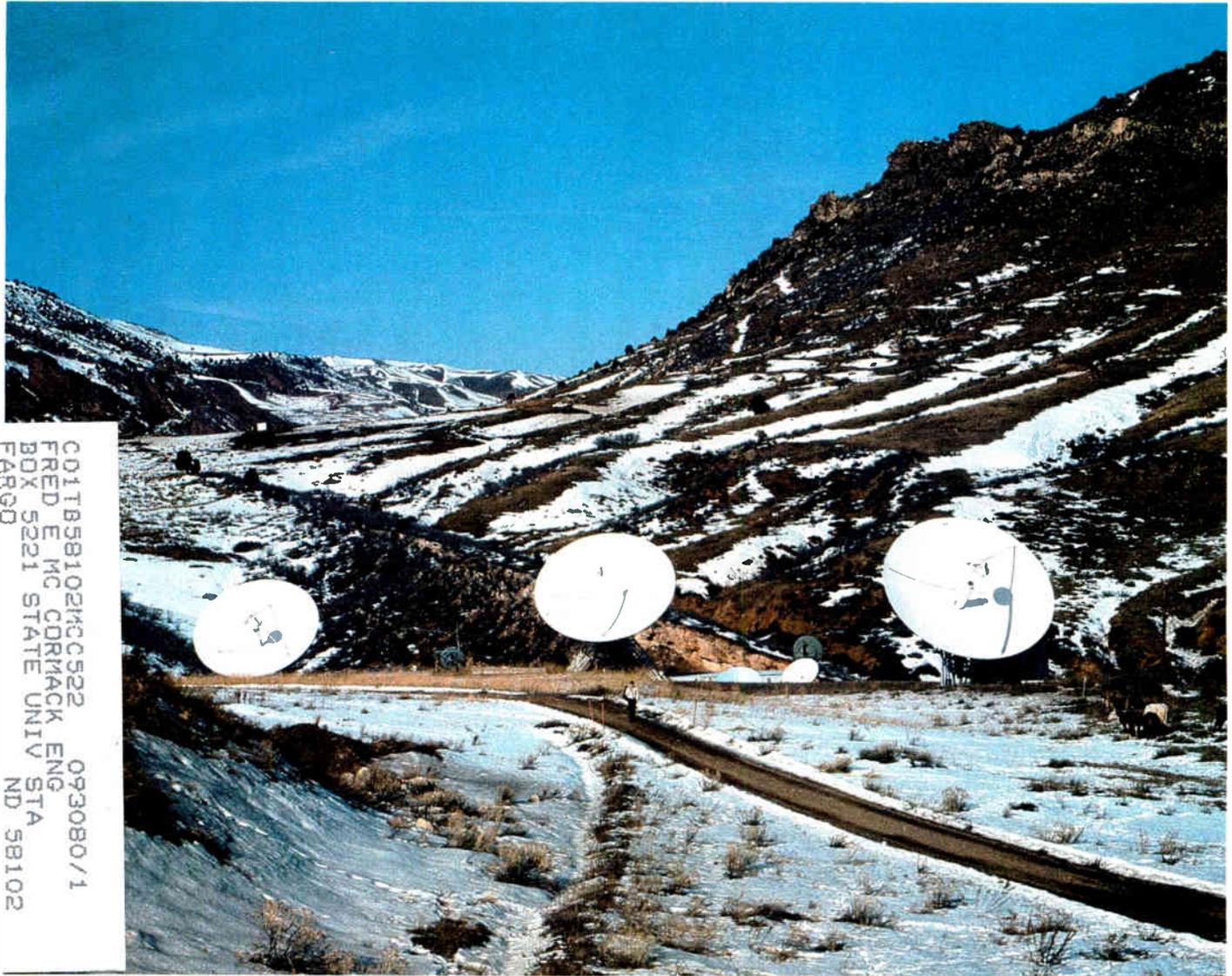


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Communications Engineering Digest/The Magazine of Broadband Technology



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FARGO

- 31 IDEAs for earth station site location
- 33 Engineering principles for site selection
- 39 TECH II—Distribution plant design
- 47 Product Profile: line extenders

February 1983

**INTRODUCING
TECH II**

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Here's the converter with all the features you must have to add and hold subscribers. Everything from Optional External A-B Switch Controllers . . . to Most Favorite Channel Memory . . . to Parental Discretion Control . . . to Direct Channel Entry and Scan Up/Down. And much more . . . all made possible by the uniquely programmed microprocessor . . . the heart of our converter.

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Cordless remote control keypad is identical to the converter. Durable membrane keypads provide long-life operation.

retardant, UL approved and virtually indestructible.

MAGNA 6400 is a product of years of Magnavox CATV experience and technology, backed by the enormous technical resources of North American Philips Corporation. See a MAGNA 6400 demonstration in our Mobile Training Center when it's in your area.

Or to arrange for a personal demonstration by your Magnavox account executive, just call toll free 800/448-5171 or in New York State 800/522-7464.

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CATV SYSTEMS, INC.
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If an amplifier is an amplifier...



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Flexibility

The T-series 450 MHz trunk amplifier's flexibility allows you to install it in a one way or two way system, a high-split, mid-split, or two way sub-split. Our modular design is easily upgraded, including status monitoring and dual plant capabilities. The modular units are anchored directly into the housing which means fewer parts, fewer problems, and less money spent on replacement parts. The durable white die cast housing provides maximum heat dissipation and reflection.

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Texscan

CED

TECHSCOPE

Plans for 'space mirror' studied **7**

A dish shaped space mirror made of carbon fiber and woven into a screen-type mesh has been proposed for sending point-to-point data communications and FM radio signals over wide areas.

SEMINARS

Training sessions abound **21**

This month's calendar features the Texas Show, technical training seminars, regional meetings and national and international events.

EDITORIAL

An editorial upgrade **23**

In this issue we are introducing TECH II, CED's new feature supplement and Product Profile.

COMMUNICATION NEWS

HBO inks scrambling agreement **25**

M/A-COM LINKABIT will supply the nation's premiere programmer with encode/decode hardware.

FEATURES

Earth station site selection **31**

Preston Kilman, marketing manager at Compucon Inc., describes how his company uses Integrated Engineering Demographic Analysis (IDEA) to deal with the complex issue of site location in today's crowded frequency spectrum. In addition, Dom Stasi, director of engineering at WASEC, offers some engineering considerations for site location.

TECH II

INTRODUCTION

Distribution plant design **41**

Distribution plant design has come a long way since the days of one-way only transmission. Operating techniques and equipment technology have paved the way for sophisticated two-way RF distribution systems and computerized system design.

TRENDS

Using pole/pedestal configuration manuals **45**

Bob Sturm, president of Cable Systems Design Group, describes the potential for a construction manual that may eliminate errors in the placement of cable and equipment.

HANDS ON

Cost-effective system design **45**

Country Cable is a 200 subscriber system in northern California maintaining cost-effective operations.

