Secretary **to the Office of Science and Technology**. The responsibility for developing training programs in the field of telecommunications includes both classroom and on-site training for members of foreign administrations who work in the telecommunications area. The actual duties include developing a training program with private industrial firms, colleges and universities, other government agencies and departmental and field components of the commission.

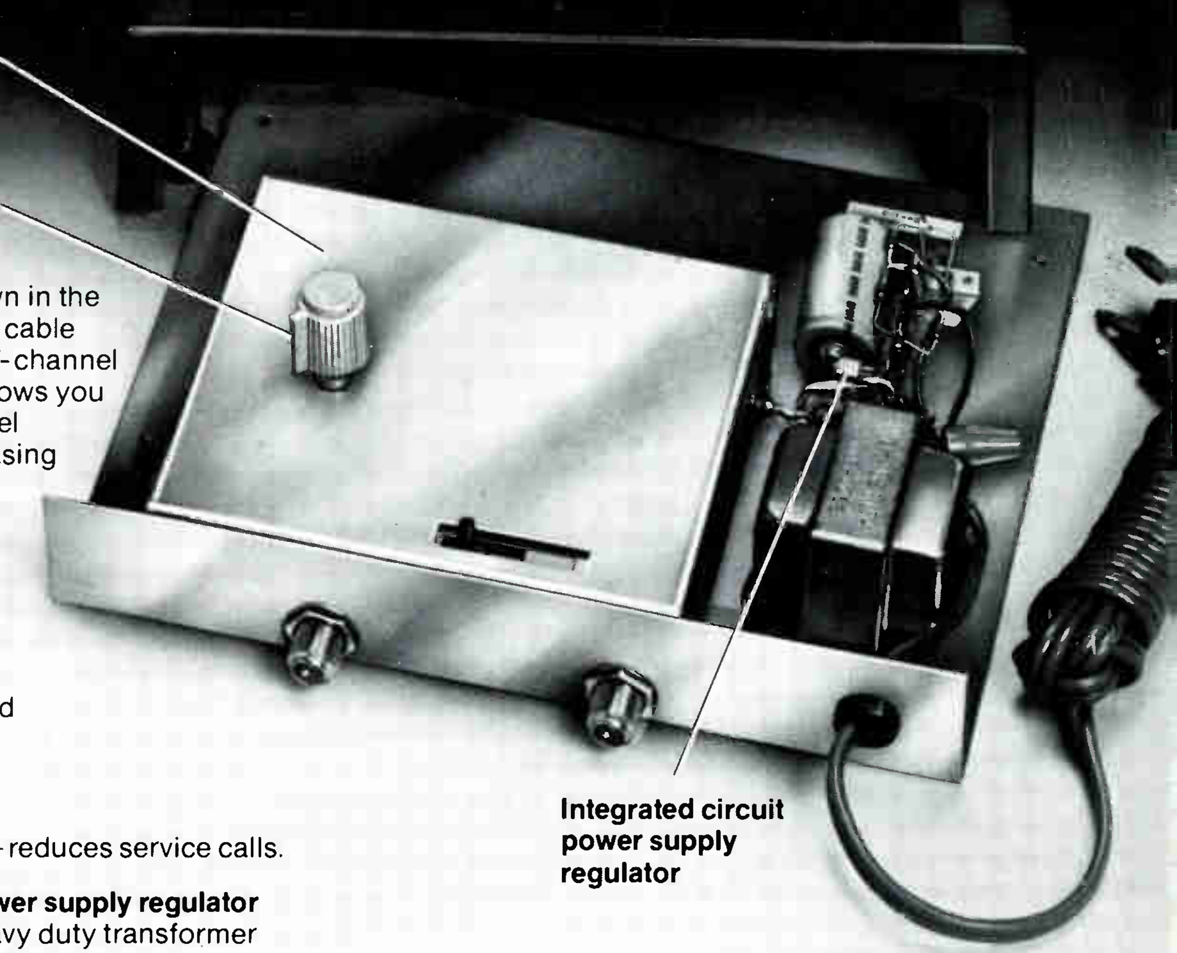
## Fifteen is Enough

The **FCC has set an interim limit of 15 on the number of grants for TV translator and low-power TV authorizations which will be made to one owner** while it considers whether to give final approval to the new low-power television service. The FCC says those filing multiple applications would be protected against additional competing applications until issuance of the final decision in the case. However, the commission emphasized that no more than 15 construction permits will be issued to a single owner during the interim, adding that it will be up to the applicant to inform the commission which of the 15 of its applications it wants processed for the interim grant. These entities would receive rapid processing of the remainder of their applications after the decision if no final numerical limit is adopted. If a final limit—15 or some other number—is decided upon, excess applications would be returned.

## Don't Be Home Without It

The president of American Express' Communications Division, Sandra Meyer, recently explained that **Warner Amex Cable Television is currently working on systems for TV order and fulfillment**. Experiments with interactive TV retailing are scheduled to begin in about 18 months, she said, adding that the image of the direct-response industry has turned around dramatically in recent years, largely as a result of new technology. Meyer said she was particularly bullish on the future of direct marketing as a result of anticipated breakthroughs in interactive cable television. "Soon," she said, "we will have the technology to put an entire catalog on a videodisc that can be started, stopped, freeze-framed and indexed, just like flipping pages."

# ATTENTION, 12-CHANNEL SYSTEMS READY TO EXPAND:




Vitek Electronics, known in the industry for our unique cable trap, now offers you a 7-channel block converter that allows you to increase your channel capacity without increasing your problems.

Our converter uses the single conversion principle and converts the 7 midband channels (A' thru G') to the VHF channels (7 thru 13) and has the features you've been asking for...

- **Fine tuning control** — reduces service calls.
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- **Totally shielded RF module** — prevents interfering signals from entering (ingress) into the converter and prevents signals from radiating from the converter (egress).
- **PC board design** — neat and compact construction allows more reliable and consistent performance.

*You wanted an inexpensive, highly reliable 7 channel block converter with impressive specs and a manufacturer to back them up! This is the one.* ***Request a demonstration.***

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# Seminars

## FEBRUARY

**4-6: Texas Cable Television Association** is holding its annual convention and trade show at the Convention Center in San Antonio, Texas. Contact W.D. Arnold, (214) 593-0335.

**10-11: Arizona Cable Television Association** is having its annual meeting at the Adams Hotel in Phoenix, Arizona. Contact the association at (602) 257-9338.

**10-13: Integrated Computer Systems, Inc.**, is holding a workshop on "Microprocessor Software, Hardware and Interfacing" in Dallas, Texas. Contact Ruth Dordick, (800) 421-8166. (213) 450-2060.

**15-16:** The **Idaho Cable Communications Association**'s annual meeting and convention will be held at the Red Lion-Riverside, Boise, Idaho. Contact Dave Reynold, (208) 377-2491.

**18-20:** The **Arkansas Cable Television Association** is holding its annual meeting in Little Rock, Arkansas. Contact Tom Carroll, (501) 321-7730.

**23: TOCOM** will sponsor a seminar. "Winning with TOCOM's 55 PLUS™ Technology" at the Airport Amfac Hotel at the Dallas-Fort Worth Airport. Contact Janie Cull, (214) 438-7691.

**24-26:** A **Jerrold** technical seminar will be held in Orlando, Florida. Contact Len Ecker, (215) 674-4800.

**24-26: Nepcon West '81** will feature 1,490 electronics displays from over 750 manufacturers and suppliers and include 15 technical discussions on electronics testing. The show will take place at the Aneheim, California, Convention Center. Contact Industrial & Scientific Conference Management, Inc., (312) 263-4866.

## MARCH

**2-4: Information Utilities '81** will focus on interactive cable and new technologies at the New York Hilton, New York, New York. Contact Jeffery Pemberton, (203) 227-8466.

**8-10:** The **Ohio Cable Television Association** annual convention will he held at the Sheraton-Columbus Hotel, Columbus, Ohio. Contact the association at (614) 461-4014.

**9-11: Arizona State University**, Tempe, Arizona, is holding a three-day intensive course on "Fiber Optical Communications." Contact Dr. Joseph Palais, (602) 965-3757.

**12-13:** The **Louisiana Association of Cable Television Operators** will hold its annual convention at Toro Hills near Many, Louisiana. Contact Andrew Angelette, (504) 446-8444.

**15-17: North Central Cable Television Association** is meeting at the Holiday Inn in Fargo, North Dakota. Contact Paul Keating, (701) 662-8141.

**16-17:** The annual spring engineering conference of the **Society of Cable Television Engineers** is being held at the Opryland Hotel in Nashville, Tennessee. Contact the association at (202) 293-7841.

**18-19:** The **Georgia Cable Television Association** will hold its annual convention at the Sheraton-Atlanta Hotel, Atlanta, Georgia. Contact Marian Smith, (912) 354-7531.

**24:** The Princeton University Department of Electrical Engineering and the New York, Princeton and Jersey Coast sections of the IEEE is holding its **1981 Communications Techniques Seminar** at Princeton University. The seminar will focus on the advances and opportunities for digital techniques, including packetized subscription television and the proposed Northeast lightwave corridor. Contact Cynthia A. Donovan, Room 2F512A, B.T.L., Holmdel, New Jersey 07733.
**24-26: Information Gatekeepers, Inc.**, is holding FOC '81 East at the Hyatt Regency Cambridge in Boston, Massachusetts. The event will include a fiber optics trade show, three short courses on fiber optics and a technical program on short-to-medium-range fiber optics applications. Contact the firm at (617) 739-2022.
**28-April 1: Illinois-Indiana Cable Television Association** is having its annual convention at the Hyatt Regency Hotel in Indianapolis, Indiana.

## APRIL

**6-10:** The Engineering Office of the **Community Antenna Television Association** is holding a technical training seminar on systems distribution problems, failures, measurements and tests at the Holiday Inn of Garland in Dallas, Texas. Contact Ralph Haimowitz, (305) 562-7847.
**12-15:** The **National Association of Broadcasters** is holding its 59th annual convention at the Convention Center in Las Vegas, Nevada.
**13-14:** The **Society of Cable Television Engineers** will hold a seminar on "Digital Electronics and Cable TV" at Stouffer's Inn, Denver Airport, Denver, Colorado. Contact SCTE at (202) 293-7841.
**13-15:** The **International Association of Satellite Users** is holding its 1981 conference and trade show at the Washington Hilton Hotel, Washington, D.C. Contact the organization at (703) 893-2217.
**23-24: Information Gatekeepers, Inc.**, is sponsoring "VIEWTEXT '81: International Viewdata Markets and Applications," at the Sheraton National Hotel in Arlington, Virginia. Contact Steve Weissman, (617) 739-2022.
**22-24: Integrated Computer Systems, Inc.**, is holding a workshop on "Fiber Optics Communications Systems" in Los Angeles, California. Contact Ruth Dordick, (800) 421-8166; (213) 450-2060.

## MAY

**4-8:** The Engineering Office of the **Community Antenna Television Association** is holding a technical training seminar on systems distribution problems, failures, measurements and tests at the Paramount-Heathman Hotel in Portland, Oregon. Contact Ralph Haimowitz, (305) 562-7847.
**11-12:** The **Society of Cable Television Engineers** will hold a seminar on "System Test Requirements" and "Preventive Maintenance" at the Hilton Airport Inn, Kansas City, Missouri. Contact SCTE at (202) 293-7841.
**13-15: Integrated Computer Systems, Inc.**, is holding a workshop on "Fiber Optics Communications Systems" in Washington, D.C. Contact Ruth Dordick, (800) 421-8166; (213) 450-2060.
**20-22: Videotex '81**, an international conference and exhibition, will be held at the Royal York Hotel (Toronto, Ontario) and the Canadian National Exhibition grounds.
**29-June 1:** The **National Cable Television Association** is holding its 1981 convention in Los Angeles, Convention Center. Contact Dan Dobsin, (202) 463-7905.

CED

Volume 7, No. 2

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# Editorial

## Take the Politics Out of Technological Questions

A few days ago we received notification that a panel from the President's Commission for a National Agenda for the Eighties was about to issue a report warning that unless the United States upgrades the role of an informed public in decisons about the application of scientific advances, the future progress from science and technology will be jeopardized. Technological advances and public support and understanding of the sciences are no longer in balance. The report calls for a reaffirmation of a national policy for science and technology.

The final report, "A National Agenda for the Eighties," will be available soon through the Government Printing Office. One matter the report addresses is attitudes toward the potential effects of the commission revolution on society.

Some of the things we know the report does say is that the political and regulatory institutions in the country have not developed the capacity to deal adequately with questions of risk and uncertainty that characterize many decisions related to science and technology. We are not sure we agree with that, but we do agree with other statements in the report. For one, it points out that a significant effort must be made both to develop science literacy and to improve the quality of the educational system at all levels. This must be done, the report says, if our increasingly technological society is to make intelligent decisions.

The report also points out that rapid progress in science and technology is essential. Implications of current trends "include erosion of U.S. capability in science and technology, loss of world leadership in many areas of scientific or economic importance, and a weakened capacity for solving national problems." A further limitation of resources in this decade increase the importance of making substantial investments in the area of science and technology.

Finally, to deal with the increasingly intense high technology competition from other industrialized countries, the report calls for explicit policies in both the public and private sectors as well as increased cooperation between them.

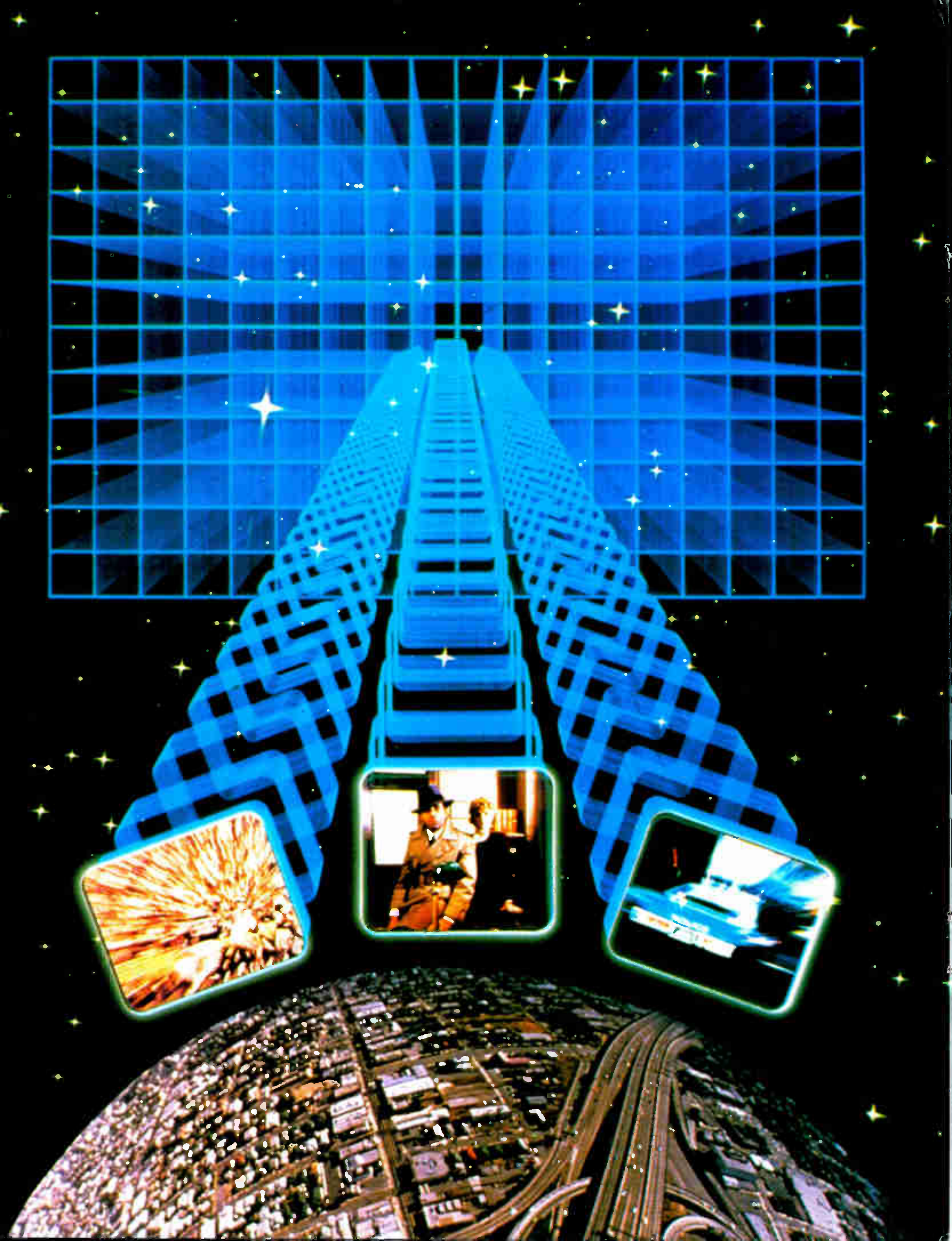
On page 39 are the results of tests conducted by Microdyne Corporation. From the tests, the company's engineers projected performance with respect to carrier to interference for smaller earth terminals. The tests stem from what has become known as the "three-meter controversy." That is, will the smaller receivers be adequate if, and when, the FCC moves to 3° spacing for orbital slots? At stake at this point is not the loss of technological and economic world leadership, which the aforementioned President's Commission addresses. However, it does touch on the business, political and regulatory capacity to deal with the risk and uncertaintly which does characterize decisions relating to science and technology.

To date, the three-meter controversy has been one of politics, not technology. It is comprised of the sometimes competing interests of manufacturers, trade association, regulatory agencies and programming services. Now, there are encouraging signs that the principles are moving away from the purely political and are getting closer to dealing with the question scientifically—taking the necessary step toward working even more closely with the regulatory institutions than in the past. (See "Techscope", page 7.)

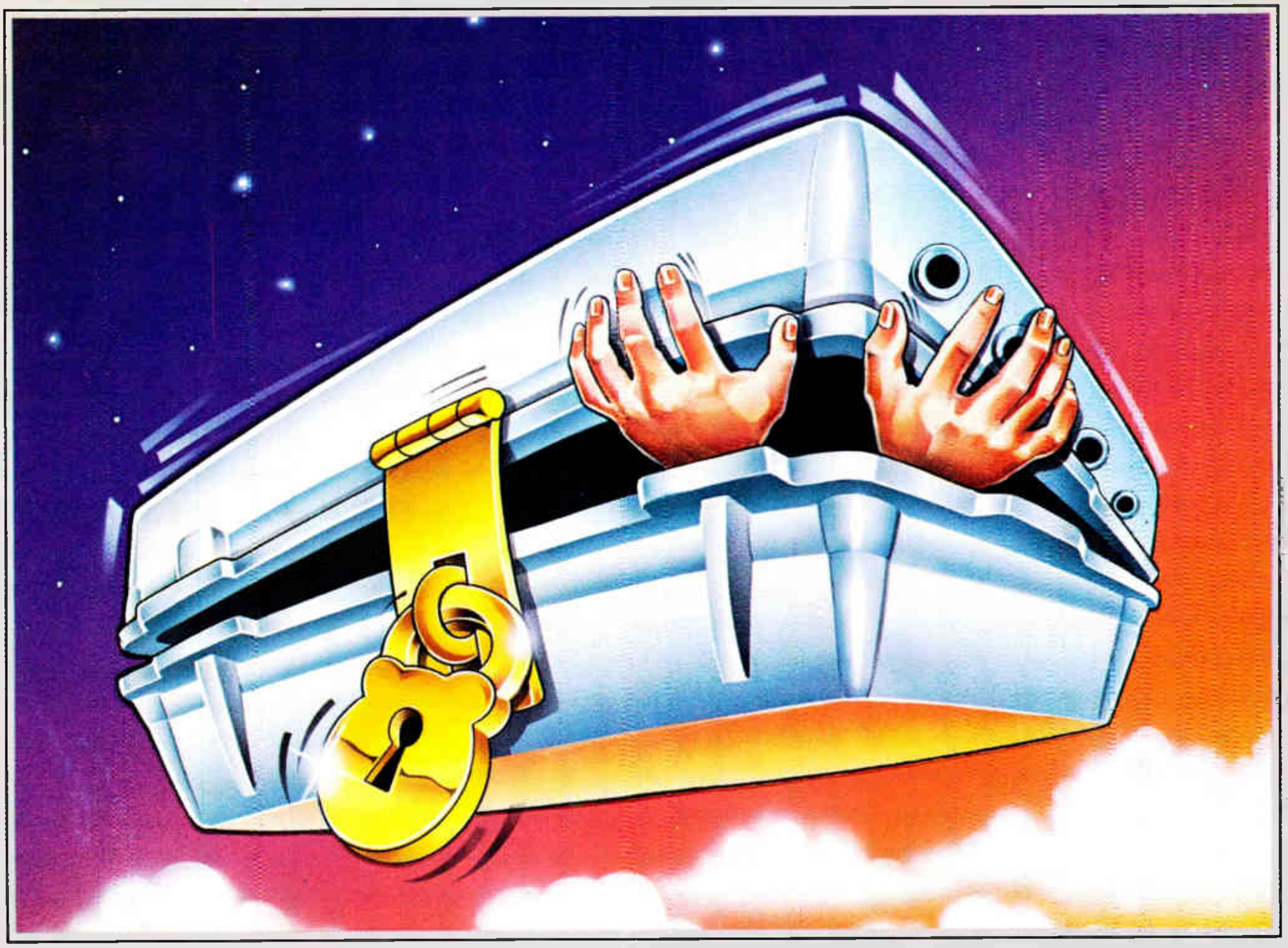
The procedures and results of the Microdyne tests have been reviewed but not totally embraced by others, including the National Cable Television Association's engineering committee. There are problems with the scope and, in some cases, the methodology, we are told. But the report is being published here so it can be even more widely disseminated and because, like so many scientific works, it is a starting place. Already, the effort has sparked preparations for numerous follow-ups by Microdyne, RCA and others.