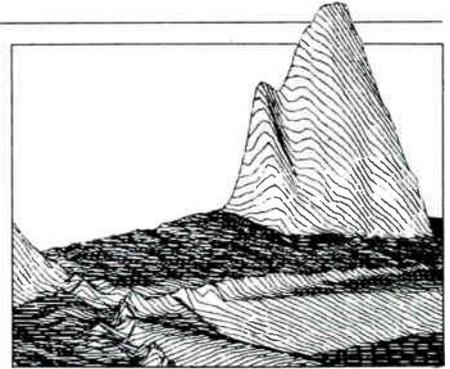
PRODUCT PROFILE

Line extenders **47**

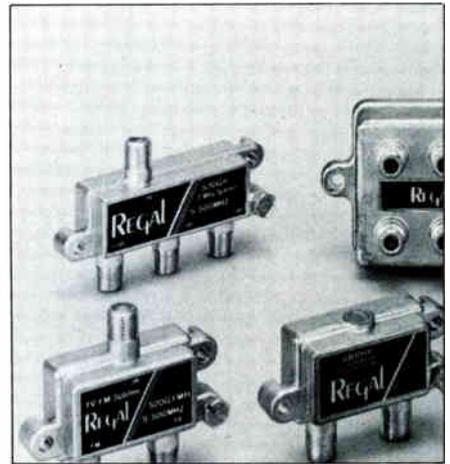
Line extenders offer the performance of trunk stations at a fraction of the cost.

DEPARTMENTS

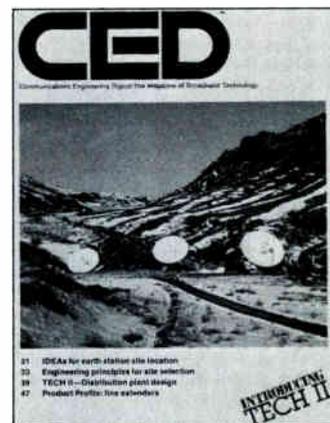
People	57	Ad index	77
Product News	69	In Orbit	86
Classified Ads	75		



31



69



About the cover

These 11-meter antennas, located near Denver, Colo., serve as a transmit-receive site for the Public Service Satellite Consortium (PSSC). The site was chosen because of the natural shielding provided by the foothills of the Rocky Mountains. The location is unique in that it can clear all satellites located in the domestic geosynchronous arc, as well as all frequencies, even though it is located near a major metropolitan area. Staff photo by Rob Stuehrk.

SUPER SUPER TRAP!



Trap more profits while securely trapping out non-subscribers. PICO's SUPER TRAP is deeper and narrower, making it possible to receive both upper and lower adjacent channels from Ch. 2 through Ch. 1.

PICO's SUPER TRAP can be tap mounted, strand mounted, or installed on a structure under the eaves.

And PICO's SUPER TRAP is compatible with systems up to **400 MHZ.**

So if your game is profit, let PICO be your guide. That's a name you can grow with.



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Telephone: (315) 451-0680

Space mirror

A dish-shaped reflector made of ultra-fine wire, called a space mirror, has been proposed by the Stanford Research Institute (SRI) to "revolutionize communications." The space mirror would be capable of sending FM radio, point-to-point data transmissions and other signals over wide areas. According to inventor Paul Csonka, professor of physics at the University of Oregon, the space mirror project would operate at a substantially lower cost than that of current communications satellites. Csonka explains that the space mirror would be held stationary, 100 miles in space, by the pressure of electronic radiation, and would reflect communications signals from points on the earth's surface as much as 1,000 miles apart. Exclusive patent rights to the space mirror are held by Electronics, Missiles and Communications Inc. (EMCEE), based in White Haven, Pa. EMCEE commissioned the SRI study and plans commercial development when they complete further studies that will float a miniature model of the device in a vacuum chamber. According to Frank Decker, EMCEE vice president for engineering, "The transmission roundtrip delay is considerably less for the mirror than for synchronous satellites. It can be reached by over-the-horizon radar, and the relatively short distance at which the mirror would float above the earth makes possible many broadcast and point-to-point communications at low cost." Could this be the poor man's satellite?

Computers for diplomas

Freshmen entering Clarkson College in Potsdam, N.Y. this fall will receive a Zenith Z-100 personal computer as standard issue. The cost of the computer is being subsidized by restricted grants and students will pay \$200 each semester plus an initial one-time maintenance fee of \$200. At graduation the students will own their computer. The decision to supply each incoming freshman with a desktop computer is part of a greater plan undertaken by the college to supply all of its students with computers. Each computer will be linked to a campus-wide network and will run off of Intel Corp. microprocessors. Over the course of the next four years it is expected that Clarkson will purchase nearly 4,000 desktop units.

Hitting the streets

Movie Systems Inc. (MSI)—one of the country's largest MDS operators, with systems in Minneapolis; Milwaukee; Indianapolis; Oklahoma City; and West Palm Beach and Ft. Lauderdale, Fla.—has won a \$476,415.44 judgment against a Milwaukee retailer of microwave antennas and downconverters, according to Ray Conley, general counsel of MSI. The judgment is the largest in a series of recent decisions being made across the United States against retailers of microwave reception gear. MSI's approach to the piracy problem is unique in its use of a signal tracking van containing \$50,000 worth of equipment, which combs the streets in search of illegal antennas. The van is full of electronic equipment, which, says Conley, not only detects a microwave receive unit in use but also establishes whether or not the unit is tuned-in to the MDS signal. The procedure is instrumental in proving a theft of the signal, Conley explains, since one of the common legal defenses to a theft suit, or even a retailer suit today, is that the reception equipment sold or being used is capable of many uses other than MDS. The signal van picks up signals that are emitted from a working

MDS antenna. Such antennas work as mini-transmitters as well as reception devices. In order to tune in to the MDS signal and deliver that signal through the system, the antenna itself must be tuned-in to the local oscillator frequency. In turn, the downconverter emits a secondary or auxiliary signal. The equipment in the van detects this auxiliary signal, and then performs a sweep of the area in which the antenna is directed, to pick up other signals besides the pay service. It is then easy to determine—and more importantly, to demonstrate to a court of law—that it is the MDS pay service being received and not some alternative signal. The van originally was fitted with exterior antennas designed to facilitate signal detection. "When we first started sending the van out, there was some extremely bad press," said Conley. "People were saying it seemed very Orwellian, or 1984-ish. The papers in Minneapolis had us on the front page almost once a week over our campaign." Since the introduction of the van, however, Movie Systems has found various ways to conceal the antennas, and in fact, says Conley, the vehicle is now simply a white, Ford Econoline van, without any markings—not even a company logo.

Navy goes cable

Who would think that the Navy, with all its sophisticated communications equipment, would actually be soliciting bids from cable suppliers for Naval base franchises? According to a spokesman for the Western Division of Naval Facilities Engineering Command—an organization that is responsible for overseeing the engineering, operation, construction, maintenance and utilities functions of those navy bases located in the western "shoreline" states—the Navy is doing just that. Increased interest in cable among the western bases has prompted the inquiry, as cries for the movies, sports and other entertainment features cable offers become increasingly vociferous. These cries, however may go unheeded, at least for a little while, because of the Navy's "competitive bidding" policy. According to current defense procurement and acquisition procedures, the "utilities" department of the Western Naval Command is charged with the task of seeking "competitive bids" from all interested CATV suppliers. As such, the department's role, as one Navy spokesman suggested, is not unlike that of a landlord or city council. Perhaps, during peaceful times, military personnel have more time to enjoy civilian comforts such as cable.

Long distance security

Armed with a plan for remote security monitoring, National Guardian Inc. is challenging the notion that security is in your own hometown. National Guardian has established a joint venture with Mid-Continent Broadcasting Company's Ocean Reef cable system to operate a security system in the Ocean Reef Community, Key Largo, Fla. Residential alarm systems in this community will be remotely monitored via telephone and satellite links from two locations: one center to be located in Florida, but not at Ocean Reef, and the other to be located in Stamford, Conn. These two remote monitoring centers will act redundantly, with the Stamford center acting as backup if the Florida site is inoperable. Although the locations of these monitoring stations are less than ideal, a spokesman for the company admits, it can be compensated for by establishing liaisons with the town police and other security forces. It is a tradeoff, he said, in which monitoring stations are consolidated in one central location to reduce monitoring and installation costs that effect both the company and its customers.

Set-top converters are obsolete.

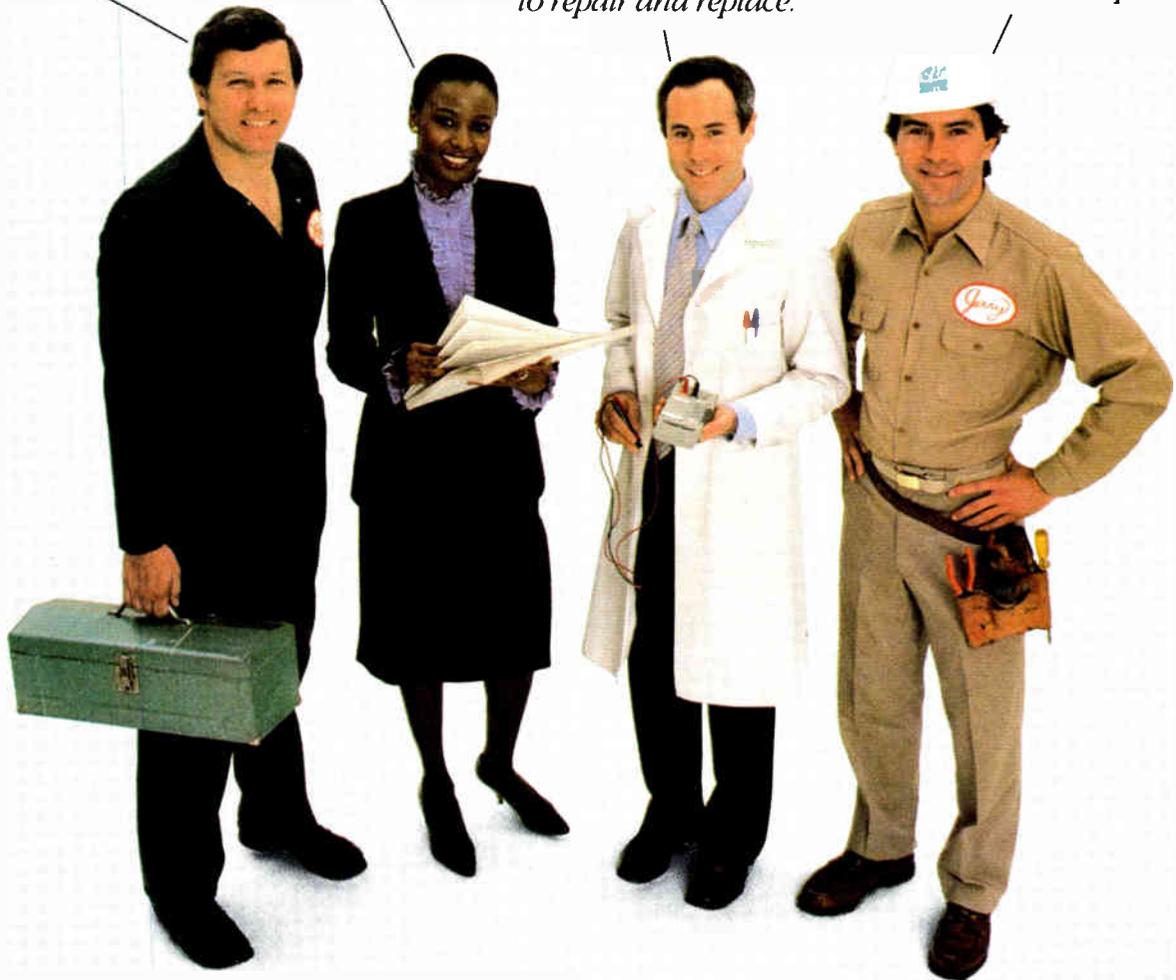
MINI-HUB SLASHES OPERATING EXPENSES.

*Fewer service calls,
reduced truck maintenance.*

*Instant disconnect or
reconnect from central
office.*

*No more set-top converters
to repair and replace.*

*No more lock outs, or
converters to pick-up.*



Only with the Mini-Hub™ System will you have total remote disconnect/reconnect, remote authorization/verification, and remote upgrading/downgrading capabilities. The subscriber program controller also provides for maintenance diagnostics and efficient service scheduling.

Since there is no set-top converter, subscriber access to disconnect or reconnect is no longer required. And your service people never have to get in to maintain, replace, or retrieve set-top converters.

Service calls are reduced because you no longer have

"bad picture" complaints caused by electromagnetic and radio frequency interference. TFC's fiber optic distribution network is immune to these disturbances.

To find out more about how the Mini-Hub System will slash your operating costs, contact TFC today at P.O. Box 384, Wallingford, CT 06492, (203) 265-8500.

TFC TIMES FIBER COMMUNICATIONS, INC.
An InSilico Company

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QUANTUM REACH

DIELECTRIC

New micro cellular structure. Much harder than other 3rd and "4th" generation dielectrics. 88% velocity of propagation provides lower attenuation.