Furthermore, as evidenced by the NCTA engineering committee meeting held last month, in which all interests, including the government's were represented, there are signs of expanding participation and growing cooperation. The results of the efforts to resolve this controversy in particular, as well as the fruits of this new spirit of cooperation are looked forward to eagerly.

Pat Gushman



# A 400 MHz system that won't lock you in.



With the new Sylvania Series 5000 station, you'll never get locked into a situation you can't get out of. Because customizing it to your own needs—even as they change—is as simple as replacing any of up to seven active plug-in modules.

And with interchangeable base plates, you can work out the best balance of price and performance for a wide variety of transmission needs.

For example, you can outfit the new Series 5000 station with a 400 MHz forward amplifier module and input/output module to provide trunk only amplification. Or you can have a full station with expanded services such as dual power supply, forward redundancy, station bypass, status monitoring and bridger switching. And for institutional networks, it can accommodate dual trunk as well as mid-band or high-band split.

This modularity also lets you upgrade your existing trunk and line extender amplifiers to accept the 400 MHz and expanded services similar to the Series 5000 station.

To keep up with the industry's growth and to assure the continued high quality of Sylvania products, we've tripled our staff, computerized our customer services and we're building a new manufacturing plant.

So whatever your CATV needs, just call your local Sylvania CATV Transmission Systems sales office for complete details. Or phone toll free 800-351-2345 within the continental U.S., except Texas. From Alaska, Hawaii and Texas, call (915) 591-3555 collect.

You'll see why the Sylvania Series 5000 station does so many things right for you.

**SYLVANIA** CATV Transmission Systems | GTE

## FCC Allocates Spectrum For Digital Message Service

WASHINGTON, D.C.—The Federal Communications Commission has reallocated 130 MHz of radio spectrum in the 10.55 and 10.68 GHz range to be used for nationwide common carrier digital telecommunications networks providing for high-speed, end-to-end transmission of digitally-encoded information.

Commission officials expect the allocation to meet the needs of widely dispersed business and governmental organizations for document distribution, data communications and teleconferencing within and among major cities in the United States. The types of transmission services anticipated could complement, as well as compete with, plans for establishing local broadband data distribution systems.

For intercity transmissions, such networks could use terrestrial microwave and satellite links already provided for in the FCC rules. The intracity portions of the networks would be comprised of digital termination systems (DTS) and the communications links between DTS nodal stations.

The DTS facilities would typically employ omni-directional transmitting and receiving nodal stations throughout a metropolitan area to provide direct, two-way communications with transceivers located at customers' premises. The nodal stations would be linked to a city-wide collection/distribution station using narrow-beam microwave radio circuits.

The complete end-to-end service as authorized by the FCC is called digital electronic message service (DEMS). Rules applicable for the new service are being added to Part 21 of the FCC's code.

The commission first issued its Notice of Proposed Rulemaking and Inquiry to establish DTS in August, 1979. The Notice was in response to a petition by Xerox Corporation in November 1978, asking for a reallocation of spectrum to allow provision of direct communications to the customers' premises independent of the existing facilities for intracity communications which at the time was almost exclusively provided by the telephone companies. Now, however, some existing cable systems and cable television systems currently being built in major markets are also offering a broadband alternative to the telephone companies for the services described above.

Of the 130 MHz allocated to facilities over which the new service would be provided, 100 MHz is for DTS. Only 70 MHz of this 100 MHz has been channelized and made available when the demand for this portion of the spectrum has been shown. The remaining 30 MHz in the band allocated for narrowband point-to-point links may be used for communications between the nodal stations and the central nodal station within a city. These internodal links would be authorized in the point-to-point microwave radio service and would be shared with other services.

The 70 MHz initially being made available to DTS will be divided among those licensees proposing to provide service and construct DTS facilities in 30 or more cities (an extended network) and those to provide service and construct facilities in fewer than 30 cities (a limited network). Because the commission said it saw the primary need for an intercity digital communications capability, it stipulated that extended DEMS carriers have access to a reserved 40 MHz.

On the other hand, the commission said it was unwilling to limit DEMS to only those large corporations capable of immediately constructing DTS facilities in 30 or more cities. To provide entrepreneurs who do not have the resources for large-scale nationwide DEMS networks, the commission said it would reserve 30 MHz for limited systems. The distinction between systems will apply for five years. After that time, a DTS applicant proposing a network of any size will be eligible for assignments in any spectrum still unassigned within the 70 MHz initially made available.

The commission also said that as a consequence of its expectation that the traffic demand for nationwide service will predominate, it adopted a 5 MHz channel pair for extended systems, allowing for extended carriers per market, and a 2.5 MHz channel pair for limited DEMS, allowing for six such carriers per market.

The commission also said that to allow for maximum flexibility in the design and operation of these systems, it was providing only the minimal technical rules consistent with its obligation to ensure efficient use of the spectrum. It also noted that it would address the allocation of spectrum and establishment of rules for DTS in the 17.7-19.7 GHz band and the use of DTS by non-common carriers in a subsequent Further Notice of Proposed Rulemaking.

# INTRODUCING . . . . .

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## Indax Requirements Force Cox Cable Shift to Oak

ATLANTA, GEORGIA—After bidding a custom version of the TOCOM 55 Plus systems in its franchise proposals for almost a year, Cox Cable Communications has signed a contract with Oak Industries for the delivery of Oak's Dimension II interactive converter/decoders to be utilized in conjunction with Cox Cable's Indax system.

The system, which blends the technologies of cable television and computers, and a version of Oak Communications' newly developed Dimension II interactive converters designed especially for Cox, will be used in Cox's existing San Diego system and in the new 54-channel systems being constructed in Omaha and New Orleans.

Cox has ordered 100,000 units of two types of equipment. Seventy-five percent of the order is for the standard addressable converter/decoders. The remaining 25 percent is for converters especially designed for use in systems like Cox's Indax.

"The deal is worth upwards of $15 million, and, looking at the New Orleans and Omaha markets, the deal could be worth $40 million," according to Dr. Garold Tjaden, vice president of engineering and technology for Cox. The order runs through 1982, with 50,000 units scheduled for delivery this year.

"The Cox deal represents the first major contract we have had for the Dimension II equipment since we introduced it at the NCTA show in Dallas," said Bob McRann, Oak Communications vice president. The standard addressable converter/decoders cost $119.50. The specially designed equipment for the Indax system goes for $300.

Reportedly, it was the special design requirements that triggered the switch to Oak from TOCOM. Sources indicated that Cox's engineering staff had been working with officials from both companies during the past year. When asked why Oak got the nod over TOCOM in this instance, Tjaden said, "They just offered us a better deal in the process of working out the design of the system."

TOCOM President Michael R. Corboy explained that Cox wanted a special product built for its requirements but that TOCOM wanted to continue allocating all of its resources toward production of the 55 Plus. "It is not that we were beat out on the thing," Corboy said. "We just decided in November that we could not produce their specialized product, fill our other orders for the 55 Plus, and do well. . . .

"Cox believes that the home banking and home shopping market will move a little faster than we and, I think, the rest of the industry feels, it is going to move," Corboy said. "It is a smart company and a good company and I am sorry we couldn't accommodate its special requirements. It is just that we have orders pending for the 55 Plus and we see tens of millions of dollars of business for the 55 Plus spread across the entire industry."

The ascertainment studies conducted by TOCOM before the product was put on the market indicated that one-way teletext will be developed first (movie listings, classifieds, etc.) and the interactive capability would be reserved for the transaction services such as home banking and shopping.

One TOCOM official said the Cox position was to have almost all the teletext services interactive. "They wanted everything interactive," he said, "which would have required the development of computer equipment for the headend that had not as yet been developed. It would have been a high risk venture."

According to Cox's Tjaden, the Dimension II interactive system is equipped with a unique communication protocol system which has 98 percent efficiency opposed to the cable television industry's standard protocol systems which have only 44 percent efficiency.

The Dimension II supports several unique and important aspects of Indax,

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such as a packet-switched communications protocol called 'data-sensed multiple access with collision detection' similar to that proposed by Xerox, Intel and Hewlett-Packard as a computer industry standard for local-loop computer communications. It also features text and graphic images with 16-color capability; up to 60 two-way data-channels and data encryption and decryption, Tjaden explained.

## SCTE News

### SCTE Irate Over Bad Debts, Adopts Cash-and-Carry Policy

WASHINGTON, D.C.—The Society of Cable Television Engineers has announced it will no longer accept orders for services or products without full payment in advance. According to Judith Baer, executive vice president of SCTE, the decision is the result of both "slow" and "no pay" experience in accepting orders for SCTE's educational publications and videotape programs.

Past-due accounts receivable have become a major problem for SCTE. Baer reported that the amount of money owed currently to SCTE on overdue invoices exceeds $25,000.

"That may not seem like much to others, but to SCTE it is staggering," said Baer.

*Judith Baer*

Baer explained that the past-due receivables resulted from SCTE's practice of accepting purchase orders and verbal commitments from cable industry operators and manufacturers for meeting registrations and for the purchase of educational products. "Many just disappear, never to be heard from again," said Baer. "We assigned collections to Dun and Bradstreet and that didn't seem to work either. The organization has made major efforts to bring educational programs to the industry, but it can't be done on these terms any longer."

In explaining the decision to adopt a cash-and-carry policy, Baer said that SCTE had some "start-up" problems two years ago when it first began introducing its products and services to the industry. However, nearly all SCTE orders are now fulfilled by a professional fulfillment service. Baer described the SCTE's programs as being "on-line"

"SCTE is still a very small group, money-wise, with dues representing less than 20 percent of its income," said Baer. "Its survival comes from its products, and SCTE deserves the support of the industry by honoring SCTE's invoices."

### New SCTE Directors Elected

WASHINGTON, D.C.—Members of the Society of Cable Television Engineers have elected six new directors to serve two-year terms on the board. Their terms will begin in March.

Two of the directors were re-elected. Lawrence Dolan of Wavetek Mid-State in Indianapolis served as SCTE's president in 1980 and was re-elected to the board by an overwhelming majority. Richard Covell of GTE Sylvania, El Paso, Texas, served as Western vice president and was also reelected to the board. Dolan and Covell are at-large directors and are joined by Thomas Polis of Comcast Corporation, Bala Cynwyd, Pennsylvania.

James Chiddir of Oceanic Cablevision, Honolulu, Hawaii, was elected Region One director, serving the Western portion of the United States. Henry Kallina of Cable Communications of Iowa will represent SCTE Region Three through the center of the country. Jay Levergood of Scientific-Atlanta was elected to represent members in Region Five, covering the Southeast.

SCTE's board of directors includes eight regional directors and four at-large directors. Formal installation of the 1981 board will take place March 17 at the Opryland Hotel in Nashville during SCTE's 1981 Spring Engineering Conference.

## Comcast's Polis Hosts Nashville Conference

WASHINGTON, D.C.—The Society of Cable Television Engineers will host its 1981 Spring Engineering Conference March 16 and 17 at the Opryland Hotel in Nashville, Tennessee. The conference is being chaired by Thomas Polis, vice president of engineering at Comcast Corporation. The hospitality and awards program chairman is Marty Koran, sales manager for Toner Cable Equipment Company.

Polis and Koran have announced program plans which include panels on New Developments, Data on Cable, Pioneers' Panel, Satellite Services Development, Systems Design Concepts, Systems Monitoring and Testing, and Developments in Earth Receiving Stations.

Luncheon programs will feature presentation of the 1981 SCTE "Member of the Year" award, the president's award, special speakers and the 1981 SCTE annual membership meeting. Newly elected SCTE officers and directors will be installed during the March 17 luncheon.

Advance registration fees are $250 for SCTE members and $350 for non-members. Advance registration closes March 1. After that date, registration fees will rise considerably, SCTE explains. Registration fees must be paid in advance. Contact SCTE at (202) 293-7841.

## Business Notes

★ **World Business Corporation** has formed a division to distribute its imported product lines and distribute U.S. products. Called the WBC Electro-Supply Division, it will specialize in capacitors, semiconductors, chokes/inductors, electro-mechanical devices and audio accessories.

★ **Superior CATV Installation Brokerage Service, Inc.**, Livingston, New Jersey, has announced the addition of subscription TV and MDS subscriber installations to its present service of cable television installations. Agreements have been consumated with PREVIEW (New England Subscription Television — an ATC subsidiary) of Norwood, Massachusetts, and Colony Productions, Ltd., (a subsidiary of Colony Communications, Inc.) of Providence, Rhode Island, for Superior to provide installation assistance through its represented independent contractor installers.

★ **Cablewave Systems** of North Haven, Connecticut, will represent the Spinner Company of Munich, West Germany. Cablewave will be responsible for all Spinner sales and marketing in the United States. Spinner offers a broad range of R.F. components, including coaxial connectors, coaxial and waveguide switches, adaptors, couplers, diplexers, dummy loads, dehydrators, filters and rotary joints.

★ **Digital Communications Corporation,** a M/A-COM company, has been awarded a contract from RCA American Communications, Inc., to supply two redundant TDMA (Time Division Multiple Access) terminals, with options to purchase an additional five terminals.

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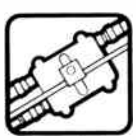

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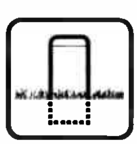

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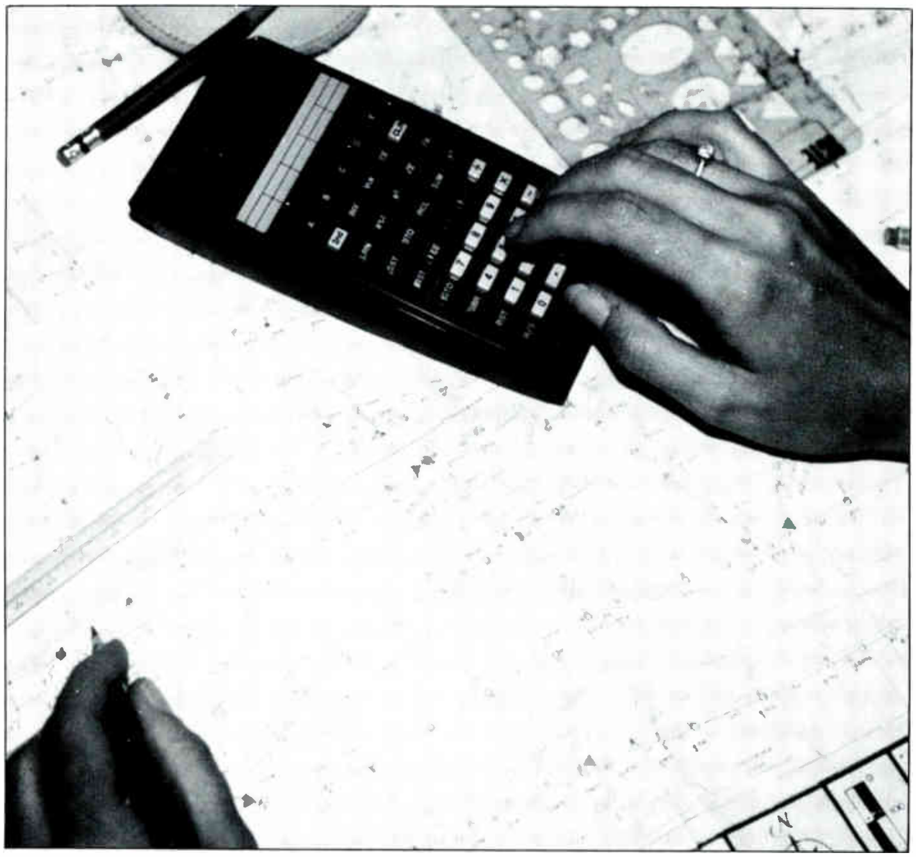
# A Programmable Shortcut To Distance Calculations

*By Bob Schumacher, a telecommunications engineer at American Television and Communications Corporation.*



If a cable television technician is asked how much time he spends computing the direction and distance between two widely separated geographical locations, he will probably answer: "Too much time." Knowledge of direction and heading is required for almost every aspect of cable construction: choosing a sight for headend, adding channels, installing microwave and, of course, performing FAA aeronautical frequency-conflict checks between a system and several airport transmitters. Typically, any one of these applications can require as many as 100 distance and heading tests—a gargantuan task without the aid of a computer.

One engineer who has made short work of distance and heading calculations is Bob Schumacher of American Television and Communications Corporation. Schumacher has developed a distance and heading program that can be used with either the Texas Instruments TI-58 or TI-59 programmable calculator. Schumacher estimates that he has used his program at least once a day for the past 18 months.

The program is based upon the distance and heading equation in Figure 1 on page 28. Without a programmable calculator, the equation takes even the fastest math minds in the business 30 minutes to calculate.

Enter the program on page 28 and perform the four steps listed below. For engineers with the TI-59, the program can be permanently stored on two sides of the unit's magnetic storage cards.