COPPER CLAD ALUMINUM CENTER CONDUCTOR

CENTER CONDUCTOR ADHESIVE

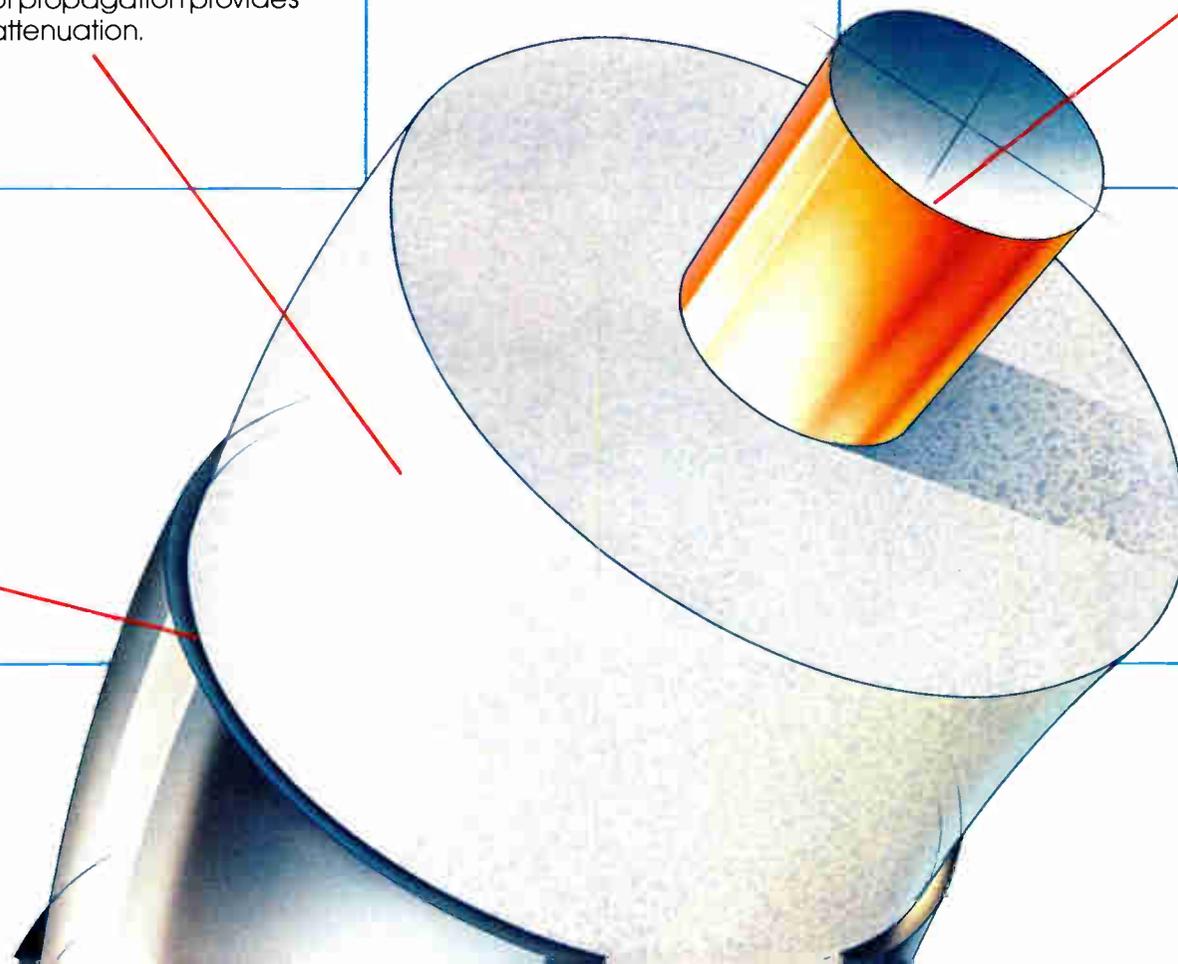
Eliminates water migration and corrosion

DIELECTRIC ADHESIVE

Prevents water migration. Enhances handling characteristics. Eliminates the threat of connector pull-out.

NEW POLYETHYLENE JACKET

Medium density polymer. Stronger and tougher than conventional jackets.



Lab Report

Cable Description: QR-860
 Product Code #: 55-001-02
 Date Manufactured: 8/21/82

*Hank!
 This Q.R.
 does it all!*

TEST SUMMARY: Electrical, mechanical, and environmental testing exceeded spec. SRL was 33dB up to 525 MHz on this length. Minimum bend was 6"; all environmentals looked excellent.

ELECTRICAL TESTING

Structural Return Loss (TP #401) **33 dB**
 Spec: 30 dB 5-450-MHz
 Impedance (TP #403): 74.8 ohm
 Spec: 75 +/- 2 ohm
 Capacitance (TP #414): 15.2 pf/ft
 Spec: 15.0 +/- 1 pf/ft
 DC Resistance (TP #406): Inner: 0.372 ohm/kft Spec: 0.374 ohm/kft
 Outer: 0.301 ohm/kft Spec: 0.302 ohm/kft
 Loop: 0.673 ohm/kft Spec: 0.676 ohm/kft
 Velocity of propagation (TP #408):
 88% Spec: 88%

Attenuation (TP #402) Data
 Table 1 attachment

NOTES: Standard variable bridge test set-up for SRL.
 Note the low-loss attenuations.
 Lower than P3-875

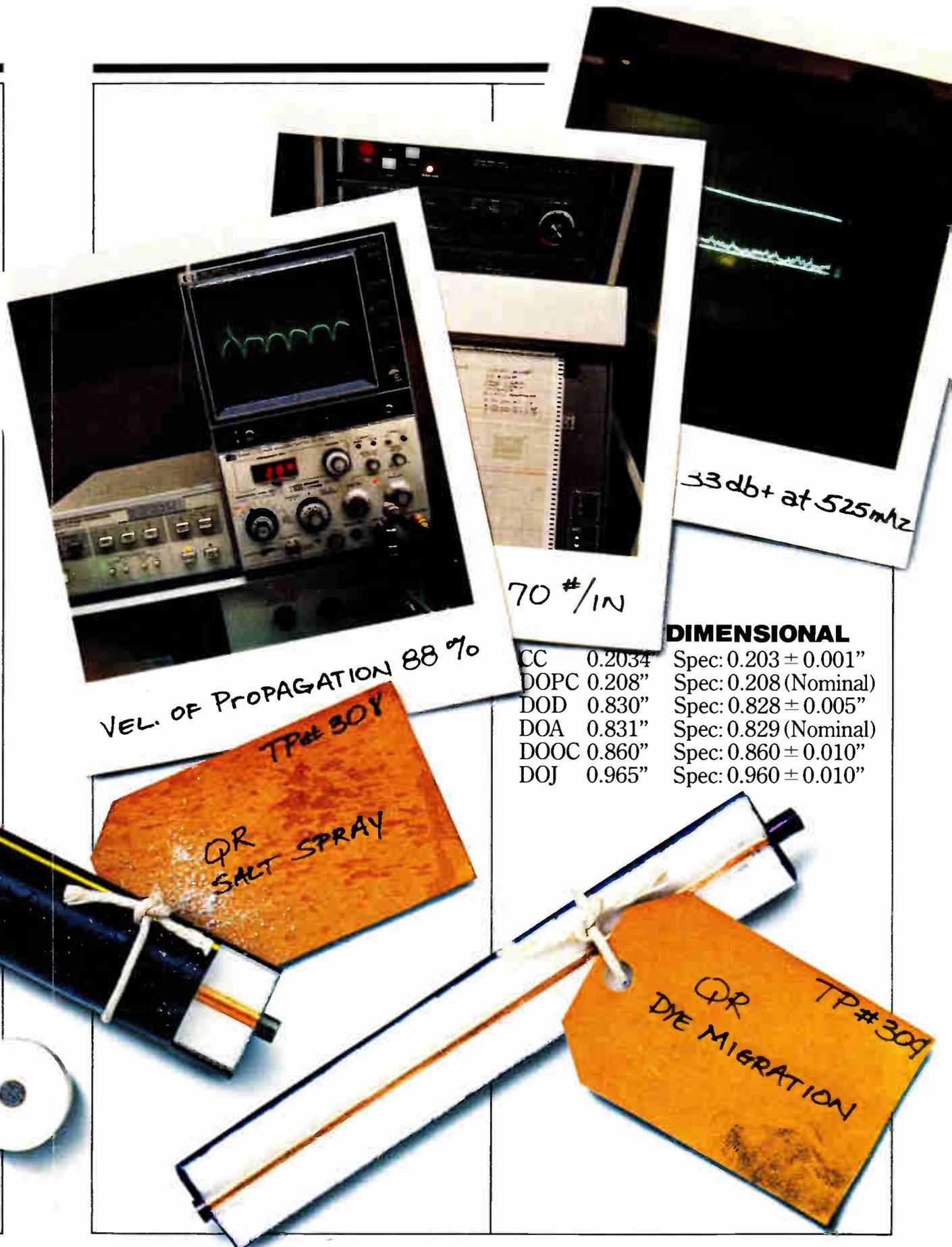
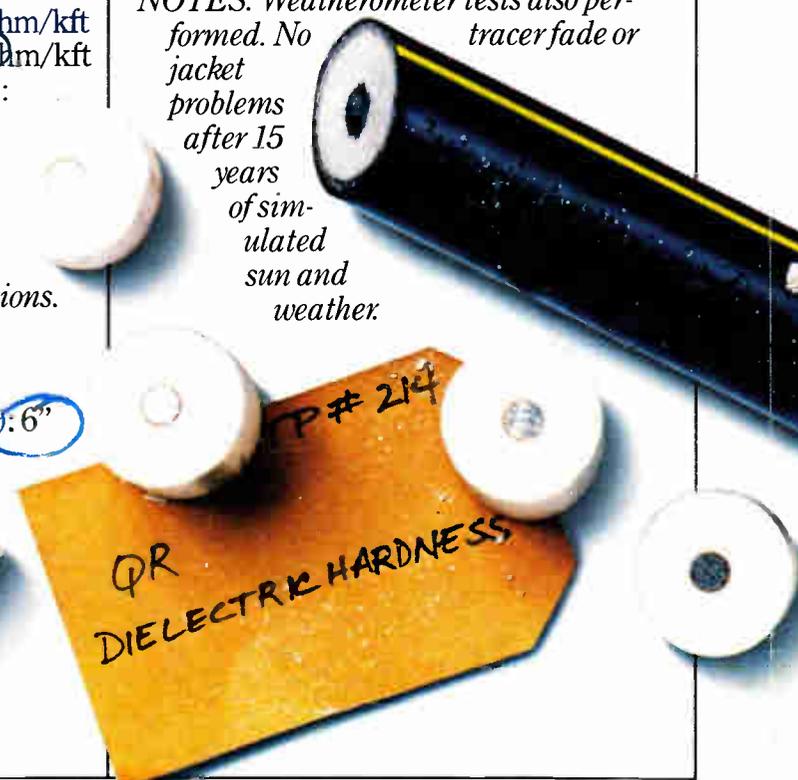
MECHANICAL TESTING