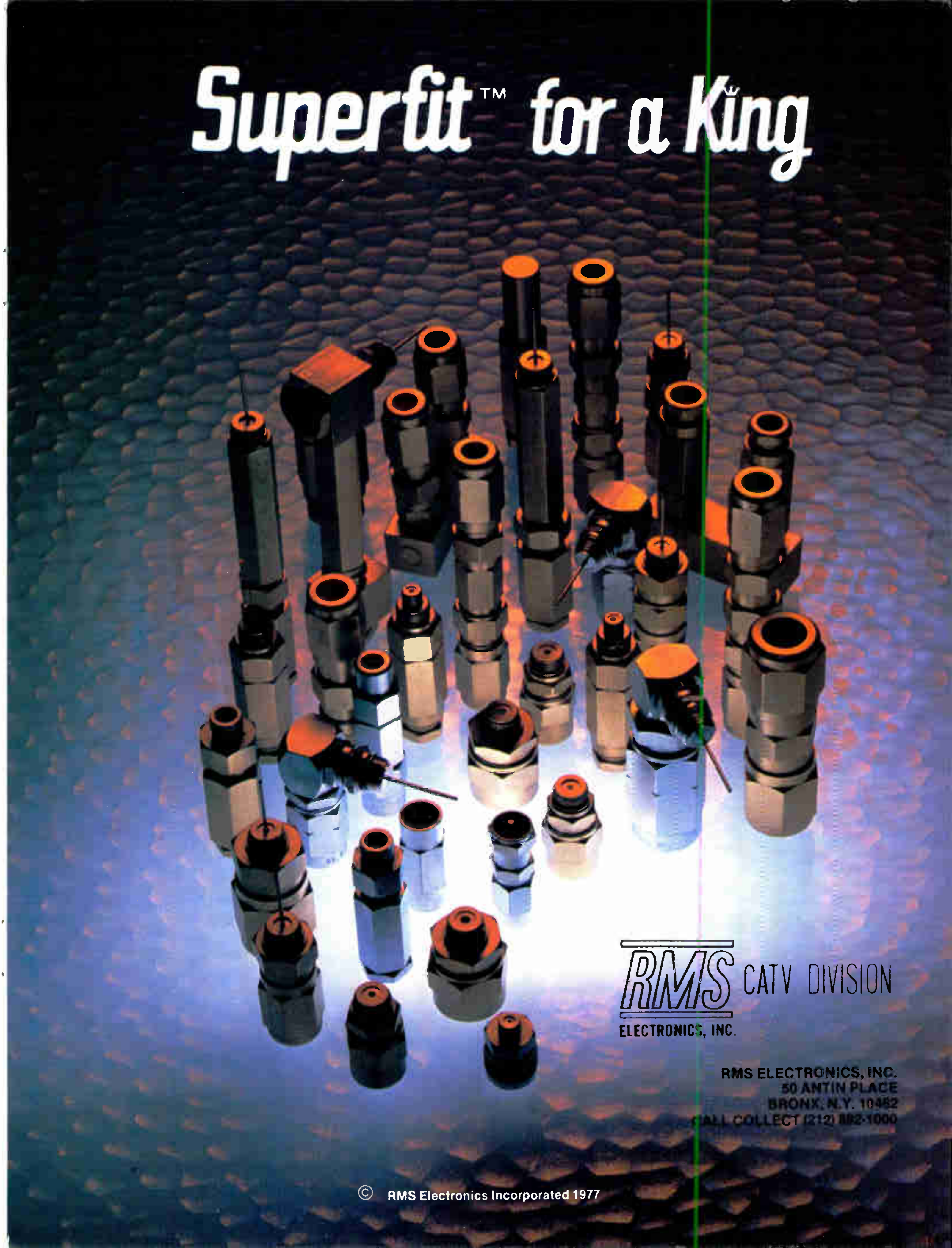
**Step 1.** Enter the first set of coordinates (usually the system headend or some central point in the system) in a decimal format. For example, 30°-23′-17″ latitude and 97°-16′-21″ longitude would be entered as 30.2317 [R/S] and 97.1621 [R/S], respectively.

**Step 2.** Enter the second set of coordinates, again as decimals, pressing [R/S] after each entry.

**Step 3.** Wait a few seconds and the distance between the two points will be printed in both statute miles and kilometers. In a few more seconds, the heading (direction) in degrees will be printed.

**Step 4.** For multiple calculations, as from one headend to a number of transmitters, it is not necessary to enter the first set of coordinates (headend) each time. Pressing [A] and [R/S] recalls and enters the first set of coordinates entered as in Step 1 above. Pressing [C] and [R/S] recalls and enters the second set of coordinates as entered in Step 2 above.

The program contains two pitfalls. Errors could occur if one location is exactly due north of the other or if the two locations are less than a mile apart. In those cases, engineers have to go back to the map and pencil. Schumacher says, however, that out of the thousands of distance and heading calculations he has done, only one couldn't be calculated with his program.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*The TI-58 programmable calculator from Texas Instruments.*

## Distance and Heading Equation

$$D = 60 \cos^{-1} \left[ \sin L_1 \sin L_2 + \cos L_1 \cos L_2 \cos(\lambda_2 - \lambda_1) \right]$$

$$H = \cos^{-1} \left[ \frac{\sin L_2 - \sin L_1 \cos(D/60)}{\sin(D/60) \cos L_1} \right]$$

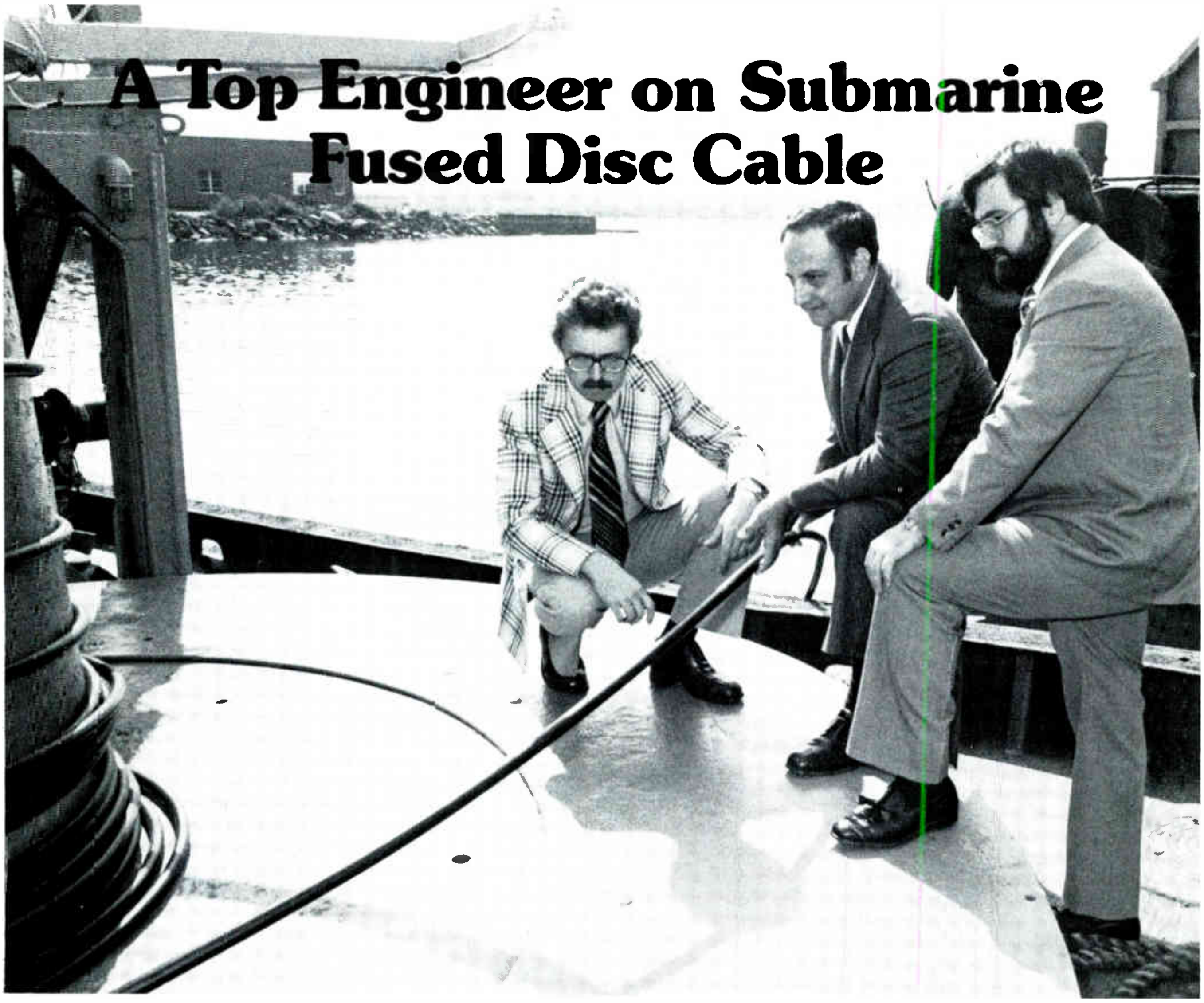
$$H_i = \begin{cases} H & ; \sin(\lambda_2 - \lambda_1) < 0 \\ 360 - H; & \sin(\lambda_2 - \lambda_1) \geq 0 \end{cases}$$

$(L_1, \lambda_1) \equiv$ the latitude of the source
$(L_2, \lambda_2) \equiv$ the longitude of the source

**Figure 1**

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 000 | 58 | FIX | 049 | 43 | RCL | 098 | 02 | 2 | 147 | 38 | SIN | 196 | 81 | RST |
| 001 | 09 | 09 | 050 | 04 | 04 | 099 | 06 | 6 | 148 | 65 | × | 197 | 76 | LBL |
| 002 | 99 | PRT | 051 | 75 | - | 100 | 03 | 3 | 149 | 43 | RCL | 198 | 11 | A |
| 003 | 42 | STO | 052 | 43 | RCL | 101 | 00 | 0 | 150 | 01 | 01 | 199 | 58 | FIX |
| 004 | 09 | 09 | 053 | 03 | 03 | 102 | 69 | OP | 151 | 39 | COS | 200 | 09 | 09 |
| 005 | 88 | DMS | 054 | 95 | = | 103 | 04 | 04 | 152 | 54 | ) | 201 | 43 | RCL |
| 006 | 42 | STO | 055 | 39 | COS | 104 | 43 | RCL | 153 | 95 | = | 202 | 09 | 09 |
| 007 | 01 | 01 | 056 | 65 | × | 105 | 20 | 20 | 154 | 22 | INV | 203 | 99 | PRT |
| 008 | 91 | R/S | 057 | 53 | ( | 106 | 69 | OP | 155 | 39 | COS | 204 | 42 | STO |
| 009 | 99 | PRT | 058 | 43 | RCL | 107 | 06 | 06 | 156 | 42 | STO | 205 | 09 | 09 |
| 010 | 42 | STO | 059 | 01 | 01 | 108 | 36 | PGM | 157 | 06 | 06 | 206 | 88 | DMS |
| 011 | 10 | 10 | 060 | 39 | COS | 109 | 00 | 00 | 158 | 43 | RCL | 207 | 42 | STO |
| 012 | 88 | DMS | 061 | 65 | × | 110 | 58 | FIX | 159 | 04 | 04 | 208 | 01 | 01 |
| 013 | 42 | STO | 062 | 43 | RCL | 111 | 09 | 09 | 160 | 75 | - | 209 | 43 | RCL |
| 014 | 03 | 03 | 063 | 02 | 02 | 112 | 02 | 2 | 161 | 43 | RCL | 210 | 10 | 10 |
| 015 | 91 | R/S | 064 | 39 | COS | 113 | 03 | 3 | 162 | 03 | 03 | 211 | 99 | PRT |
| 016 | 99 | PRT | 065 | 54 | ) | 114 | 01 | 1 | 163 | 95 | = | 212 | 42 | STO |
| 017 | 42 | STO | 066 | 95 | = | 115 | 06 | 6 | 164 | 38 | SIN | 213 | 10 | 10 |
| 018 | 11 | 11 | 067 | 85 | + | 116 | 02 | 2 | 165 | 22 | INV | 214 | 88 | DMS |
| 019 | 88 | DMS | 068 | 53 | ( | 117 | 02 | 2 | 166 | 77 | GE | 215 | 42 | STO |
| 020 | 42 | STO | 069 | 43 | RCL | 118 | 69 | OP | 167 | 12 | B | 216 | 03 | 03 |
| 021 | 02 | 02 | 070 | 01 | 01 | 119 | 04 | 04 | 168 | 03 | 3 | 217 | 61 | GTO |
| 022 | 91 | R/S | 071 | 38 | SIN | 120 | 43 | RCL | 169 | 06 | 6 | 218 | 00 | 00 |
| 023 | 99 | PRT | 072 | 65 | × | 121 | 00 | 00 | 170 | 00 | 0 | 219 | 15 | 15 |
| 024 | 42 | STO | 073 | 43 | RCL | 122 | 55 | ÷ | 171 | 75 | - | 220 | 76 | LBL |
| 025 | 12 | 12 | 074 | 02 | 02 | 123 | 06 | 6 | 172 | 43 | RCL | 221 | 13 | C |
| 026 | 88 | DMS | 075 | 38 | SIN | 124 | 00 | 0 | 173 | 06 | 06 | 222 | 58 | FIX |
| 027 | 42 | STO | 076 | 54 | ) | 125 | 95 | = | 174 | 95 | = | 223 | 09 | 09 |
| 028 | 04 | 04 | 077 | 95 | = | 126 | 39 | COS | 175 | 58 | FIX | 224 | 43 | RCL |
| 029 | 01 | 1 | 078 | 22 | INV | 127 | 65 | × | 176 | 02 | 02 | 225 | 11 | 11 |
| 030 | 93 | • | 079 | 39 | COS | 128 | 43 | RCL | 177 | 69 | OP | 226 | 99 | PRT |
| 031 | 01 | 1 | 080 | 65 | × | 129 | 01 | 01 | 178 | 06 | 06 | 227 | 42 | STO |
| 032 | 05 | 5 | 081 | 06 | 6 | 130 | 38 | SIN | 179 | 98 | ADV | 228 | 09 | 09 |
| 033 | 00 | 0 | 082 | 00 | 0 | 131 | 95 | = | 180 | 98 | ADV | 229 | 88 | DMS |
| 034 | 07 | 7 | 083 | 65 | × | 132 | 94 | +/- | 181 | 91 | R/S | 230 | 42 | STO |
| 035 | 07 | 7 | 084 | 42 | STO | 133 | 85 | + | 182 | 81 | RST | 231 | 01 | 01 |
| 036 | 09 | 9 | 085 | 00 | 00 | 134 | 43 | RCL | 183 | 76 | LBL | 232 | 43 | RCL |
| 037 | 42 | STO | 086 | 43 | RCL | 135 | 02 | 02 | 184 | 12 | B | 233 | 12 | 12 |
| 038 | 05 | 05 | 087 | 05 | 05 | 136 | 38 | SIN | 185 | 43 | RCL | 234 | 99 | PRT |
| 039 | 01 | 1 | 088 | 95 | = | 137 | 95 | = | 186 | 06 | 06 | 235 | 42 | STO |
| 040 | 06 | 6 | 089 | 58 | FIX | 138 | 55 | ÷ | 187 | 58 | FIX | 236 | 10 | 10 |
| 041 | 02 | 2 | 090 | 02 | 02 | 139 | 53 | ( | 188 | 02 | 02 | 237 | 88 | DMS |
| 042 | 04 | 4 | 091 | 69 | OP | 140 | 53 | ( | 189 | 69 | OP | 238 | 42 | STO |
| 043 | 03 | 3 | 092 | 06 | 06 | 141 | 43 | RCL | 190 | 06 | 06 | 239 | 03 | 03 |
| 044 | 06 | 6 | 093 | 36 | PGM | 142 | 00 | 00 | 191 | 98 | ADV | 240 | 61 | GTO |
| 045 | 03 | 3 | 094 | 24 | 24 | 143 | 55 | ÷ | 192 | 98 | ADV | 241 | 00 | 00 |
| 046 | 07 | 7 | 095 | 14 | D | 144 | 06 | 6 | 193 | 25 | CLR | 242 | 15 | 15 |
| 047 | 69 | OP | 096 | 42 | STO | 145 | 00 | 0 | 194 | 91 | R/S | 243 | 00 | 0 |
| 048 | 04 | 04 | 097 | 20 | 20 | 146 | 54 | ) | 195 | 25 | CLR | | | |

# A Top Engineer on Submarine Fused Disc Cable



Richard M. White, Vice President, Engineering for Vision Cable Communications, Inc. of New York, N.Y. had this to say in a recent letter to us:

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Cover Story

# Avoiding Errors In Signal-Level Reading

*In this issue, Raleigh B. Stelle III, national and international sales manager for Texscan Corporation, begins a series of articles on the fine points of operating test equipment. Future articles will deal with structure return-loss analysis, system spectrum analysis and coaxial cable calculations.*

A cable television system should be subject to test and measurement in all phases, from initial signal survey and construction to final franchise or FCC proof of performance. Day to day preventive maintenance is also impossible without testing and measurement.

The survey phase will require the measurement of signal and interference levels at the proposed headend site.

The construction phase requires the sweep testing of coaxial cable as received from the vendor. Testing is also required after installation and splicing either on the strand or underground. In this phase, amplifiers should be swept to determine input/output match, flatness, AGC/ASC range and overall gain. Passives should likewise be tested for insertion loss, isolation and directivity isolation and return-loss prior to installation. It is not necessary that each amplifier, tap and passive be examined, but it is prudent to conduct a lot-sample type quality assurance program. It can save days and weeks of grief later when faulty devices cause problems that require troubleshooting and replacement.

After installation, a system must meet either a franchise proof or an FCC proof or both. The FCC tests are fairly straightforward, but some franchise tests are really exotic and are beyond the scope of this article.

A technician must master four basic techniques to deal with these tests and measurements: RF signal-level measurement, system sweeping, bench sweeping, and spectrum analysis.

RF signal-level measurement techniques are probably the most frequent measurements made in a cable television system. There are two devices used in RF level measurements: the field-strength meter and the spectrum analyzer. Operation of these devices is relatively straightforward and the manufacturers seem to do a good job with these descriptions in their instruction manuals. A deeper understanding of the internal workings of these devices is in order because, under certain circumstances, the devices can lie with authority.

A field-strength meter is a superheterodyne receiver. It converts an incoming signal to some intermediate frequency (IF) which is usually lower than the desired receiver frequency. The reason for conversion is to generate selectivity and gain. This is more easily accomplished at relatively low frequencies.

To accomplish this conversion, a nonlinear device (diode) is excited by two incoming RF signals. The product at the IF frequency is equal to the sum and/or difference of the two incoming signals. See the mixer block diagram in Figure 1. A bandpass filter is provided at the mixer output ("C") to select the desired mixing product. When a signal is present at the IF, the instrument shows a response on its indicator (meter, LED, etc.).