Minimum Bend Radius (TP #207): **6"**
 Spec: 8"
 Multi-Plane Bend
 Radius (TP #2")
 6 1/2" Spec: 10"

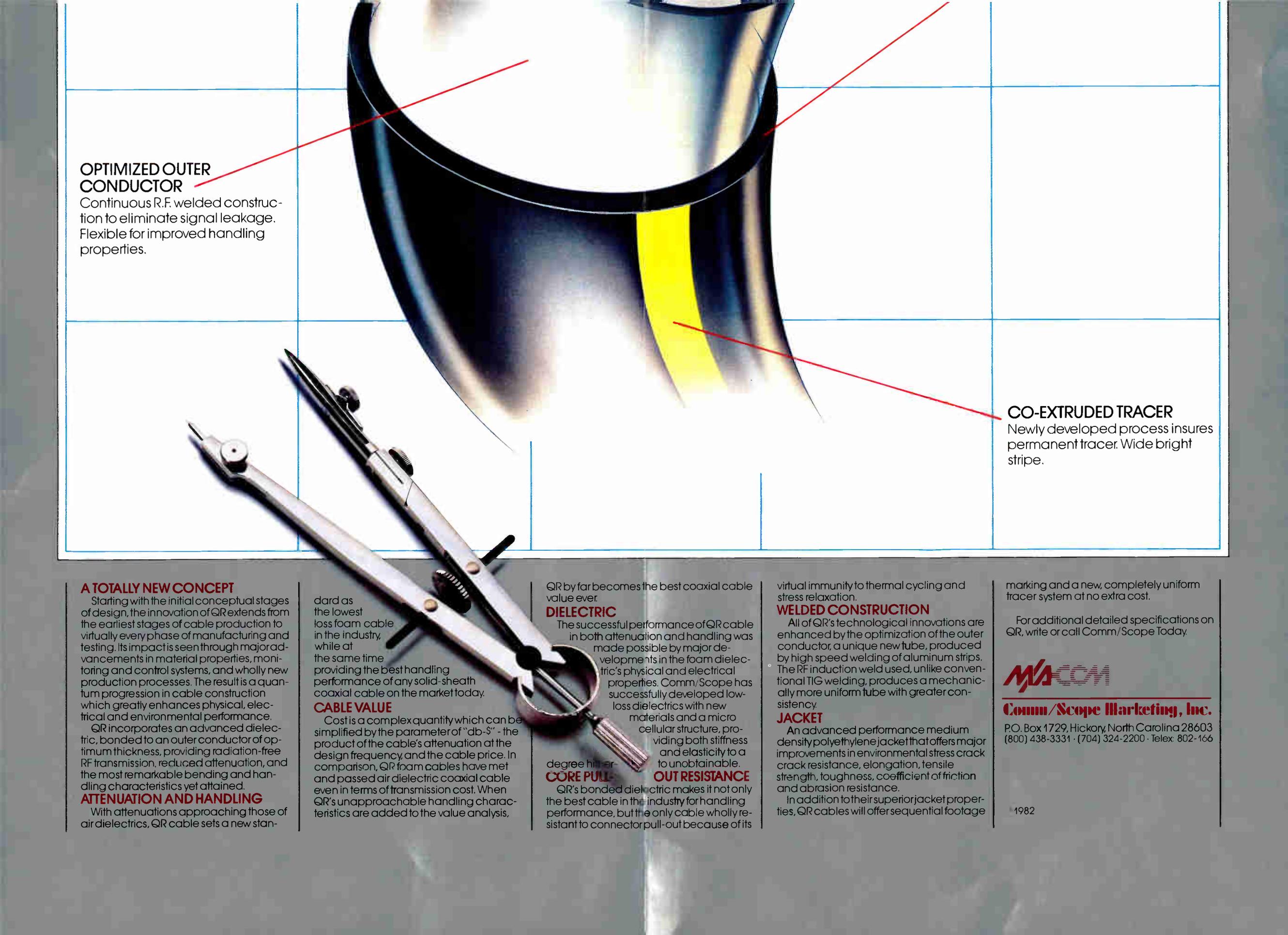
Reverse Bend Fatigue (TP #224):
 92 cycles Spec: 80 cycles
 Flexural Stiffness (TP #225): 200 in-lb
 Spec: 220 in-lb
 Core Pull-Out Strength (TP #221):
 495 lbs Spec: **440 lbs**
 Dielectric Hardness (TP #214): 75 lbs/in
 Spec: 70 #/in
 NOTES: Five samples used for each test.

ENVIRONMENTAL

Salt Spray (TP #308): Penetration less than 1/2"
 Dye Migration (TP #309): Penetration less than 3/8" — No open cells found
 Expansion Loop Cycling (TP #226):
 25k cycles; Spec: 10k cycles
 Thermal Cycling (TP #227): No degradation in jacket strength, core pull-out
 NOTES: Weatherometer tests also performed. No jacket problems after 15 years of simulated sun and weather.



DIMENSIONAL		
CC	0.2034	Spec: 0.203 ± 0.001"
DOPC	0.208"	Spec: 0.208 (Nominal)
DOD	0.830"	Spec: 0.828 ± 0.005"
DOA	0.831"	Spec: 0.829 (Nominal)
DOOC	0.860"	Spec: 0.860 ± 0.010"
DOJ	0.965"	Spec: 0.960 ± 0.010"



OPTIMIZED OUTER CONDUCTOR

Continuous R.F. welded construction to eliminate signal leakage. Flexible for improved handling properties.

CO-EXTRUDED TRACER

Newly developed process insures permanent tracer. Wide bright stripe.

A TOTALLY NEW CONCEPT

Starting with the initial conceptual stages of design, the innovation of QR extends from the earliest stages of cable production to virtually every phase of manufacturing and testing. Its impact is seen through major advancements in material properties, monitoring and control systems, and wholly new production processes. The result is a quantum progression in cable construction which greatly enhances physical, electrical and environmental performance.

QR incorporates an advanced dielectric, bonded to an outer conductor of optimum thickness, providing radiation-free RF transmission, reduced attenuation, and the most remarkable bending and handling characteristics yet attained.

ATTENUATION AND HANDLING

With attenuations approaching those of air dielectrics, QR cable sets a new stan-

dard as the lowest loss foam cable in the industry, while at the same time providing the best handling performance of any solid-sheath coaxial cable on the market today.

CABLE VALUE

Cost is a complex quantity which can be simplified by the parameter of "db-S" - the product of the cable's attenuation at the design frequency, and the cable price. In comparison, QR foam cables have met and passed air dielectric coaxial cable even in terms of transmission cost. When QR's unapproachable handling characteristics are added to the value analysis,

QR by far becomes the best coaxial cable value ever.

DIELECTRIC

The successful performance of QR cable in both attenuation and handling was made possible by major developments in the foam dielectric's physical and electrical properties. Comm/Scope has successfully developed low-loss dielectrics with new materials and a micro cellular structure, providing both stiffness and elasticity to a degree hitherto unobtainable.

CORE PULL-OUT RESISTANCE

QR's bonded dielectric makes it not only the best cable in the industry for handling performance, but the only cable wholly resistant to connector pull-out because of its

virtual immunity to thermal cycling and stress relaxation.

WELDED CONSTRUCTION

All of QR's technological innovations are enhanced by the optimization of the outer conductor, a unique new tube, produced by high speed welding of aluminum strips. The RF induction weld used, unlike conventional TIG welding, produces a mechanically more uniform tube with greater consistency.

JACKET

An advanced performance medium density polyethylene jacket that offers major improvements in environmental stress crack resistance, elongation, tensile strength, toughness, coefficient of friction and abrasion resistance.

In addition to their superior jacket properties, QR cables will offer sequential footage

marking and a new, completely uniform tracer system at no extra cost.

For additional detailed specifications on QR, write or call Comm/Scope Today.



Comm/Scope Marketing, Inc.

P.O. Box 1729, Hickory, North Carolina 28603
(800) 438-3331 · (704) 324-2200 · Telex: 802-166

Field Tests

Cable Description: QR-860
Product Code #'s: 55-001-02, 55-002-02,
55-003-02
Dates Manufactured: 9/21/82 to 9/22/82

FIELD TEST SUMMARY: The construction crew loved it! The light weight and easy forming kept their enthusiasm and excitement. The cable performed well. Still 30dB SRL after installation.

ELECTRICAL PERFORMANCE:

No attenuation, impedance or SRL degradation after installation. SRL plotted before and after installation.

FLEXIBILITY: Very tight bend radii used. The best demonstrations were at the amplifiers. 6" radius bends were formed by hand for the loop backs. The cable was molded with ease to flow with existing obstructions.

It survived the ultimate test!

CONNECTORIZATION:

Connectorization was fast and smooth. New tools and connectors worked fine on QR.



Major Breakthrough in Cable Television

HICKORY, NORTH CAROLINA. A totally new family of high performance coaxial cables for the Cable Television Industry was unveiled here today by its developer and manufacturer, M/A-Comm/Scope, Catawba, North Carolina, the long-time industry leader in products for cable television transmission.

- Other significant capabilities of the new cable are:
- Vastly improved handling characteristics.
 - A unique, optimum-thickness outer conductor tube, made by high speed induction welding of aluminum strips, which reduces the weld zone area to fractional proportion.
 - Less vulnerability to cable damage during construction and installation.

- Improved cable jacketing of new medium density polyethylene (MDPE), imparting environmental stress crack and abrasion resistance, tensile strength, toughness, elongation, and coefficient of friction.



M/A-COM Comm/Scope Q.R. Coaxials



Q.R. Comm. Return Room
242

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Local plant / active and passive

Cost comparison
Shogmore, A.C.

A&J Construction
Peoria, Illinois
(520) 765-0321



For the whole story on
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transmission line —
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Hank,
It's finally off
the drawing board.
Wanted you to see
this data first.
Clearly our greatest
breakthrough!
B.B.

CONFIDENTIAL

Seminars

February

7-8: Phillips Publishing will sponsor a conference on "Ku-Band Satellite Communications in the '80s" at the Hyatt Regency in Washington, D.C. Contact (202) 463-2970.

8-9: The annual meeting of the **Arizona Cable Television Association** will be held at the Phoenix Hilton Hotel. Contact the ACTA, (602) 257-9338.

8-10: A **Jerrold** technical seminar will be held in Charlotte, N.C. Contact Diane Bachman, (215) 674-4800.

9-11: Magnavox CATV Systems will be conducting a field training seminar with its Mobile Training Center in Denver, Colo. For more information contact Laurie Venditti, (800) 448-5171 or (800) 522-7464.

9-11: The **Arkansas Cable Television Association** annual convention will be held at the Excelsior Hotel in Little Rock. Contact (501) 661-7677.

14-16: Magnavox CATV Systems will be conducting a field training seminar with its Mobile Training Center in Denver, Colo. Contact Laurie Venditti, (800) 448-5171 or (800) 522-7464.

18-19: A seminar on "Communication Satellites: Systems and Networks" sponsored by **New York University** will be held at the Washington Square campus. Contact A. Krebs, (212) 598-7064.

22-24: A **Jerrold** technical seminar will be held in San Francisco. Contact Diane Bachman, (215) 674-4800.

23-25: Blonder-Tongue will hold a "MATV/CATV/TVRO Technical Seminar" in conjunction with J.R. Morgan Agency, in Phoenix, Ariz. Contact Chuck Fitzer, (415) 449-0547.

25: The **National Association of MDS Service Companies** will sponsor a regional seminar at the Salt Lake City Airport Hilton Hotel. Contact Jim Clark, (319) 752-3607; or Diane Hinte, (213) 532-5300.

28-March 2: A meeting on optical fiber communications, OFC '83, sponsored by the **Quantum Electronics and Applications Society of IEEE** and the **Optical Society of America**, will be held at the Hyatt Regency in New Orleans. Contact (202) 223-8130.

March

1-3: A **Jerrold** technical seminar will be held in Vancouver Wash. Contact Diane Bachman, (215) 674-4800.

8-10: A **Jerrold** technical seminar will be held in Atlanta. Contact Diane Bachman, (215) 674-4800.