When measuring large carrier-to-noise (C/N) ratios, high-level test points such as bridger or line-extender outputs are generally used. Signals of +20 to +30 dBmV are present at the FSM input terminals. As input attenuation is removed to measure low level noise, the signal levels arriving at the mixer "A" port can

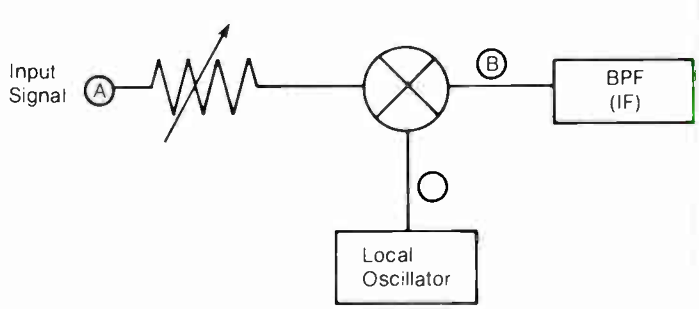


**Figure 1**

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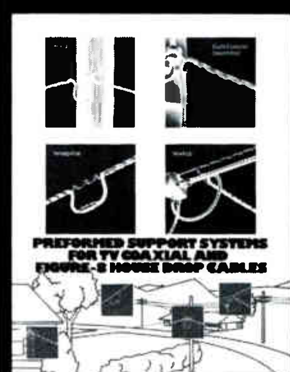
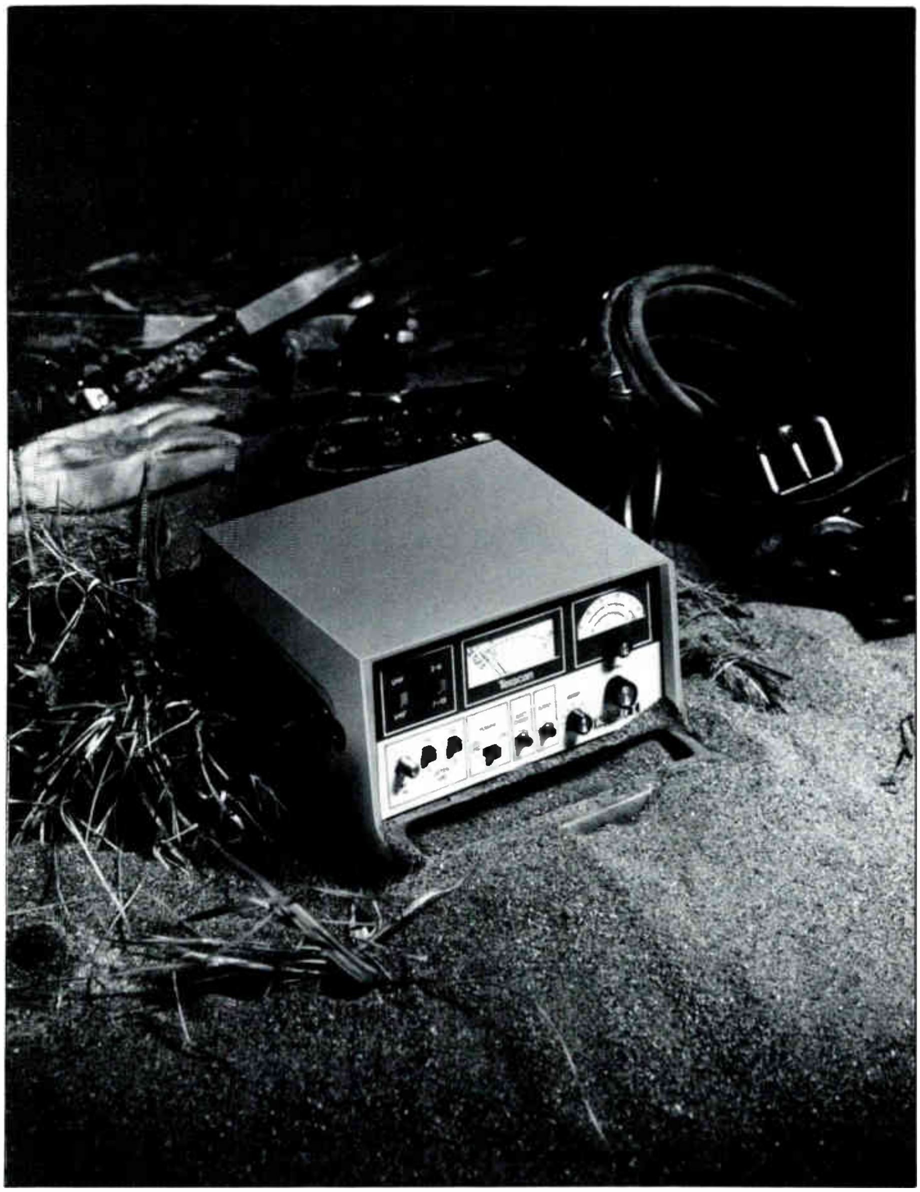
| GFDE-2121 | Galvanized False Dead-End for 1/4" Galvanized Steel Strand |
| **For House Drop Coaxial Cables specify:** | |
| DE-1500 | Galvanized Telegrip for RG-59/U Coaxial Cable |
| DE-3329 | Stainless Steel Custom Dead-End for RG-59/U Coaxial Cable |
| DE-2525 | Galvanized Dead-End for .051 Galv. messenger of Figure 8 RG-59/U Coaxial Cable |
| DE-2505 | Galvanized Dead-End for .063- .072 Galv. messenger of Figure 8 RG-59/U Coaxial Cable |
| **For protection of Strand and Cables, specify:** | |
| Plastic Guy Guards, Plastic Tree Guards, Ground Wire Molding | |




PREFORMED LINE PRODUCTS



*The field-strength meter has done yeoman service for many years.*

approach the level at which the mixer compresses "C" output. At this point, "C" is no longer in 1:1 relationship with "A" and the indicated output will be less than the actual value of signal present at the input (see Figure 2).

Under the conditions described above, a fault more serious than a little compression can occur. As signal levels to the mixer approach +10 dBmV, the simple mixing process of A+B=C becomes invalid. Multiple mixing products can now occur which will lead us to believe we have signals or beats occurring in the system where in fact there are none. It is relatively easy to determine this condition with low value external attenuators. Either use a 3 dB fixed pad or a 1 dB step attenuator. So long as the meter scale changes 1 dB for a 1 dB attenuation change, the meter is reading accurately. When the meter is overloaded, the meter scale will change 2 or 3 dB for a 1 dB attenuator change.

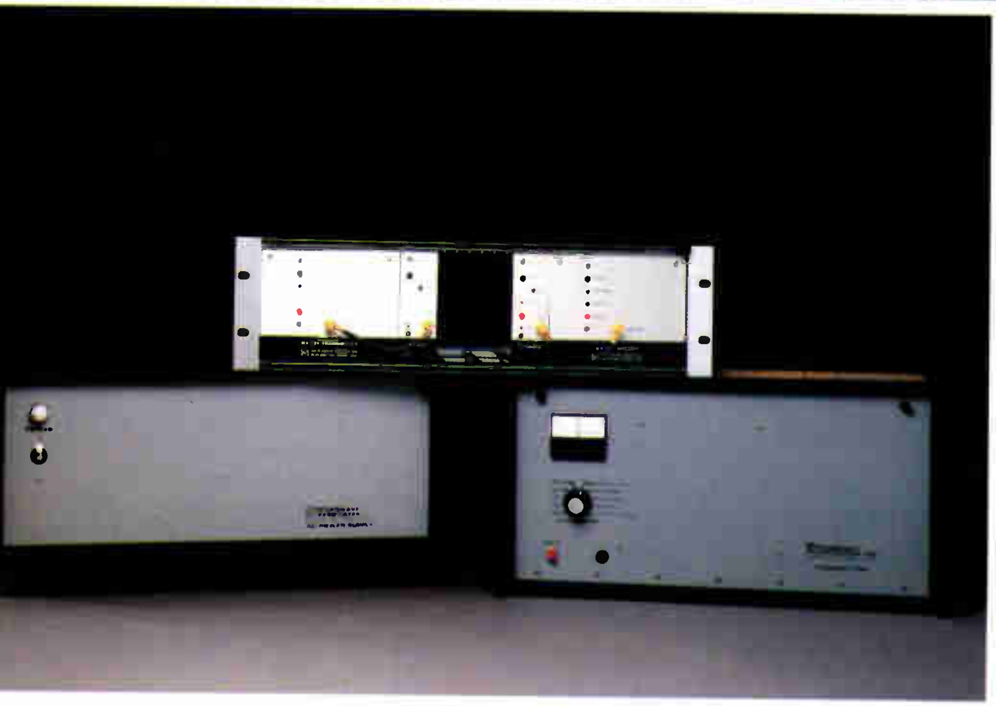
### How False Mixing Products Occur

"C" = "A" ± "B" (Frequencies)

1) Assume "A" Is -10 dBmV
2) If >>"A"≈ +57 dBmV, Then "C" Will Track with "A" in a 1:1 Relationship Within the Dynamic Range of the Mixer.
3) However, as "A" Becomes Larger ≈ +10 dBmV, Mixing Products Appear As
   2A ± B = C
   3A ± B = C
   A ± 2B = C
   2A ± 2B = C
   A ± 3B = C
   2A ± 3B = C
   3A ± 3B = C

**Figure 2**

# 8 out of 10 video FM relay systems get from here



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Both feature 12.7 to 13.2 CARS Band operation □ PSIT and common carrier frequencies around 12 GHz □ 40 channel CARS Band capability □ available in 12.5, 25, or 50 MHz frequency plans.
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MAC can deliver the FM advantage of superior picture quality in a variety of configurations. The right system—at the right price—to meet your growing needs. For example, our MA-12X receiver and transmitter make the backhauling of signals from remote sub-headends a practical alternative to cable or AM. When greater performance and power is required, our MA-12G system is perfect for handling multiple power splits and multihop/long haul relays.

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With high input levels, or with superband or UHF converters, images become a problem. If the desired mixing product is A-B=C, the image is A+B=C. The two graphs, Figures 3 and 4, show the channel and frequency relationships. If you were measuring system noise just below channel 7, you might get an indication of a signal which is really caused by channel 4. There are three ways to determine if this is an image response:

1. If the signal "peaks," chances are good that you are measuring an image or beat product. If you are measuring noise, the indication should be nearly flat.
2. Use the audio section of the FSM. Noise has only a "hissing" or "rushing" sound. There should be no indication of "sync buzz" or other audio information present.
3. Use a good sharp bandpass filter in front of the FSM. This will eliminate all responses except the desired signal frequencies.

Noise in a cable television system is specified as the noise in a 4 MHz bandwidth. Many FSMs have a much narrower bandwidth, typically 0.2 to 0.6 MHz. Since the measurement bandwidth is much less than the required 4 MHz, allowances must be made. The noise correction factor for IF bandwidth alone is 10 log 4 MHz÷b/w MHz. If the IF bandwidth is 600 KHz, then NCF=10 log 4/.6=8.239 dB. For narrower IF bandwidths, the number becomes increasingly larger.

The nature of noise is such that it has a very high peak-to-average ratio. This means that a detector circuit which is designed to read peak voltages will read a higher value than the average, which is the quantity needed. An additional correction in the opposite direction is now required. It is difficult to assign a value theoretically, so this number must be derived experimentally by each FSM manufacturer. This correction number is added algebraically to the noise, or subtracted from the C/N ratio.

Example: For a system to supply a 0 dBmV signal to the subscriber, it must maintain 36 dB carrier-to-noise ratio.

With the 727 field-strength meter, a technician reads the following:

1) Carrier level - 0 dBmV
2) Noise level - 36 dBmV
3) Noise Correction - 4dB

What is the carrier-to-noise ratio? 40 dB? Absolutely no.

In the example above, the noise level was observed to be -36 dBmV. The ultimate sensitivity of most FSMs is only 40 dBmV. This limitation is a result of the instrument's inherent noise floor. In order to measure a signal or noise accurately, that signal must be 8-10 dB above the instrument's noise floor. At the given level of - 36 dBmV, the measurement could be in error by a further 2 to 3 dB. At levels close to the noise floor, the detector in the FSM cannot distinguish between the instrument noise and the input noise (or signal).

The circuit shown in Figure 5 should be a true peak detector. Unfortunately, the gulf between theory and practice has not taken some factors into account. In fact, some FSMs have an error between types of input signal, depending on modulation. Since the meters are usually calibrated on a CW source, they are accurate only for that type signal. On video signals, some meters exhibit as much as 2 dB error. The answer is to check the meter against both CW and video sources and note the differences. The difference should not change with frequency but may vary depending on where the pointer is on the meter scale.

A field-strength meter is the cornerstone of the cable industry. It has done yeoman service for years and will continue to do so for many more years. However, it is not an instrument without faults. Understanding the limitations of this instrument will enhance the usefulness of the information derived from it.

Another important aspect of testing is structural return-loss (SRL) measurement. This will be the focus of an article in the March issue of **CED.**

* * * * * * * * *

*Raleigh B. Stelle III has been with Texscan for nine years, two years in his present capacity. He is working with Ralph Haimowitz on the newly formed Engineering Committee of the Community Antenna Television Association to develop technical seminars for cable television engineers. He serves as associate vice director of CATA and is a member of the NCTA and the SCTE.*

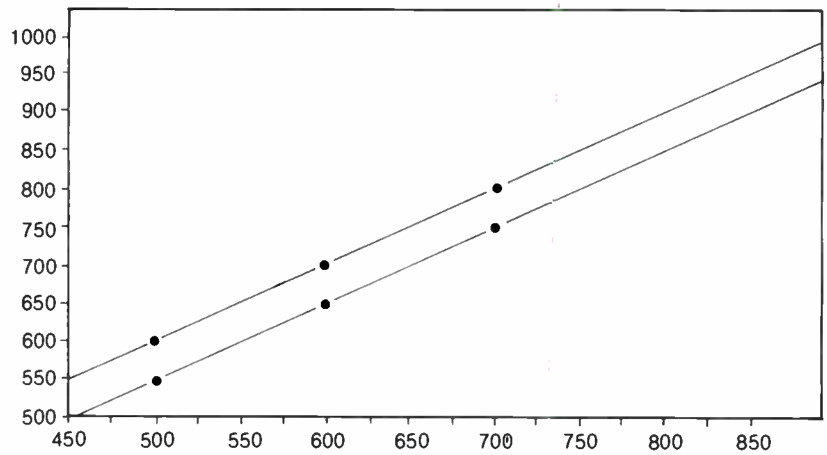


**Figure 3**

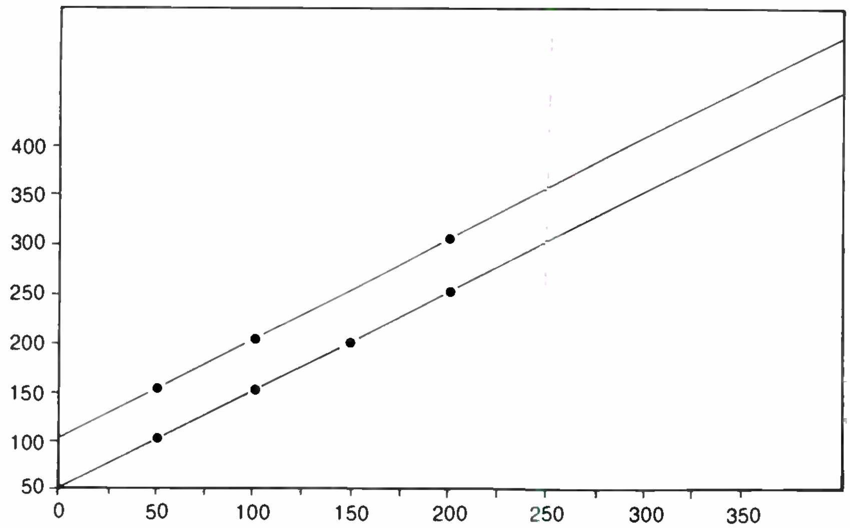


**Figure 4**

## FSM Block Diagram

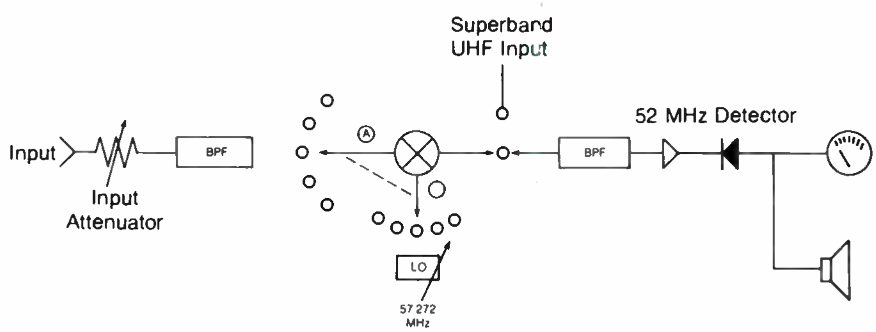


**Figure 5**

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GENERAL INSTRUMENT

# Impact of 3° Satellite Spacing On Smaller Earth Stations

*The recent utilization of 3.6- and three-meter antennas for reception of satellite television signals has stirred controversy as to whether antennas of this aperture will continue to perform when satellites are spaced 3° in the orbital slot. To shed light on the dispute, Satellite Syndicated Systems, Inc., requested Microdyne Corporation to conduct an analysis of the carrier-to-interference levels produced by adjacent satellites spaced 3°. The results of the tests are presented in the following article by David L. Alvarez. The article addresses the case of three satellites with an orbital arc spacing of 3° and the possibility of interference to 3.6- and three-meter antennas. It does not seek to determine the minimum carrier-to-noise ratio that a system should operate when using the smaller antennas in conjunction with high level EIRPs available from domestic satellites.*

Microdyne conducted its antenna test in Ocala, Florida, before the heavy frosts of January. In the test, the antenna mount was modified to accommodate a large protractor which could resolve elevation-angle changes within .1°. The 3.6-meter antenna was peaked on Westar III and the carrier-to-noise ratio at IF receiver was measured at 11.7 dB. The test setup is pictured in Figure 1. In this configuration, the satellite signal is the desired signal and the RF

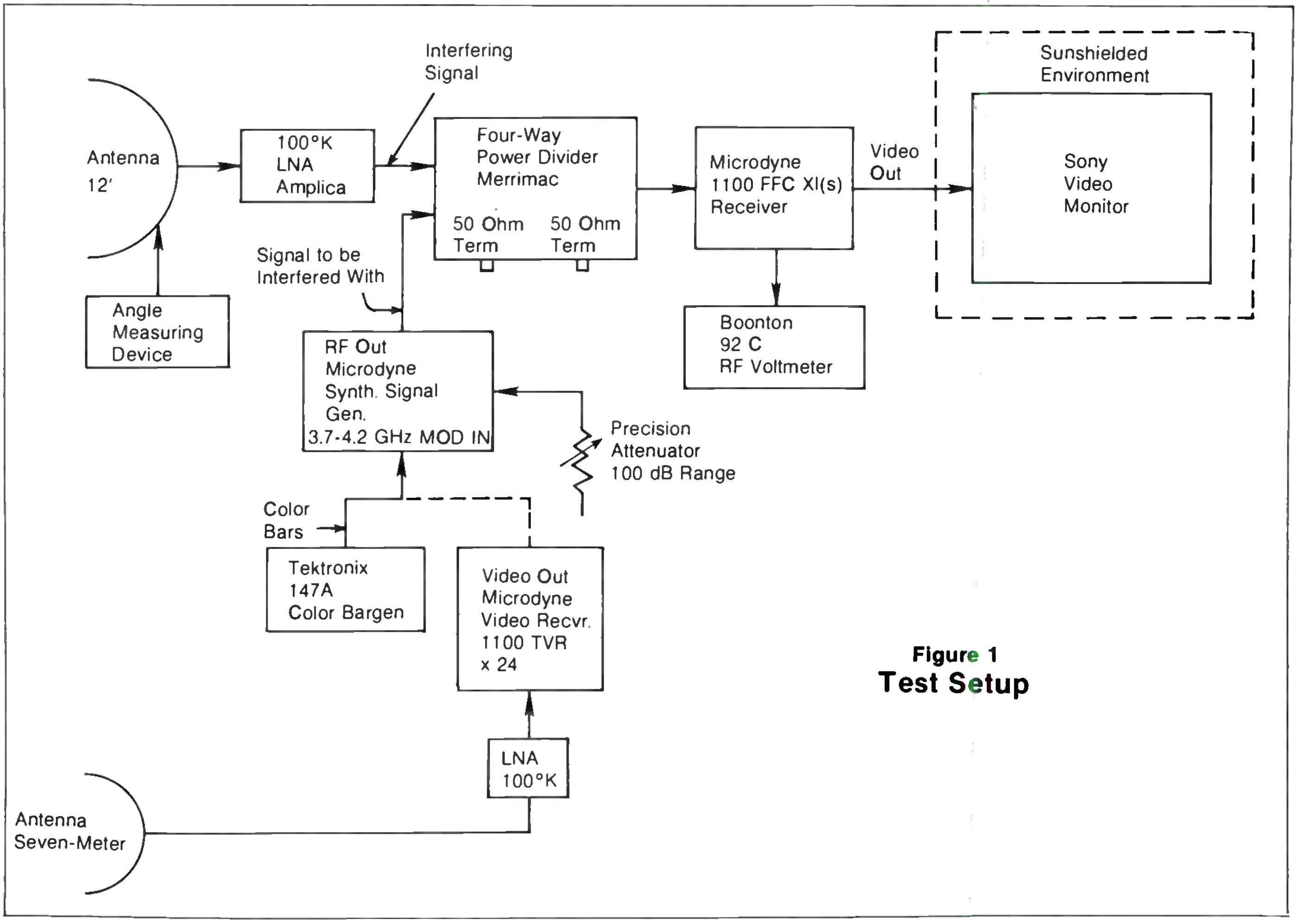



**Figure 1**
**Test Setup**

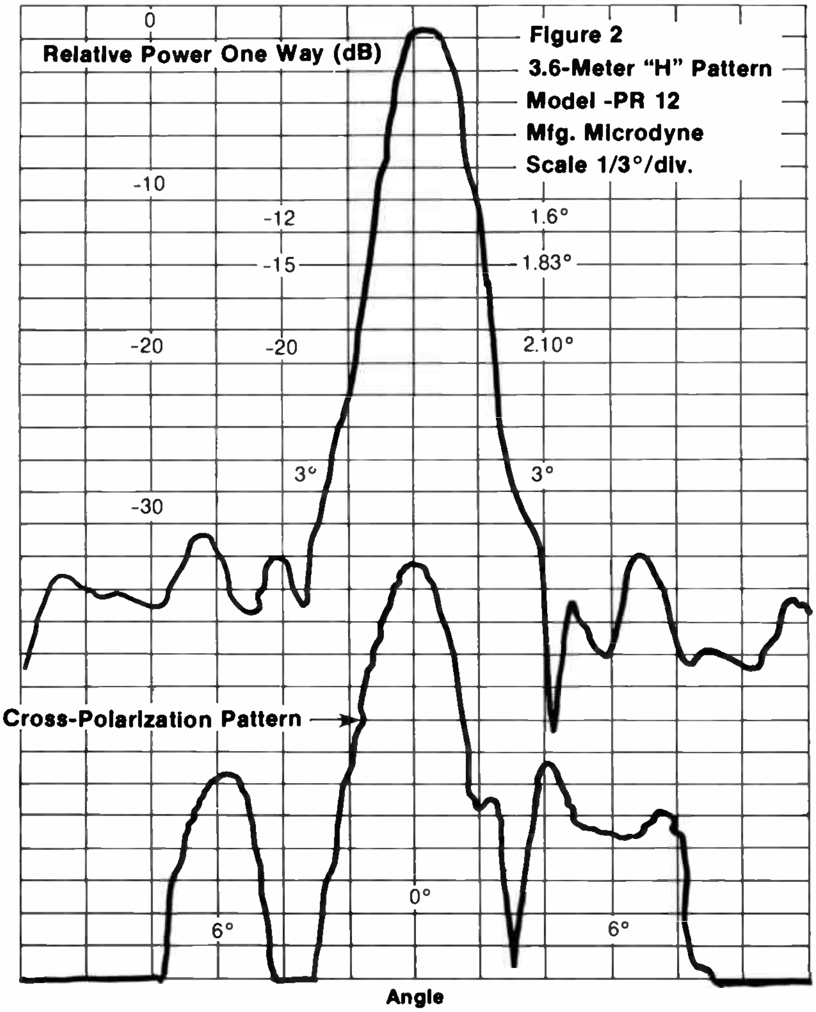


Figure 2
3.6-Meter "H" Pattern
Model -PR 12
Mfg. Microdyne
Scale 1/3°/div.

generator is the interferer.

In the first step, the antenna was pointed away from the satellite and the RF generator level was increased to obtain the same carrier-to-noise ratio of 11.7 dB. Thus, when the antenna was returned to the satellite the power increase in the IF of 3 dB was obtained. At this point, the interfering carrier was equal to the desired carrier. In the next step, the generator was modulated with color bars and with color program material being received from the satellite. The generator level was decreased, then increased until just noticeable distortion was apparent as viewed on the monitor. The difference as read on the attenuator (out of view from the observer and accurate to within .25 of a dB) was recorded as a carrier-to-interference (C-to-I) ratio.

In this test, as with all the tests viewed by the first observer, the subsequent observers were called in independently to view the interference-free picture. They were then requested to stop the operator of the generator when just noticeable distortion was obtained in the picture. The worst case number for C-to-I recorded was 13 dB.

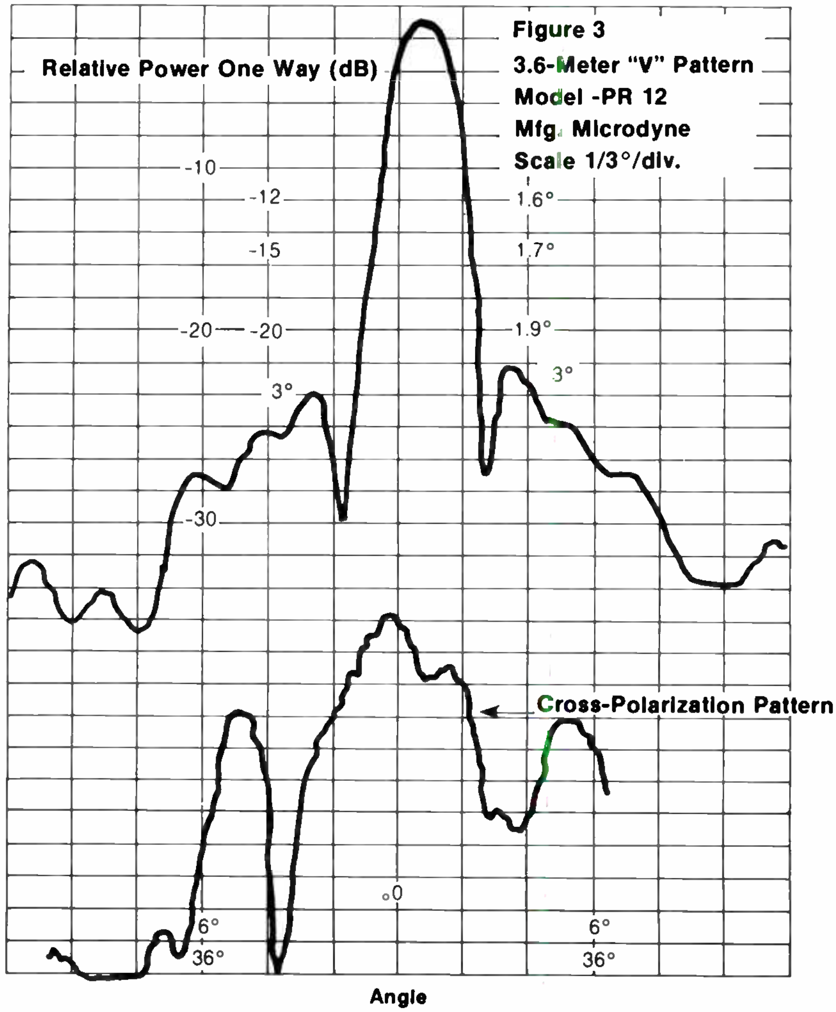
The test was repeated using the signal generator as the desired signal modulated with color program material and the satellite as the interfering source. A transponder on Westar III was located modulating with color bars. The system was then recalibrated with a measurement of carrier-to-noise ratio on the transponder with color bars and the generator's output level set to match the level of the incoming signal. Great care was taken to ensure that the antenna was peaked on the satellite and represented the middle of the main beam. The antenna was then moved away from the satellite (greater than 5°) so that an interference-free picture was obtained on the monitor.

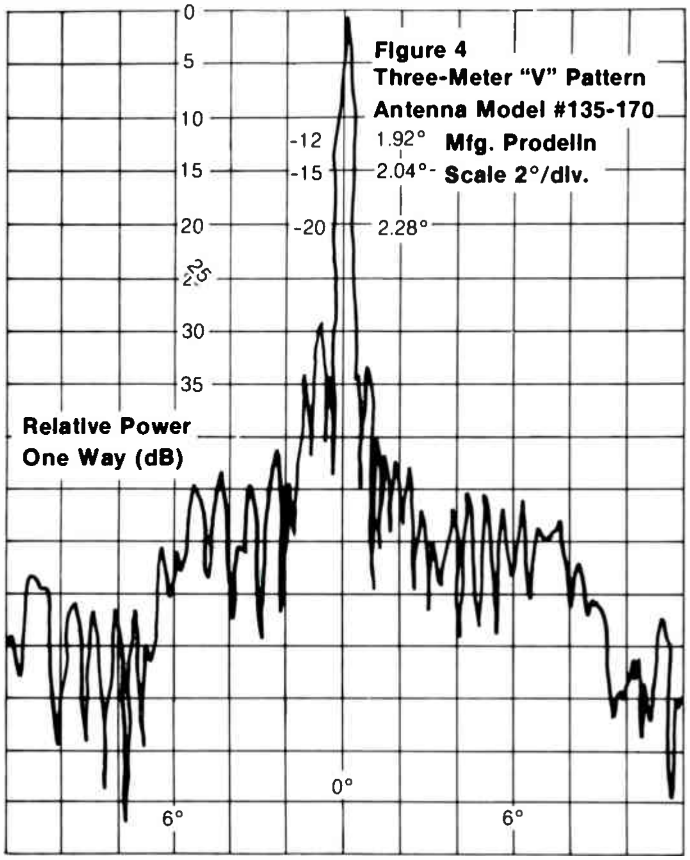
In the next step, the antenna was moved toward the satellite until just noticeable distortion was obtained in the program material as viewed independently by four observers. The resultant worst case angle measured was 1.6°.

It should be noted that this resultant angle did not vary by more than .1° for each of the four observations and that the observers could not see the antenna or angle indicator.

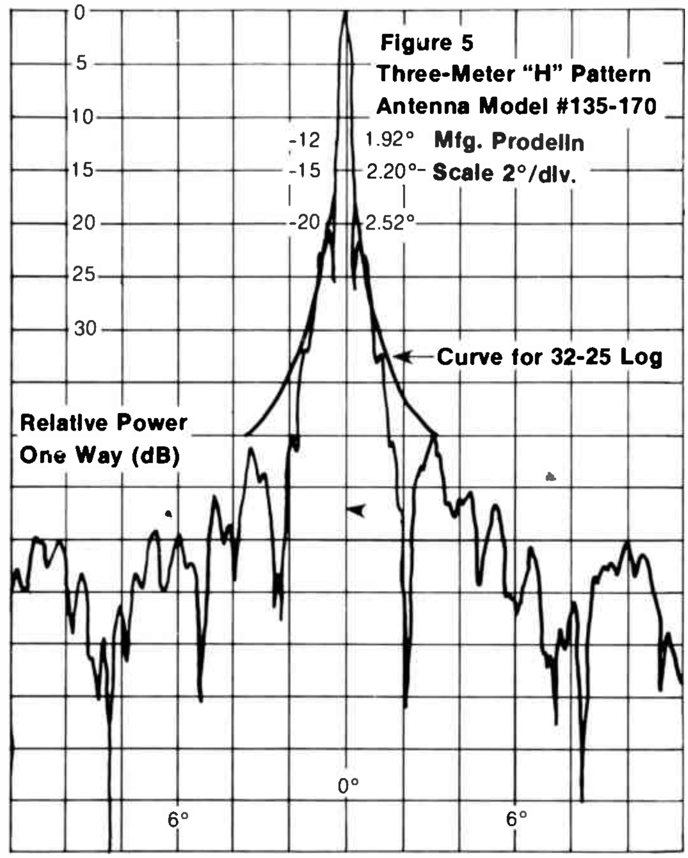
## Analysis of Data

The first step in analyzing the data was to determine whether the initial number for C-to-I of 13 dB (as measured using the signal generator as the interference source) was duplicated by utilizing the satellite as the interfering source. The second step was to relate the angular displacement of the antenna to the satellite in terms of decibels. This is shown in Figure 2. One can see that the 1.6° (as measured on the 3.6-meter antenna), offset from the center of the main beam, yields a number of -12 dB.






Angle




Angle

This number correlates within measurement accuracy to the initial 13 dB, since the signal-generator attenuator has an accuracy of .25 dB and the measurement of the angular displacement of the antenna can be resolved within .1°. The data reflects a case in which two satellites with equal EIRP could be spaced 1.6° apart. The computations are listed in Table 1.

The third step was to synthesize the case for three satellites with equal EIRP. Since the desired satellite is stationed between the two interfering sources, each interfering satellite is on different sides of main beam. Therefore, the power received from the interfering satellites will be equal, yielding a 3 dB increase of interfering signal. This is also shown in Figure 2. An angle of 1.83° would yield another 3 dB of rejection (-15 dB total down from the peak of the main beam). In Table 1, case three is the same as case two, but each of the interfering satellites has an EIRP value 5 dB greater than the desired satellite. Again referring to Figure 2, moving down the amplitude curve an additional 5 dB (total 20 dB down from main-beam gain) yields an angular displacement of 2.1°.

To correlate this data to a three-meter antenna, Microdyne measured and calculated the main-beam pattern differential between the 3.6-meter antenna and a three-meter antenna. This was done by comparing the V pattern of the 3.6-meter antenna (Figure 3 on page 41) to the V pattern of the ten-foot antenna (Figure 4 above). It was apparent that the main-beam beamwidth for the ten-foot antenna was 1.2 times greater than the main-beam beamwidth of the 3.6-meter antenna. The factor of 1.2 was also proved by comparing the H patterns of the antennas as shown in Figures 2 and 5. Therefore, any given value of attenuation versus angular displacement for a 3.6-meter antenna can be scaled to apply to the ten-foot patterns by multiplying the angular differential by 1.2. Refer to Table 1 and Figures 4 and 5.

## The Correlation

The next stage is to determine the

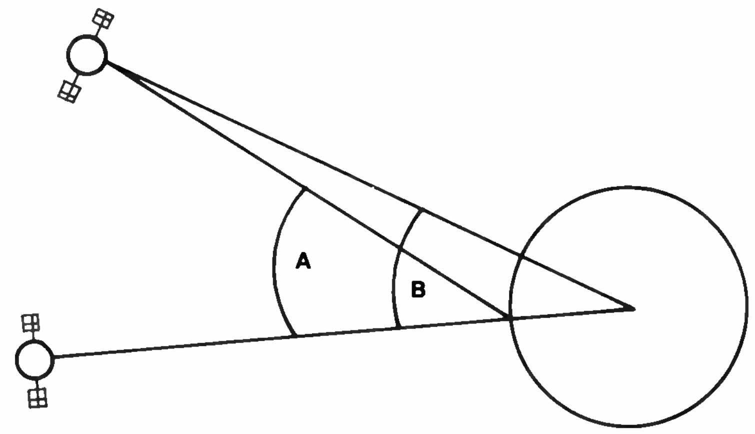
**Table 1**

### Tabulation of Results

**Various Satellite Configurations Versus Minimum Orbital-Slot Spacing**

| | — ANTENNA SIZE — 3.6-Meter | Three-Meter |
|---|---|---|
| **Case I** | | |
| Two Satellites Equal EIRP | 1.6 ° (1) | 1.92° (2) |
| **Case II** | | |
| Three Satellites Equal EIRP (3 dB worse) | 1.83° (3) | 2.20° (2) |
| **Case III** | | |
| Three Satellites EIRP of each interfering satellite is 5 dB greater than desired satellite | 2.10° (3)<br>2.20° (4) | 2.52° (2)<br>2.62° (4) |

(1) Measured
(2) From plot Figure 5
(3) From plot Figure 2
(4) Corrected by .1° representing orbital drift of the interfering satellites.




A=Topocentric Angle
B=Geocentric Angle

**Figure 6**

## Topocentric Vs. Geocentric Angles

$$\sqrt{(E1_1 - E1_2)^2 + (Az_1 - Az_2)^2}$$

$E1_1$ = Elevation Angle for Satellite at 73°
$E1_2$ = Elevation Angle for Satellite at 70°
$Az_1$ = Azimuth Angle for Satellite at 73°
$Az_2$ = Azimuth Angle for Satellite at 70°

$$\sqrt{(17.1 - 15.3)^2 + (122.7 - 120.0)^2}$$
$$\sqrt{(1.8)^2 + (2.7)^2}$$
$$\sqrt{10.53}$$

**Figure 7**

**Table 2.**

## Earth Station Azimuth And Elevation Look Angle For Various Satellite Orbital Slots

| Bellingham, Washington Satellite Look Angle | | | Plentywood, Montana Satellite Look Angle | | | Caribou, Maine Satellite Look Angle | | |
|---|---|---|---|---|---|---|---|---|
| TVRO Site Latitude 48.4500 | | | TVRO Site Latitude 48.4700 | | | TVRO Site Latitude 48.5200 | | |
| TVRO Site Longitude 122.2800 | | | TVRO Site Longitude 104.3200 | | | TVRO Site Longitude 68.0000 | | |
| **Long.** | **Elev.** | **Azim.** | **Long.** | **Elev.** | **Azim.** | **Long.** | **Elev.** | **Azim.** |
| 070 0 | 015 3 | 120 0 | 070 0 | 025 0 | 137 5 | 070 0 | 036 1 | 182 7 |
| 073 0 | 017 1 | 122 7 | 073 0 | 026 4 | 140 8 | 073 0 | 035 9 | 186 8 |
| 076 0 | 018 8 | 125 5 | 076 0 | 027 7 | 144 1 | 076 0 | 035 6 | 190 9 |
| 079 0 | 020 5 | 128 4 | 079 0 | 028 9 | 147 6 | 079 0 | 035 1 | 194 9 |
| 082 0 | 022 1 | [illegible] | 082 0 | 030 0 | 151 1 | 082 0 | 034.4 | 198 9 |
| 085 0 | 023 6 | 134 5 | 085 0 | 030 9 | 154 7 | 085 0 | 033 6 | 202 7 |
| 088 0 | 025 1 | 137 6 | 088 0 | 031 8 | 158 5 | 088.0 | 032 7 | 206.5 |
| 091 0 | 026 5 | 140 9 | 091 0 | 032 5 | 162 3 | 091 0 | 031 6 | 210 2 |
| 094 0 | 027 7 | 144 2 | 094 0 | 033 1 | 166 1 | 094.0 | 030 4 | 213.8 |
| 097 0 | 028 9 | 147 6 | 097 0 | 033 6 | 170 0 | 097 0 | 029 1 | 217.2 |
| 100 0 | 030 0 | 151 2 | 100 0 | 033 9 | 174 0 | 100 0 | 027.8 | 220 6 |
| 103 0 | 031 0 | 154 8 | 103 0 | 034 0 | 178 0 | 103 0 | 026 3 | 223.8 |
| 106 0 | 031 9 | 158 5 | 106 0 | 034 0 | 181 9 | 106 0 | 024 7 | 227 0 |
| 109 0 | 032 6 | 162 3 | 109 0 | 033 9 | 185 9 | 109 0 | [illegible] | 230.0 |
| 112 0 | 033 2 | 166 2 | 112 0 | 033 6 | 189 9 | 112 0 | 021 4 | 232.9 |
| 115 0 | 033 6 | 170 1 | 115 0 | 033 1 | 193 8 | 115 0 | 019.6 | 235.8 |
| 118 0 | 033 9 | 174 1 | 118 0 | 032 5 | 197 7 | 118 0 | 017 8 | 238 5 |
| 121 0 | 034 0 | 178 0 | 121 0 | 031 8 | 201 5 | 121.0 | 015.9 | 241.2 |
| 124 0 | 034 0 | 182 0 | 124 0 | 031 0 | 205 2 | 124 0 | 014.1 | 243.8 |
| 127 0 | 033 9 | 186 0 | 127 0 | 030.0 | 208 8 | 127.0 | 012.1 | 246.3 |
| 130 0 | 033 6 | 190 0 | 130 0 | 028 9 | 212 3 | 130 0 | 010.2 | 248.8 |
| 133 0 | 033 1 | 193 9 | 133 0 | 027 7 | 215.8 | 133.0 | 008.2 | 251.2 |
| 136 0 | 032 6 | 197 8 | 136 0 | 026 4 | 219 1 | 136 0 | 006 2 | 253 6 |
| 139 0 | 031 8 | 201 5 | 139 0 | 025 0 | 222 4 | 139.0 | 004.2 | 255.9 |
| 142 0 | 031 0 | 205 3 | 142 0 | 023 6 | 225 5 | 142 0 | 002 2 | 258.2 |

correlation of earth station azimuth and elevation angles to absolute angular displacement. Figure 6 demonstrates that the topocentric angle is always greater than the geocentric angle. The absolute angular displacement of the antenna at the earth station site (topocentric angle) is always greater than the orbital satellite spacing (geocentric angle). Table 2 below shows the various satellite orbital slots between 70° and 142° longitude and the corresponding elevation and azimuth angles for earth stations in various locations throughout the United States. Referring to Table 2, the site of Bellingham, Washington, a satellite with a longitude of 73° has a corresponding elevation angle of 17.1° and azimuth angle of 122.7°.