9-11: Magnavox CATV Systems will hold a field training seminar with its Mobile Training Center in Phoenix, Ariz. Contact Laurie Venditti, (800) 448-5171; in New York, (800) 522-7464.

13-15: The **Ohio Cable Television Association** annual convention and trade show will be held at the Hyatt Regency in Columbus, Ohio. Contact (614) 461-4014.

14-16: Magnavox CATV Systems will hold a field training seminar in its Mobile Training Center in Phoenix, Ariz. Contact Laurie Venditti, (800) 448-5171; in New York, (800) 522-7464.

14-16: Scientific-Atlanta will be conducting a product training seminar in Portland, Ore. Contact Tammy Waller, (404) 925-5847.

16-18: Scientific-Atlanta will be conducting a product training seminar in San Jose, Calif. Contact Tammy Waller, (404) 925-5847.

22-24: A **Jerrold** technical seminar will be held in Kansas City, Mo. Contact Diane Bachman, (215) 674-4800.

24-25: The annual convention of the **Georgia Cable Television Association** will be held at the Atlanta Marriott. Contact Nancy Horne, (404) 252-4371.

30-31: The **Oklahoma Cable Television Association** will hold its annual convention at the Lincoln Plaza in Oklahoma City. Contact Jay Allbaugh, (405) 721-6377.

April

6-8: Magnavox CATV Systems will conduct a field training seminar with its Mobile Training Center in Dallas. Contact Laurie Venditti, (800) 448-5171; in New York, (800) 522-7464.

10-13: The annual convention of the **National Association of Broadcasters** will be held at the Las Vegas Convention Center, Las Vegas, Nev. Contact the NAB, (202) 293-3500.

11-13: Magnavox CATV Systems will conduct a field training seminar with its Mobile Training Center in Dallas. Contact Laurie Venditti, (800) 448-5171; in New York, (800) 522-7464.

12-14: A **Jerrold** technical seminar will be held in Dallas. Contact Diane Bachman, (215) 674-4800.

19-21: A **Jerrold** technical seminar will be held in Toronto. Contact Diane Bachman, (215) 674-4800.

25-27: The **International Association of Satellite Users** will sponsor SATCOM '83 at the Hyatt Hotel in Orlando, Fla. Contact Ann Roark, (703) 759-2094.

May

4-6: Magnavox CATV Systems will conduct a field training seminar with its Mobile Training Center in Kansas City, Kan. Contact Laurie Venditti, (800) 448-5171; in New York, (800) 522-7464.

6-8: The **Society of Cable Television Engineers** will hold its first cable TV hardware exposition, Cable-Tec Expo, at the Dallas Convention Center. Contact SCTE, (202) 293-7841.

10-12: A **Jerrold** technical seminar will be held in Minneapolis. Contact Diane Bachman, (215) 674-4800.

25-26: The **Public Service Satellite Consortium** will conduct a workshop in Washington, D.C., on "How To Video-Teleconference Successfully." Contact (202) 331-1154.

Looking ahead

1983

May 6-8: SCTE's Cable-Tec Expo, Dallas Convention Center.

June 12-15: National Cable Television Association convention, Houston.

June 27-29: Videotex '83, New York Hilton.

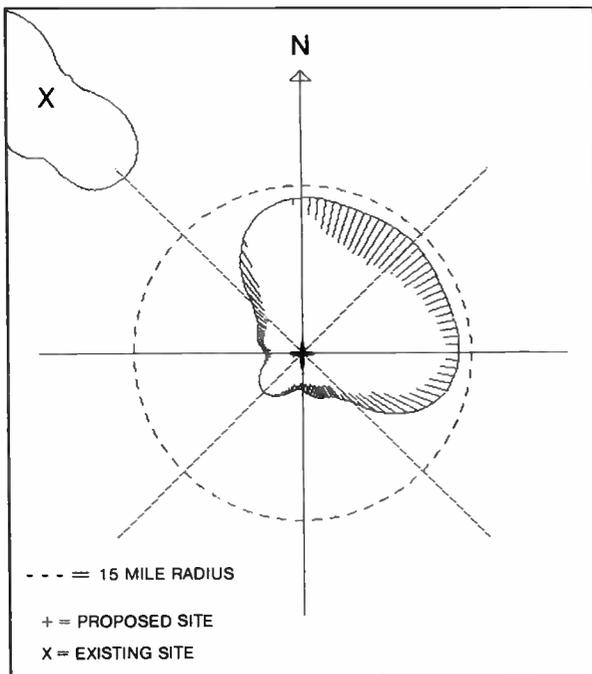
August 11-14: Community Antenna Television Association's CCOS-83, Arlington Hotel, Hot Springs, Ark.

September 7-9: Great Lakes Cable Conference, Indianapolis Convention and Exposition Center.

September 8-10: Eastern Show, Georgia World Congress Center, Atlanta.

September 11-14: The United Kingdom's first "International Cable and Satellite Television Exhibition and Conference, CAST 83," The National Exhibition Centre, Birmingham, England.

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An editorial upgrade

In this issue of *CED* we are launching TECH II, our new feature supplement and Product Profile. This is a section we have had in the works for some time at Titsch Communications and one we believe certainly has a place as the center section of *CED* each month. Capitalizing on the success of *CableVision Plus* in our sister magazine *CableVision*, our editorial staff was convinced that there was a need for a similar feature section inside *CED*. The focal point of TECH II is *CED*'s Product Profile, which has been quite popular among our readers. We will take this section and expand upon it, providing you, our readers, with more in-depth material, solicited both from writers and technical personnel within the industry and from our own staff. Call it an upgrade, if you will.

This is not to say, however, that the Product Profile is being revamped. We will maintain our profile chart, but also concentrate on an upturn on editorial, giving you more information about the product being profiled, as well as applications and "hands-on" articles about the product and the field or business it serves. In future sections of TECH II, we will offer biographies, market position and other pertinent information on the companies that make the products being profiled. This month, we are studying the business of distribution plant design and will key in on line extenders in the profile.

In sum, we think TECH II has a niche to fill in the business. It's a section you can quickly turn to to find answers to the whos, whats, wheres, hows and whys, along with answers to other questions on the products and fields that mean cable technology. Here's a quick rundown of those topics and product profiles that we will feature over the next four months:

March

Subject: Developing Maintenance Schedules
Product Profile: Standby Power Supplies

April

Subject: Interfacing CATV Business Management Systems
Product Profile: Computerized Billing Systems

May

Subject: Techniques of System Strand Mapping
Product Profile: Trunk and Distribution Cable

June

Subject: Alpha-numeric Programming for Vacant Channels
Product Profile: Character Generators

And there will be more to come. We'd also like to hear from you. What topics do you have in mind?

On the subject of different topics, Home Box Office has made a decision to go with M/A-COM LINKABIT Inc., for network-wide scrambling of its satellite signal. You'll find a news piece on that announcement in this issue (p. 25). Showtime has set a target date of mid-1984, when it intends to begin scrambling its signal as well. It would appear, therefore, that the move to prevent theft of service and eliminate "poaching" by individual earth station owners is taking a definitive step forward. What that means for private users is still up in the air, if you'll pardon the pun. Those who purchase and have purchased backyard dishes are obviously concerned about the future viability of their receiver, especially if they are unable to pick up two of cable's premium services. It may even be safe to say that The Movie Channel will follow on the heels of Showtime's scrambling deadline because of their recent partnership agreement.