In the event a satellite is placed at 70° longitude, the elevation angle would be 15.3° to that satellite, with an azimuth angle of 120°. By using the equation in Figure 7, Microdyne determined that the total angular difference from the desired to the interfering satellite equals 3.24°. Again, this shows that even though the azimuth and elevation angle differential is only 2.7° and 1.8°, respectively, the angle subtended is greater than 3°.

As a result of the tests, Microdyne concluded that satellite orbital-arc spacing of 3° will not impact either a 3.6-meter or three-meter system with regard to carrier-to-interference levels produced by adjacent satellites.

Microdyne believes the actual measurement data and application of this data to antenna patterns has determined the worse case situation of three satellites occupying orbital incremental spacing of 3°, with the two interfering satellites having an EIRP 5 dB greater than the desired satellite and allowing for station keeping of .1°, produces no degradation to the satellite television receive-only terminal utilizing antennas as small as three-meters.

* * * * * * * * *

*For nearly ten years, David L. Alvarez has been with the engineering and marketing departments of Microdyne Corporation in Ocala, Florida. He is currently sales manager for the company's satellite communications products. An active member of several industry technical groups, Alvarez is a member of the National Cable Television Association's engineering committee which is exploring, among other issues, the feasibility of smaller-aperture earth stations in anticipation of the Federal Communications Commission authorizing 3° or less orbital-arc spacing. The committee has the findings of this report and others under consideration.*

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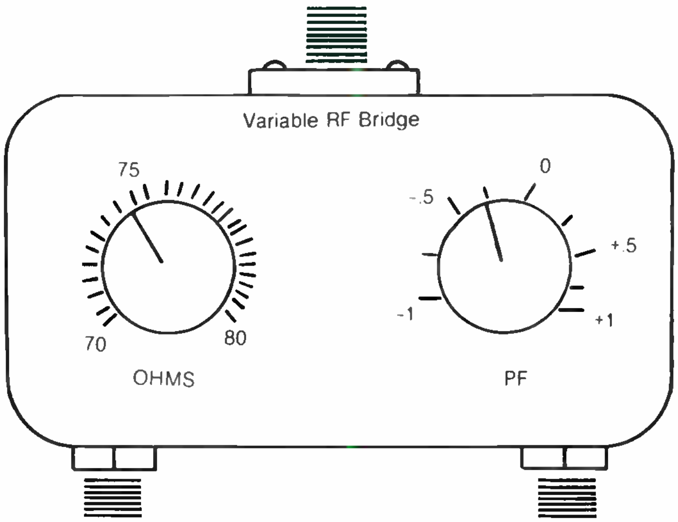
**Q. We use a variable return-loss bridge to sweep cable, and there is some disagreement as to how it should be used. Some of us feel that the bridge should be balanced into a precision terminator and then not adjusted during testing. Others balance the bridge to the cable during the test. Which method is correct?**

Both. Balancing the bridge into a termination gives you the structural return-loss readings at 75 ohms. If you want to test cables at only this impedance, use the terminator as indicated. However, most cables used in cable television systems are specified as having a tolerance of ±2 ohms from the nominal of 75 ohms.

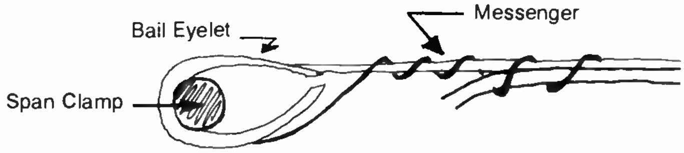
Balancing the bridge into the cable to be tested will show whether the cable impedance is within tolerance and will indicate structural return loss at the cable's actual impedance. I personally prefer this method since it checks two cable parameters during a single test. Also, I think you will find that most system passive and active devices will not have an impedance of exactly 75 ohms.

Be sure to adjust the capacitance control (PF) for the lowest, flattest response at the higher frequencies during impedance testing.

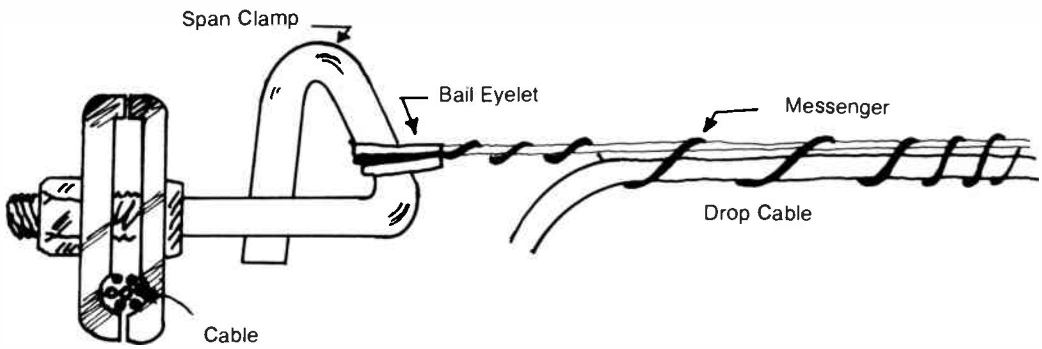


**Q. We use messengered drop cable for all our installs to help protect them from heavy ice loading during winter storms. We have started to experience some wear and messenger breakage at the point where the messenger wraps around the span clamp. We have tried using different wrapping methods, both with and without leaving the jacketing on the messenger, but nothing seems to make any difference to the breakage. Do you have any suggestions?**

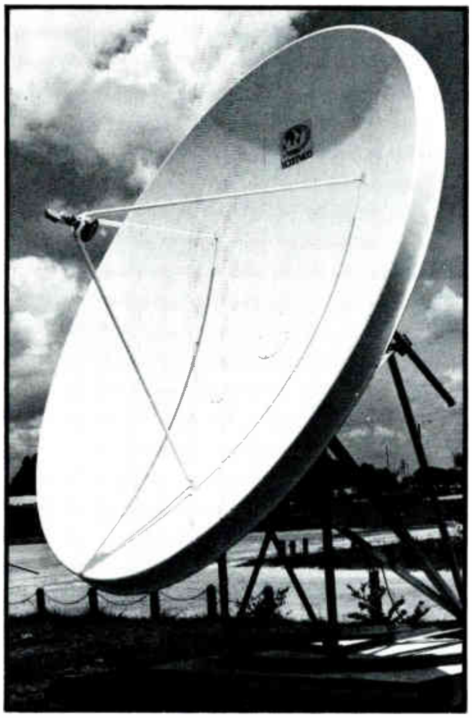
**A.** My company has also experienced this problem, plus an additional one of salt air corrosion in coastal regions when the jacketing is removed from the messenger. We have almost completely eliminated both problems by using the material and procedures shown in Figure 1 below. The bail eyelet is slipped over the span clamp and the messenger, with the jacketing still on, is wrapped over the eyelet. Bail eyelets may be purchased in either galvanized steel or in brass. Brass is about four times more expensive, but will last forever. Our steel eyelets have been in use for about six or seven years and do show some rust. However, if corrosion is not a major problem in your area, steel should be satisfactory for the life of an average drop.



**Top View**

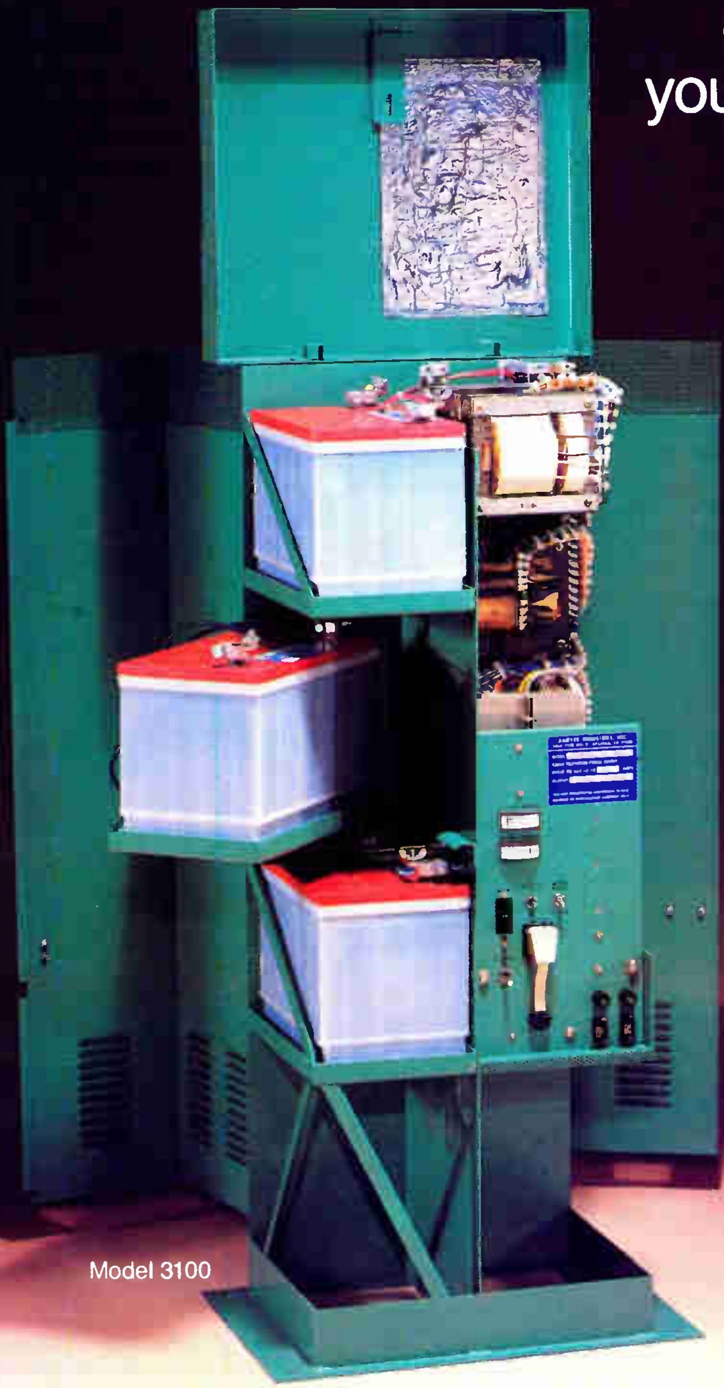


**Side View**



# When power goes off…
# the show goes on.

## Sawyer CATV Standby Power Supplies are there when you need them.



Model 3100

Sawyer Industries CATV Standby Power Supplies are tough, heavy-duty units built to with-stand a wide range of environments. Combining compactness with a modular design for easy maintainability and accessability, they provide a wide range of power to 900 VA in pole mount and pedestal configurations.

*Additional features include:*

- Clam Shell Door Design allows complete access for ease of maintenance.
- Local/remote status monitor.
- Output current/voltage meters.
- Battery heaters.
- Surge protection.
- Safety line cord.

Standby Power is just part of the growing family of Sawyer products and accessories for CATV.

Model 1200S

**Sawyer**

Sawyer Industries Inc., 5649 Peck Rd., Arcadia, CA 91006 (213) 442-5981

# Intermod

## On the Verge of Videotex

Recently, some old friends and I got together and, sure enough, it wasn't long until the old familiar game of "do you remember" got started once again. Things like: "Do you remember when your entire headend electronics consisted of two or three Jerrold DPM strip amps?" "Do you remember when cable powering meant putting 115 volts AC on an open wire or cable, or how much fun it was to try to splice a 115 volt powered trunk line in a rain storm?" Those really were the good old days, and I for one am sure glad they are gone.

Most of us old fogies can and do get frustrated at times in trying to keep up with all the new advances in cable television technology. I'm pretty sure that some of the young techs feel the same way. Just about the time you think you pretty well understand how everything works, some smart engineer comes up with something so new and different that you have to start learning all over again.

One of the new technologies now being explored for cable television is Videotex. It is a prime example of one of the new (at least to the United States) technologies which will help to shape the future of our industry. Just a few years ago, vertical-interval blanking was one of those accepted things which had to be there to keep retrace lines from appearing on the TV screen. Now, thanks to some really fine engineering (unfortunately, most of it not from the USA) the vertical-blanking interval can be used to transport a great variety of information in the form of alphanumerics and graphics. In fact, information which is carried in the vertical-blanking interval can just about double the number of informational channels that may be carried on a cable system.

Of course, there are several different methods of encoding and decoding this information, since several countries (primarily England, France, Japan and Canada) have worked independently on developing their own Videotex systems. As of now, the United States has not officially approved any of the systems. But, judging by the pressure being exerted by some groups, it may do so fairly soon.

Most of the engineers working in cable television are somewhat hesitant to predict, or even to guess, how and in which direction the cable television industry will change in the next few years. Most of them do feel that we will see more emphasis on non-entertainment services such as home and personal security services, traffic monitoring and control, and utility metering and control. It is also felt that dependence on cable systems for distribution of the entertainment services may diminish if the potential of direct broadcast satellites (DBS) is implemented.

The number of channels that a system can carry will be many times greater than what we can put on a typical system today. To see equipment which will only handle twelve channels, you will have to go to a museum.

Glenn Chambers

## Telecommunications Carriers Choose New Function in Canada

OTTAWA, ONTARIO—In a change of policy, the Canadian Telecommunications Carriers Association (CTCA) is dropping its practice of developing technical standards and public policy recommendations and will devote the major part of its resources to the management of collaborative project undertakings on behalf of its member companies.

Among the major programs the association will undertake in 1981 include the fiber optics trials system installation in Elie, Manitoba; a computerized microwave interference calculation system which will be run as a service for all the carriers; and an electrical interference research program, which will extend over several years.

"In recent years, the association has changed from being a forum for the exchange of information and liaison with others on matters of general interest and concern to its members, to a much more active organization addressing the major telecommunications policy issues of the day and formulating the technical networking standards and arrangements required for the future," W. Struan Robertson, CTCA chairman, said, explaining the reason for the change.

The increasing advocacy by many government and regulatory agencies for more vigorous competition in the telecommunications marketplace, and the advent of new technologies which can be incorporated in the carrier networks to improve their economic and competitive performance, have made it impractical, or indeed impossible, to handle many of these matters in a forum of competitors, according to Robertson.

The increasing incidence of interventions by member companies of the association in opposition to business proposals made by other members, and a growing need for some member companies with connecting networks to collaborate in planning the development of new facilities and services in competition with other members, has "rendered the association an inappropriate forum for the development of public policy recommendations, particularly as they relate to the future structure and operations of the industry," said Robertson.

Accordingly, the CTCA board has decided to restrict the future activities of the association to its participation in joint project activities of interest to the broad community of members. Telecommunications policy development work and technical collaboration in national and international standards and networking arrangements will no longer be undertaken by CTCA. These latter activities will be handled by the member companies, who may well form other groupings for liaison purposes and to interface with government and regulatory bodies.

## DBS Project Extended on Anik B

OTTAWA, ONTARIO—Communications Minister Francis Fox has announced that his department is extending the life of a satellite television project which enables residents in about 75 British Columbia and Ontario communities to receive Canadian TV programming.

Some residents have been loaned the earth stations by the federal Department of Communications so that they may receive color TV programming from Telesat Canada's Anik B satellite. The project is among 19 projects in the second phase of the Anik B satellite program.

## US Tower Signs Costa Rica Deal

AFTON, OKLAHOMA—United States Tower Company (USTC) has signed a contract to construct and install a 52-foot by 81-foot spherical antenna with Cable Americas to be installed in San Jose, Costa Rica, early this year.

The contract, totaling approximately $250,000 for the new design, calls for installation in April to serve a cable system for the 2.2 million Costa Rican population.

The spherical antenna, introduced by USTC earlier this year, has the capabilities to receive simultaneous signals from all 11 domestic satellites in the 45 degree geostationary arc and provide picture quality equivalent to an 18-meter parabolic antenna that can receive signals from only one satellite.

The contract represents the fifth spherical to be installed by USTC.

The Costa Rican installation began in February and will be on line in June. It will include approximately 900 miles of plant, three head-ends with a tiered 35-channel, state-of-the-art service. The total project, passing 125,000 homes, will cost $10 to $12 million.

# MICROCEPTOR™*

## MDS ANTENNA

### WITH INTEGRATED DOWN CONVERTER

by CONIFER®

(FORMERLY NAMED WINEGARD INDUSTRIES)

This anodized reflector antenna with factory preassembled crystal controlled down converter results in excellent match and a substantial savings in installation labor.

The antenna is available with our standard down converter (MDPA) or with our new high gain, low noise converter (MDPA—LN). See specifications below. You also have a choice of vertical or horizontal polarization.

Microceptor is small and compact...about the size of this page... has low wind resistance and is unobtrusive on the home.

BASIC SPECIFICATIONS

| | MDPA | MDPA-LN |
|---|---|---|
| Antenna Gain | 15dBi | 15dBi |
| Antenna VSWR | 1.1:1 max. | 1.1:1 max. |
| Converter Gain | 22.5dB typical | 32dB typical |
| Converter Noise Fig. | 4.2dB typical | 2.5dB typical |

### THE ORIGINAL PARACEPTOR™*

America's most copied MDS antenna. Available with 18dBi gain or 21dBi gain. Preassembled and weatherproofed. Unique design has greater signal capture area.

### CONIFER'S DOWN CONVERTER

Crystal controlled and designed for use with Paraceptor or other MDS antennas. Proven reliable in tens of thousands of installations. 100% tested. Competitively priced. Choice of standard or high gain, low noise models.

*Patents Pending

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You no longer have to go back and forth between two manufacturers to solve technological problems.

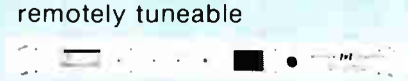
Our total technology spans the entire system from the antenna to the receiver. Microdyne manufactures the most complete cost-effective Satellite Communications Systems on the market.

Microdyne's integrated Satellite Communications Systems completely interface. So when you need technical assistance or trouble shooting rely on Microdyne... the single source with the solution.

## System Components

### Receivers

1100-TVR(X24)
Frequency agile 24 channel, remotely tuneable



1100-FFC (X1)S
Frequency agile 24 channel, manually tuneable

1100-TVRM
Frequency agile 24 channel, manually tuneable receiver, with integral head end modulator.

### Low Noise Amplifier

120 & 100° K
low noise amplifiers

### Head End Modulators

1100-HEM
Fully tuneable modulator, channels 2 through 13 plus A through I.

1000-TVM
Dedicated modulator VHF and Mid Band.

## Customer Service

We are dedicated to customer service.

In most cases, we are able to service our satellite receivers and have them back to you within 48 hours. Our complete system science provides us with the technology necessary to service our components and support our customers.

Microdyne Corporation

Microdyne Corporation / Marketing Dept. / 012N / P.O. Box 7213 / Ocala, FL 32672 / (904) 687-4633 / TWX-810-858-0307

# New Products

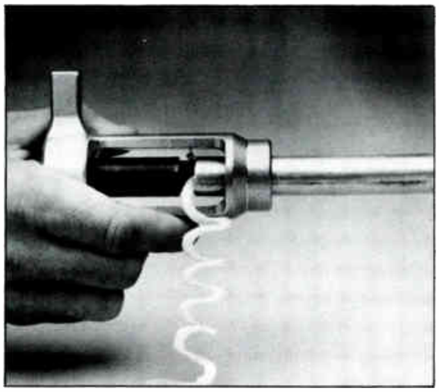
## Cable Equipment

**Lemco Tool Develops Cable-Coring Device**

A cable-coring tool designed to end splicing problems is now available through distributors. Manufactured by **Lemco Tool Corporation**, the tool has a special blade design which prevents dielectric jam-up. Foam falls free in a neat spiral, so coring can be accomplished in one cut. The blade design also prevents flaring of the conductor. Since no stress is placed on the cable when removing it from the tool, premature cable failure is eliminated.

The tool is lightweight. The one-piece, fully-insulated handle is cast aluminum. Blade is carbon steel. Overall size is about half that of typical coring tools, making it ideal for pedestal work. T-handle and cylindrical styles are available, each in six, color-coded diameters.

For information, contact Lemco Tool Corporation, RD 2, Box 330A, Cogan Station, Pennsylvania 17728; (717) 494-0620.



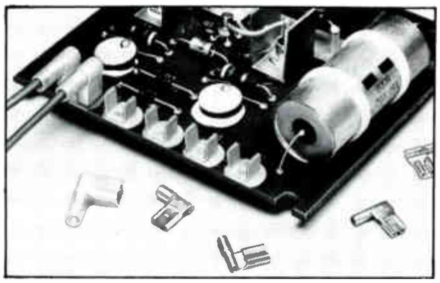
*The cable-coring device from Lemco Tool cuts foam in a spiral.*

**Pandult Introduces Right-Angle Female Disconnects**

A line of nylon pre-insulated and non-insulated right-angle female disconnects is announced by **Pandult Corporation**, Electrical Products Group. The new PAN-TERM® disconnects help complete reliable connections in tight spaces due to their right angle configuration.

The disconnects are available in three tab sizes for wire sizes from #22 to #14 AWG. They have funnel entry to speed wire insertion. The pre-insulated feature eliminates the need for separate insulating parts and helps protect against shorting. The insulation is color coded to speed assembly. The non-insulated right-angle disconnects are offered in two styles. The sleeved-barrel style is for more demanding applications and has three tab sizes; wire size range is #22 to #10 AWG. The butted-seam style is an economical alternative and the three tab sizes are available for wire sizes #22 to #14 AWG. The disconnects have a rolled spring design which ensures consistent insertion and withdrawal characteristics and provides a "wiping action" on the contact surface on each insertion.

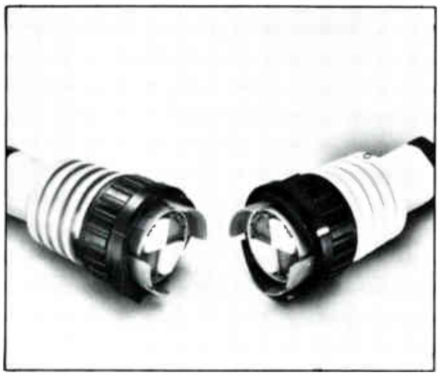
For free samples and information, contact Panduit Corporation, 17301 Ridgeland Avenue, Tinley Park, Illinois 60477; (312) 532-1800.



*This board features right-angle disconnects from Panduit Corporation.*

**Tesco Markets Cable Connectors**

**Tesco Cable Company** has announced a new line of high-density cable connectors. The units are available in four sizes—for 128, 160, 212 or 252 contacts. They are hermaphoditic and connect with only a 90-degree rotation of the coupling ring. A coordinate system permits easy contact identification. Either solder or wire-wrap connection of conductors may be specified. The assemblies are designed to resist physical and chemical exposure and are tested for watertight integrity to over 20 psi. Contacts are gold plated and of military quality. For information, contact Tesco Cable Company, 4250 South 76 East Avenue, Tulsa, Oklahoma 74145.



*Tesco high-density electronic cable connectors.*

**Cablewave Systems Develops One-Piece SMB Snap-On Plugs**

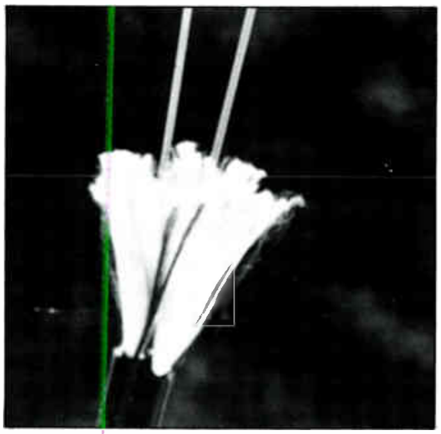
**Cablewave Systems** is offering one-piece semi-rigid SMB cable plugs designed for .086-inch cable. The snap-on plugs feature easy assembly by inserting the cable into the captivated contact and soldering the jacket. The units meet all applicable portions of MIL-C-39012B. All metal parts are gold plated per MIL-G-45204, Type 1, Class 2, Grade C over copper plate per MIL-C-14550, Class 4. Part number is 701908-002. Other plating also available.

For information, contact Cablewave Systems, Inc., 60 Dodge Avenue, North Haven, Connecticut 06473; (203) 239-3311.

## Cable

**Belden Fiber Optic Cable Features Tubeless Design**

**Belden Corporation**'s Fiber Optics Group has introduced 100-micrometer core partially graded-index fiber optic cables with tubeless construction. The series 2261 BitLite™ optical cable, available in simplex and duplex configurations, utilizes a Kevlar-strength member surrounding a clad-and-coated Corning fiber. The 100-micrometer core is surrounded by a 140-micrometer O.D. glass cladding. Overall diameter of the fiber including the acrylate coating is 500 micrometers. Jacket is black flame-retardant polyurethane.



*Belden Corporation's series 2261 BitLite™ fiber optic cable.*

Optical characteristics include a 20 MHz-km bandwidth; numerical aperture, 0.28; and maximum attenuation of ten dB/km at 850 nanometers.

For information, contact Belden Corporation, 2000 South Batavia Avenue, Geneva, Illinois 60134; (312) 565-1200.

# Guess who's introducing Simulchannel™ AR1000–the ideal Satellite CATV Receiver!

**Avantek's Simulchannel AR1000 is the most advanced expandable, 6-channel earth station receiver available today.** Great news, whether you're building CATV systems or operating your own: Avantek is introducing a complete, expandable receiver system that can significantly reduce the cost of getting you on the air; reduce your cost of adding channels; and permanently reduce your cost of operating repairs. Combine the AR1000 with an Avantek ACA4220 LNA-Downconverter module at your antenna, and you have the critical electronics you need to receive satellite signals for cable TV.

**Built around the latest technology at 1.2 GHz IF.** Relying on years of experience with CATV Low Noise Amplifiers, Downconverters, Oscillators and Test Equipment, Avantek consistently brings you only the latest in communications equipment.

With the AR1000 you get features such as full digital tuning; threshold extension; automatic frequency control; a 40 dB dynamic range; and your receiver-input frequency is the new industry standard centered on 1.2 GHz to avoid excessive interference. Also, 12-channel block down conversion simplifies the addition of modules for new TV channels.

Call or write today for a full information package. Avantek, Inc., 3175 Bowers Ave., Santa Clara, CA 95051, (408) 727-0700.

**Avantek**

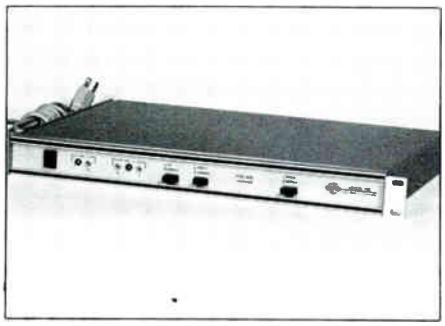


# Test Equipment

### Lenco Develops Device For Analyzing RS-170A Systems

**Lenco, Inc.**, has recently introduced a device for certifying, timing and analyzing RS-170A systems. Called the Videoscope, model PVS-430, it provides a video-graphic display for certifying the correct SC/H phase relationship of the master house-sync generator and the tape play-back phase.

The Videoscope works in conjunction with a standard picture monitor to display a sine wave representing burst phase that indicates the SCH condition at the leading edge of sync, line ten, field one. A horizontal line is introduced in the picture to indicate zero cross of subcarrier at 50 percent. The video source is adjusted until the leading edge of sync intersects the zero cross. At this point, the system meets RS-170A specifications. The source then becomes the "A" reference to which other video sources are compared for system timing. The Videoscope is available in NTSC and a PAL version will be available in April. For information, contact Lenco, Inc., Electronics Division, 300 North Maryland Street, Jackson, Missouri 63755; (314) 243-3147.



*The Videoscope model PVS-430 from Lenco, Inc., Electronics Division.*

# Converters

### Two S/D Converters Added to Transmagnetics Line

**Transmagnetics, Inc.**, has announced two converters: the model 1512 single module two-speed S/D converter and the model 1653 universal autoranging tracking S/D converter.

Model 1512 accepts two synchro or resolver inputs from a two-speed system and combines them into a digital word of high resolution and high accuracy. Previous designs required three modules to accomplish the same results as this single converter-combiner. The design will maintain accuracy and a non-ambiguous output even though gear errors or backlash reach of five degrees. A self-test feature, two-speed ratio formats and velocity output units are available.


*The model 1653 universal autoranging tracking S/D converter from Transmagnetics.*

The model 1653 senses and compensates for wide variations of reference voltage, reference frequency and input voltage with no loss of tracking accuracy or resolution even though the reference voltage and line-to-line voltages vary independently of each other. This innovation has eliminated the need for different converter modules, thus simplifying designs and spares requirements. The converters are pin compatible with existing units in the field so that no wiring changes or additional components are required. In addition, the need for a -15 VDC supply has been eliminated.

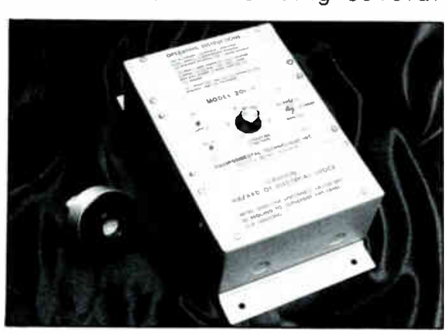
For information, contact Transmagnetics, Inc., 210 Adams Boulevard, Farmingdale, New York; (516) 293-3100.

# Miscellaneous

### Environmental Technology Develops Snow/Ice Control for Antennas

**Environmental Technology, Inc.**, has introduced a U-L listed snow/ice control for activating satellite and microwave antenna de-icing heaters.

The model 201/211 snow/ice control is equipped with transducers that sense both ambient temperature and moisture. The transducers activate the heaters whenever moisture is present and the temperature is between 20 F and 34 F or as the temperature rises through 20 F after snow has fallen. A user-adjustable timer delays heater turn-off for optimum de-icing with minimum energy lost. The unit can be equipped with up to four transducers for de-icing several antennas simultaneously. The transducers can be located up to 500 feet from the panel or from each other. Transducer wiring is low voltage.



*The model 201/211 snow/ice control from Environmental Technology, Inc.*

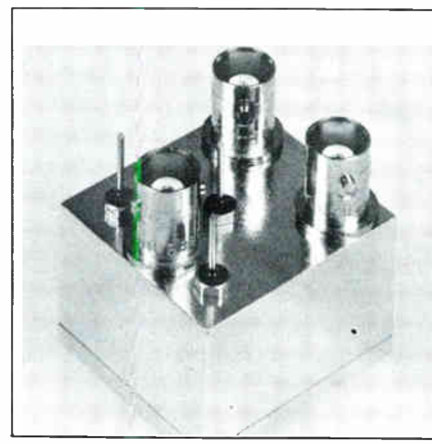
For information, contact Environmental Technology, Inc., 2816 W. Sample Street, South Bend, Indiana 46619; (219) 233-1202.

### JFW Industries Develops Model 50S SPDT Coax Switch

**JFW Industries, Inc.**, has introduced the model 50S SPDT coax switch. The switch features .5 to 500 MHz frequency range, one dB insertion loss maximum; 1.2:1 maximum VSWR and isolation of 60 dB to 50 MHz, 50 dB to 250 MHz and 40 dB to 500 MHz. Standard control voltage is 26 volts at 30 milliamps, but other voltages can be supplied, RF connectors are standard.

The series is flexible. Various packages, control voltages, frequency ranges and connectors are available.

For information, contact JFW Industries, Inc., P.O. Box 226, Beech Grove, Indiana 46107; (317) 783-9875.



*The JFW model 50S SPDT coax switch.*

### Communications Supply Markets TRU-100 Digital/RF Interface

The TRU-100 digital/RF interface from **Communications Supply, Inc.**, speeds two-way coaxial cable communications. When compared to standard telephone-type modems, TRU-100 is ten times more cost efficient due to its use of RF transmission. This system can access any coaxial network. The TRU system utilizes a TRU-200 master modem operating at 38.4 kB polling rate and can employ up to 4,000 TRU-100 remote units. The system also features microprocessor intelligence; expandable capacity through TRX series modules; full-duplex operation; addressable RF switching; AC/DC or cable power; and identical TRU-100 units used throughout the system.

For information, contact Communications Supply, Inc., 319 J Westtown Road, P.O. Box 1538, West Chester, Pennsylvania 19380; (803) 626-3613.

## Employment Opportunities

# Employment Opportunities

## ENGINEERING
### AND TECHNICAL SALES
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**KEY SYSTEMS**

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*Southeastern District Office*
*240 Oxmoor Circle, Suite 102*
*Birmingham, AL 35209*

Looking to move South for advancement? Looking for a technical team with a strong experienced Director, coached by a hardworking progressive management team? You have found it and we have the openings. Due to new construction and rebuild of existing systems we have the following openings:

**Working Engineering Assistant;** strong construction background a must.
**Working Technician;** Strong hands-on background; must be a good pole climber. Non lineman need not apply. Good pay, benefit package, training and advancement opportunities. Try us, you'll like us. Send Resume and salary desired to: Henry S. Swindle Sr.

# HelpWanted



### SYSTEMS DESIGN ENGINEER FOR MATV/CATV

Hands-on exp. a must, CCTV knowledge a plus, duties include systems design from specs, client coordination and supervision of installations. This position is an on-going one and not limited to one project. Short-term overseas travel may be avail. if you desire.

**Call R. Henderson 201/288-6130.**
**Stylist Systems, Inc.**
**Teterboro, N.J.**

---

### CABLE TV CHIEF TECHNICIAN

**Booneville, Mississippi.**

We have a position available for a Regional Technician to supervise a staff of 15 System Technicians. Other duties involve sweeping and balancing systems; working with microwave, earth stations, head-end equipment, construction and test equipment. We are looking for a candidate with five to seven years' experience in installation, service and construction. Supervisory experience is desired and a First Class FCC license is a plus.

### CABLE TV MICROWAVE TECHNICIAN

**Harlingen, Texas**

Our Texas system is in need of a technician to install and maintain microwave receivers, antennas and associated equipment. Must perform tower maintenance functions and service restoration duties. Must know FCC and FAA rules and regulations and maintain FCC and Heritage picture and sound quality standards. We are looking for an individual with electronics knowledge and skill. A 2nd class FCC license is desired.

Heritage Communications is a progressive and growing company with cable systems in 10 states. If interested, contact:

**Personnel Department**
**Heritage Communications Incorporated**
**2195 Ingersoll**
**Des Moines, IA 50312**
**(515) 245-7579**

---

### TECHNICIAN WANTED

Excellent opportunity for experienced line technician for an independent northern Virginia system. Send resume or call Howard Lewis, Winchester TV Cable, P.O. Box 908, Winchester, VA 22601, phone 703/667-4424.

An equal opportunity employer.

---

### OPENING FOR CHIEF TECHNICIAN

Expanding cable TV company is seeking a chief technician to supervise installation and operation of new cable builds. Applicants should be experienced in all phases of cable TV operation; knowledge of microwave installation construction and engineering; of CATV laws rules and regulations required. Second-class FCC license helpful. Must have 2 to 3 years field experience. Competitive salary with exc. fringe benefits plan. Send resume and salary history to:

**Personnel Director**
**Norcom Video, Inc.**
**901 Kilbourn Avenue**
**Tomah, WI 54660**
**or call 608/372/8199**
**equal opportunity employer**

# Help Wanted

### TECHNICAL MANAGER

Ohio-based company with two adjacent systems under construction is seeking a technical manager with strong technical and organizational skills. State-of-the-art, multi-tier systems in modern suburban communities—a progressive individual capable of operating quality systems to high standards will receive an extremely attractive salary and benefits package. Phone or write in confindence to:

**William M. Park**
**West Shore Cable TV**
**26555 Center Ridge Rd.**
**Westlake, OH 44145**
**216/871-4032**

### SYSTEM TECHNICIAN

A growing innovative system in sunny Tampa Florida is looking for a well-qualified System Technician. Should have 3-5 years of actual system maintenance experience. Salary commensurate with experience. We operate a 35-channel fully bi-directional-full standby power, all converter "Cadillac" system with alarm service. Don't delay, learn what the future in CATV holds today. Send resume in confidence to:

Harry Cushing
Coaxial Communications
3770 E. Livingston Ave.
Columbus, OH 43227

# Business Directory

JCA

- Amps
- Cable
- Connectors
- Components
- Drop Mat'l
- Hardware
- Passives
- Traps
- Switchers
- Stand-by Power
- Sweep Gear
- Test Gear

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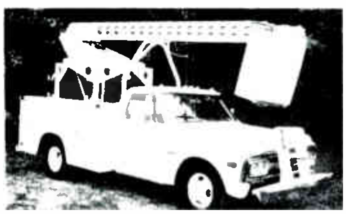

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CableFile '81 is the reference book for the cable television industry.

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CABLEVISION

# Ad Index

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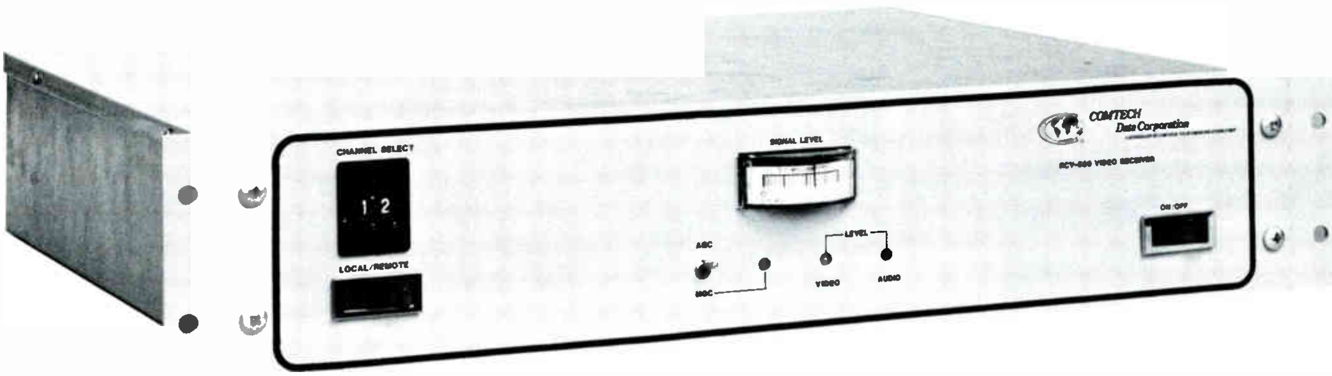


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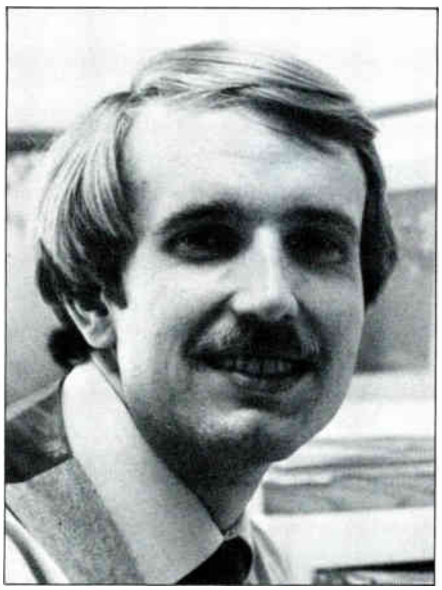
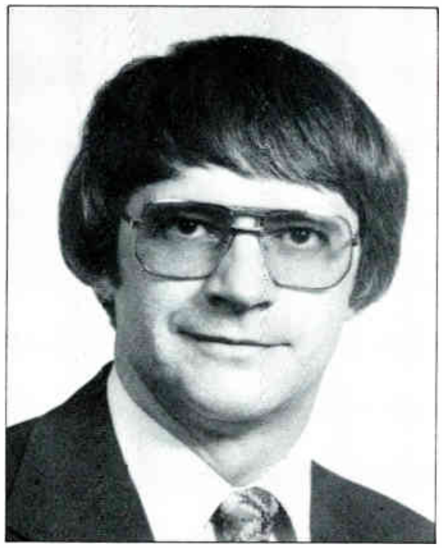
★ **William K. Bucklen** has been named to manage product applications for **TRW LSI Products.** He reports to Jag Chopra, director of marketing. Bucklen began his career with TRW after graduation from UCLA in 1975 with a BS and MS degree in engineering. Initially, he worked in TRW's Defense and Space Systems Group as an integrated circuit designer of components for high-reliability aerospace programs. In January 1977, he transferred to TRW LSI Products. His first assignments at TRW LSI Products were directed toward establishing a video-speed A/D and D/A converter product line. He has presented papers on video-speed A/D and D/A converters to the Society of Motion Picture and TV Engineers (SMPTE) and the IEEE's Midcon. He has also authored a number of articles on the same subject.


*William K. Bucklen*

★ **Robert E. Leroux** has been promoted to manager of fiber optic field engineering operations at **Times Fiber Communications, Inc.,** a subsidiary of Insilco Corporation.

Shortly after joining Times, Leroux supervised the development of 100 Mbit digital television transmission links and six Mbit clock-recovery data links. In April 1980, Leroux was made responsible for scheduling and installation of analog fiber optics systems. In his new post, he will also continue to train and supervise an enlarged installation group.

Prior to joining Times, Leroux was an electronic technician in the development laboratory of The Superior Electric Company of Bristol, Connecticut. Previously, he was a microwave technician with the Bendix Microwave


*Robert Leroux*

Devices Division. Leroux, a U.S. Air Force veteran, graduated from Waterbury State Technical College in 1972 and received a BSEE degree cum laude from the University of New Haven in 1977. He is currently enrolled in the MSEE program at Rensselaer Polytechnic Institute. The Lerouxs live in Terryville, Connecticut.

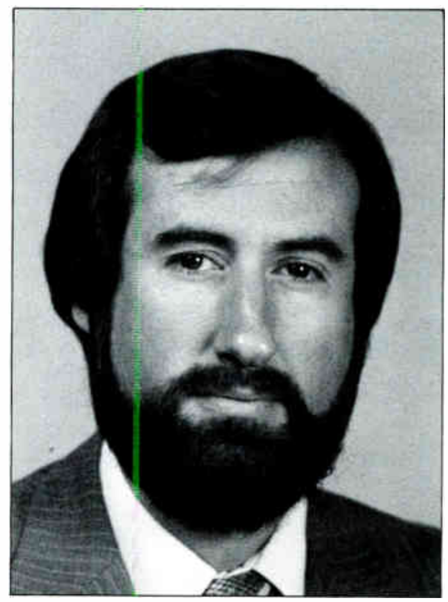
★ **Scientific-Atlanta, Inc.,** has appointed **Sezer Soylemez** as vice president of information management and **John Bacon** as general manager of the firm's division in Phoenix, Arizona.

Soylemez joined the Atlanta-based communications and instrument firm from Federated Department Stores in Cincinnati, Ohio, where he served as director of technical engineering, research and planning. At Scientific-Atlanta, Soylemez


*Sezer Soylemez*

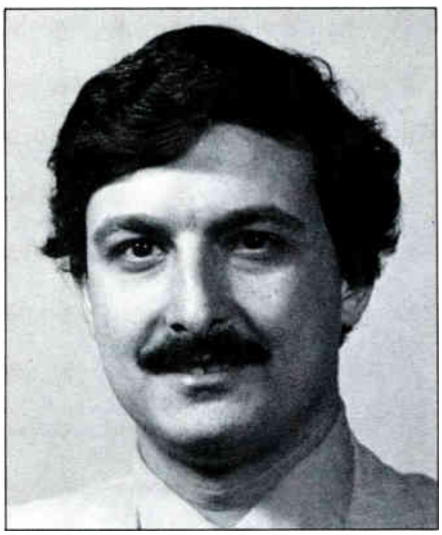
will be responsible for the company's systems of management information, data processing and internal telecommunications. Soylemez holds a B.S. degree from Massachusetts Institute of Technology and masters and Ph.D. degrees from the University of Pennsylvania.

In his new position, Bacon will supervise the activities of newly-acquired Systems Communications Cable, Inc., which manufactures coaxial cable for cable television and other communications applications. Bacon has served in several capacities at Scientific-Atlanta since joining the firm in 1967. Bacon recently managed the firm's Optima enclosures division in Atlanta, Georgia, and Optima Enclosures, Ltd., in MacMerry, Scotland. He also served as general manager of Scientific-Atlanta's video products division. Bacon holds a BSIE degree from the Georgia Institute of Technology and has done post-graduate work at Georgia State University.


*John Bacon*

★ **California Microwave, Inc.,** has appointed **Fred P. Storke** to the post of vice president, engineering, and chief technical officer, responsible for the firm's new product design. Storke has been a technical consultant to California Microwave for the past 15 months and is a principal of Nytek Electronics. Before founding Nytek in 1969, he founded Kruse Storke Electronics, which is now a division of Systron Donner. Storke, who holds a BSEE from the University of Colorado and an MSEE from Stanford, has held engineering positions at Magnavox, Hughes Aircraft, National Bureau of Standards and Ford Aerospace.

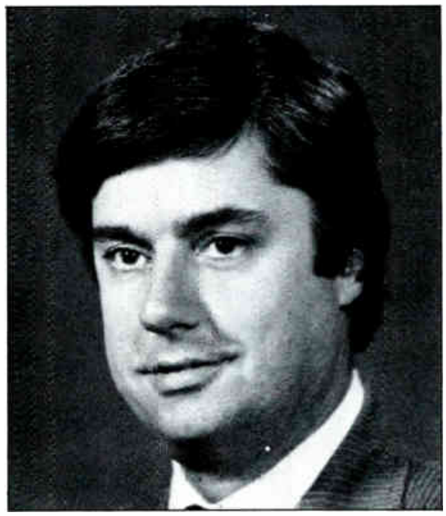
★ **Mitch Bloom** has been named product manager for fiber optics at **Augat, Inc.** He will have responsibility for sales and marketing of all Augat fiber optics interconnection systems, including the three families of fiber optics data links. Bloom comes to Augat from Teledyne Philbrick, where he was a product manager for development of several product lines. His responsibilities included initial market investigation, engineering proposals, price and forecast planning. Bloom has held positions as an international distributor manager and electronics test engineer. A 1974 graduate of Lowell Technological Institute with a bachelor of science in electronic engineering, Bloom is a member of IEEE and the Tau Kappa Epsilon engineering fraternity.



*Mitch Bloom*

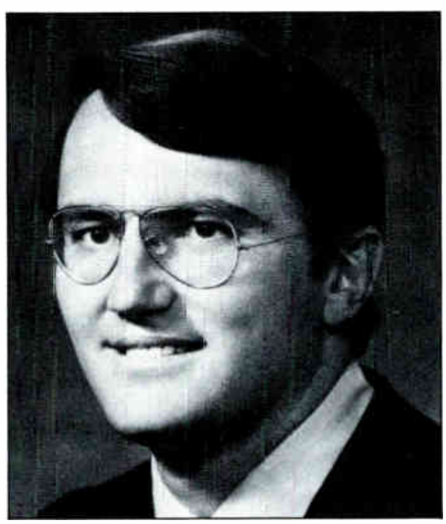
★ The Dynatel Department of **3M's TelComm Products Division** has appointed **Roman G. Schweizer** as market manager. Schweizer's duties include the research and definition of new products and markets for the Dynatel line of cable and cable fault locators, the development and implementation of marketing strategy, and overseeing the firm's promotional program. Schweizer joined Dynatel/3M seven years ago as a field engineer. Subsequently, he was named national accounts supervisor. A Newark College of Engineering graduate, he has 19 years experience in designing and selling test equipment used in the telecommunications industries.

★ **Brand-Rex Company** has named **George C. Graeber** as vice president and general manager, Electronic and Industrial Cable Division, and **Bruce W. Gardner** as vice president and general manager, Telecommunications Cable Division. Graeber and Gardner will have overall responsibility for engineering, manufacturing, sales and marketing. Graeber is responsible for the Electronic and Industrial Cable Division facilities at Willimantic, Connecticut; and Gardner, for the Telecommunications Cable Division facilities at Asheville, North Carolina, and Siloam Springs, Arkansas.



*Bruce W. Gardner*

★ **Microtime, Inc.,** has appointed **Gene R. Sarra** as chief engineer. A graduate of the University of Hartford School of Engineering, Sarra joined Microtime in 1967. He was involved as a senior designer in the creation of several of the company's most successful products, including the TBC 2020 and the 2525 framestore synchronizer.



*George C. Graeber*

★ **Telcom Cablevision, Inc.,** has appointed **Andrew F. Staniak** as director of engineering for its cable television systems in St. Louis County, Missouri. Staniak's initial responsibility will be project manager for the construction and engineering development of Telcom's 600-mile underground and aerial cable system in 17 municipalities in North, West and South counties. The system, when completed, will serve a potential of 50,000 households and 150,000 people.

Staniak, an electronic communication specialist with more than 13 years of experience in evaluating, building, operating, servicing and testing cable television systems, lives in Manchester, Missouri. He was formerly a senior cable television specialist and technical instructor for the New York State Commission on Cable Television. Previously, he performed technical and engineering coordination and support for eight separate cable television systems in New York. Staniak, a member of the Society of Cable Television Engineers, is married and has three children.

★ **Joe D. Phares** product manager, has been named marketing manager, microminiature/fiber optics for **ITT Cannon Electric,** Santa Ana, California. A U.S. Air Force veteran, Phares joined this division of International Telephone and Telegraph Corporation in 1973 as a customer service expeditor in the Phoenix special products unit. Promoted to sales engineer in 1974, Phares has also worked as senior sales engineer in Dallas, Texas, and senior program manager in central marketing. Phares was formerly with Arrow Electric Company, Crawfordsville, Indiana.

*Joe D. Phares*

★ **Matrix Enterprises, Inc.**, has appointed **Vince King** as vice president of operations responsible for system administration, management, and policy and budget implementation. He joins the firm's corporate headquarters outside Nashville, Tennessee, from Atlanta where he served with Cox Cable as vice president, Chicago area.

★ **Cox Cable Communications'** vice president for marketing and corporate communications, Arthur A. Dwyer, has announced that **Merritt S. Rose, Jr.**, has joined Cox Cable as director of advertising sales. Rose comes to Cox Cable Communications from the broadcast division of Cox Broadcasting Corporation where he has just recently completed a comprehensive and indepth review of the future of advertising on cable systems.

# In Orbit

| Signal | Day | Start/Stop | Alert Tones | Satellite/ Transponders |
|---|---|---|---|---|
| **CBN** | | 24 hrs. | None | F1,#8 |
| **CNN** | | 24 hrs. | None | F1, #14 |
| **C-SPAN** | Weekdays | 12:00 p.m./6:30 p.m. | 195*/1# | F1,#9 |
| **ESPN** | | 24 hrs. | None | F1,#7 |
| **Front Row** | | 2:30 p.m./2:30 a.m. | 481*/# | F1, #12 (E,C)<br>F1, #10 (P,M) |
| **HBO** | | | Program | F1,#24 |
| | Feb. 1 | 3:30 p.m. 2:07 a.m. | 729*/# | F1,#22 |
| | Feb. 2 | 5:30 p.m. 2:18 a.m. | Scramble | F1,#23 |
| | Feb. 3 | 6:00 p.m. 3:04 a.m. | 835*/# | F1,#20 |
| | Feb. 4 | 6:00 p.m. 2:57 a.m. | Duplication | |
| | Feb. 5 | 6:00 p.m. 2:00 a.m. | 940*/# | |
| | Feb. 6 | 5:00 p.m. 4:42 a.m. | Take-2 E | |
| | Feb. 7 | 2:30 p.m. 3:11 a.m. | 592*/# | |
| | Feb. 8 | 3:30 p.m. 2:52 a.m. | Take 2 W | |
| | Feb. 9 | 5:00 p.m. 1:46 a.m. | 681*/# | |
| | Feb. 10 | 5:30 p.m. 2:52 a.m. | | |
| | Feb. 11 | 5:00 p.m. 2:45 a.m. | | |
| | Feb. 12 | 5:30 p.m. 2:41 a.m. | | |
| | Feb. 13 | 5:30 p.m. 4:01 a.m. | | |
| | Feb. 14 | 3:30 p.m. 3:58 a.m. | | |
| | Feb. 15 | 3:00 p.m. 2:32 a.m. | | |
| | Feb. 16 | 5:00 p.m. 2:04 a.m. | | |
| | Feb. 17 | 5:00 p.m. 2:51 a.m. | | |
| | Feb. 18 | 5:00 p.m. 2:00 a.m. | | |
| | Feb. 19 | 5:00 p.m. 1:57 a.m. | | |
| | Feb. 20 | 5:30 p.m. 3:41 a.m. | | |
| | Feb. 21 | 2:30 p.m. 3:57 a.m. | | |
| | Feb. 22 | 2:00 p.m. 2:42 a.m. | | |
| | Feb. 23 | 5:00 p.m. 2:30 a.m. | | |
| | Feb. 24 | 5:30 p.m. 3:29 a.m. | | |
| | Feb. 25 | 5:30 p.m. 2:27 a.m. | | |
| | Feb. 26 | 5:00 p.m. 2:00 a.m. | | |
| | Feb. 27 | 5:30 p.m. 4:43 a.m. | | |
| | Feb. 28 | 2:00 p.m. 3:16 a.m. | | |
| **HTN** | | 8:00 p.m./10(11:00) p.m. | 517*/# | F1,#21 |
| **KFIX** | | 2-4 hrs./day | None | F1,#1 |
| **KTVU** | Weekdays<br>Weekends | 7:00 a.m./1:00 a.m.<br>7:00 a.m./4:00 a.m. | None | F1,#1 |
| **Modern Talking Pictures** | Weekdays<br>Weekends | 12:00 p.m./5:00 p.m.<br>7:00 a.m./ 12:00 p.m. | 243*/# | F1,#22 |
| **The Movie Channel** | | 24 hrs. | None | F1,#5 (E,C)<br>F1,#11 (M,P) |
| **Newstime** | | 24 hrs. | 276*/# | F1,#6 |
| **PTL** | | 24 hrs. | None | F1,#2 |
| **Reuters** | Weekdays | 4:00 a.m./7:00 p.m. | None | F1,#18 |

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

| Signal | Day | Start/Stop | Alert Tones | Satellite/ Transponders |
|---|---|---|---|---|
| **Showtime** | | | Program | F1,#12 (E,C) |
| | Feb. 1 | 7:00 a.m. 2:30 a.m. | 576*/# | F1,#10 (M,P) |
| | Feb. 2 | 3:30 p.m. 3:30 a.m. | Scramble | |
| | Feb. 3 | 3:30 p.m. 2:25 a.m. | 679*/# | |
| | Feb. 4 | 3:30 p.m. 2:50 a.m. | Off-line | |
| | Feb. 5 | 3:30 p.m. 3:02 a.m. | 753*/# | |
| | Feb. 6 | 3:30 p.m. 7:43 a.m. | Access | |
| | Feb. 7 | 8:00 a.m. 7:00 a.m. | 843*/# | |
| | Feb. 8 | 7:00 a.m. 2:35 a.m. | | |
| | Feb. 9 | 3:30 p.m. 2:38 a.m. | | |
| | Feb. 10 | 3:30 p.m. 3:00 a.m. | | |
| | Feb. 11 | 3:30 p.m. 2:59 a.m. | | |
| | Feb. 12 | 3:30 p.m. 2:37 a.m. | | |
| | Feb. 13 | 3:30 p.m. 6:40 a.m. | | |
| | Feb. 14 | 8:00 a.m. 7:37 a.m. | | |
| | Feb. 15 | 8:00 a.m. 3:15 a.m. | | |
| | Feb. 16 | 3:30 p.m. 2:49 a.m. | | |
| | Feb. 17 | 3:30 p.m. 2:00 a.m. | | |
| | Feb. 18 | 3:30 p.m. 3:11 a.m. | | |
| | Feb. 19 | 3:30 p.m. 2:00 a.m. | | |
| | Feb. 20 | 3:30 p.m. 7:57 a.m. | | |
| | Feb. 21 | 8:00 a.m. 7:49 a.m. | | |
| | Feb. 22 | 8:00 a.m. 3:08 a.m. | | |
| | Feb. 23 | 3:30 p.m. 2:15 a.m. | | |
| | Feb. 24 | 3:30 p.m. 3:07 a.m. | | |
| | Feb. 25 | 3:30 p.m. 3:00 a.m. | | |
| | Feb. 26 | 3:30 p.m. 3:32 a.m. | | |
| | Feb. 27 | 3:30 p.m. 6:30 a.m. | | |
| | Feb. 28 | 7:00 a.m. 7:30 a.m. | | |
| **SIN** | | 24 hrs. | None | Westar III, #8 |
| **Trinity (KTBN)** | | 24 hrs. | None | F1,#13 |
| **USA Network** | | | | F1,#9 |

Off-times are listed below. For on-times, see notes below.

| | | | |
|---|---|---|---|
| Feb. 1 | 3:30 a.m. | Feb. 15 | 3:00 a.m. |
| Feb. 2 | 1:30 a.m. | Feb. 16 | 2:30 a.m. |
| Feb. 3 | 2:00 a.m. | Feb. 17 | 3:00 a.m. |
| Feb. 4 | 2:30 a.m. | Feb. 18 | 3:00 a.m. |
| Feb. 5 | 3:00 a.m. | Feb. 19 | 3:00 a.m. |
| Feb. 6 | 1:00 a.m. | Feb. 20 | 1:30 a.m. |
| Feb. 7 | 2:30 a.m. | Feb. 21 | 2:30 a.m. |
| Feb. 8 | 3:00 a.m. | Feb. 22 | 2:00 a.m. |
| Feb. 9 | 2:30 a.m. | Feb. 23 | 2:30 a.m. |
| Feb. 10 | 4:00 a.m. | Feb. 24 | 4:00 a.m. |
| Feb. 11 | 3:00 a.m. | Feb. 25 | 3:00 a.m. |
| Feb. 12 | 3:00 a.m. | Feb. 26 | 2:00 a.m. |
| Feb. 13 | 1:30 a.m. | Feb. 27 | 2:00 a.m. |
| Feb. 14 | 2:30 a.m. | Feb. 28 | 3:00 a.m. |

USA Network on-time is 7:30 p.m. except on the following days: Feb. 1: 5:00 p.m.; Feb. 7, 8: 5:00 p.m.; Feb. 14, 15: 3:00 p.m.; Feb. 21: 4:00 p.m.; Feb. 22: 7:00 p.m.; Feb. 28: 1:00 p.m.

Calliope. Weekdays: 6:30 p.m. to 7:30 p.m. Saturdays: 10:00 a.m. to 1:00 p.m.

The English Channel is on the following times. Sundays: Feb. 1: 11:00 p.m. to 1:00 a.m.; Feb. 8: 10:30 p.m. to 12:30 a.m.; Feb. 15: 10:30 p.m. to 12:30 a.m.; Feb. 22: 11:30 p.m. to 1:30 a.m. Tuesdays: Feb. 3: 10:00 p.m. to 12:00 a.m.; Feb. 10: 11:00 p.m. to 1:00 a.m.; Feb. 17: 10:00 p.m. to 12:00 a.m.; Feb. 24: 11:00 p.m. to 1:00 a.m. Saturdays: Feb. 7: 1:00 p.m. to 5:00 p.m.; Feb. 14: 1:00 a.m. to 5:00 p.m.; Feb. 21: 1:00 p.m. to 4:00 p.m.; Feb. 28: 3:30 p.m. to 6:30 p.m.

| Signal | Day | Start/Stop | Alert Tones | Satellite/ Transponders |
|---|---|---|---|---|
| **WGN** | Mon.-Thurs.<br>Weekends | 5:42 a.m./3(3:30) a.m.<br>Ends 3:00 a.m. on Sun. | None | F1,#3 |
| **WOR** | | 24 hrs. | None | F1,#17 |

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

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