So, while theft of service may diminish as a result of the scrambling move, what is to be done about the vast community of private earth station users? Surely, there would be quite a market for descrambling devices for the private dishes, which M/A-COM Video would be glad to supply. Whether such approval is forthcoming is no doubt an issue many people will watch with great anticipation. Count *CED* as one.



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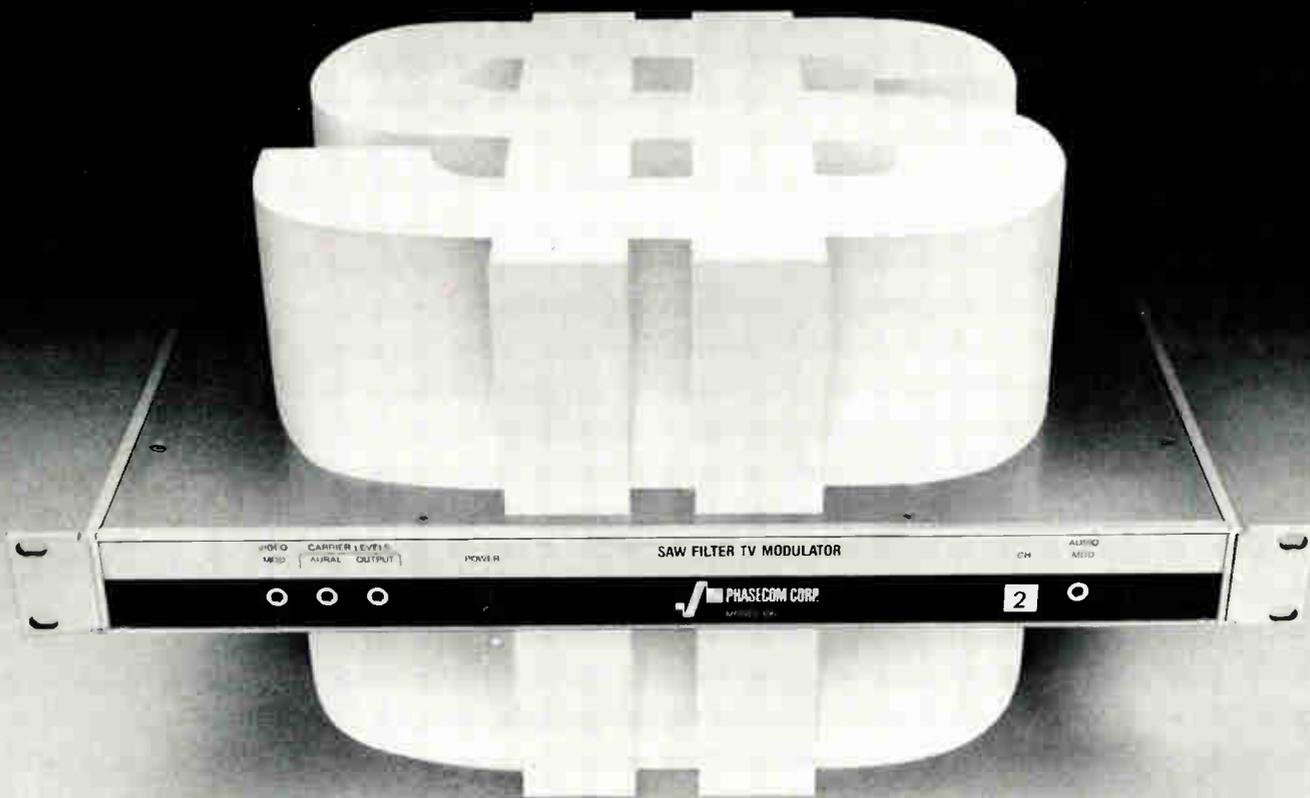
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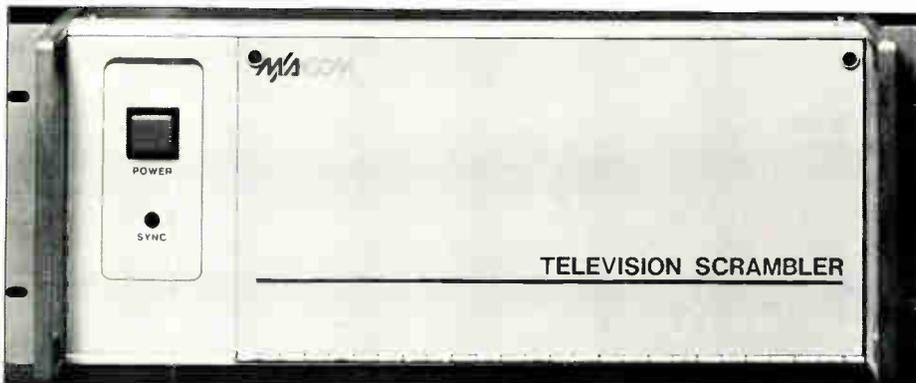
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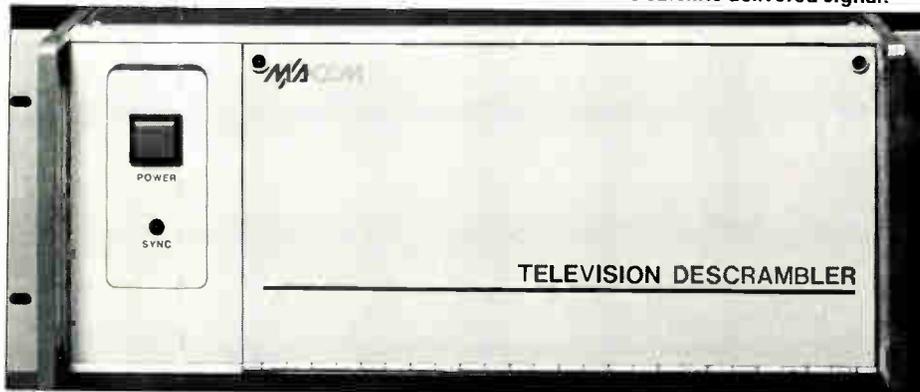
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HBO has chosen M/A-COM LINKABIT hardware to scramble its satellite delivered signal.



HBO picks M/A-COM LINKABIT to supply encode/decode hardware

NEW YORK—After three years of research, HBO has reached a decision on the technology that it will use to scramble its satellite delivered signal. A contract has been awarded to M/A-COM whereby its LINKABIT subsidiary will manufacture, to HBO's specifications, descrambling units that will be provided free of charge to all current HBO affiliates.

The original decision to scramble the HBO signal came about because of the growing number of private individuals and apartment house owners who have been able to receive the HBO signal without permission or compensation. The new technology, while not foolproof, is believed to provide a level of security that will make any attempt at piracy unprofitable.

The scrambling technology will not be provided to HBO, but the electronic "key" that will authorize any of the units to descramble the signal is unique to the company. The process utilizes an algorithm based on those specified by the Department of Encryption Standards, "the highest level of non-classified encryption allowed outside of the government," according to Ed Horowitz, HBO vice president for studio and network operations.

Scrambling will begin in mid-1983, once

HBO moves its uplink to new facilities on Hauppauge, Long Island. Initially, only affiliates in the West and Mountain time zones will receive the shelf-mounted, addressable descrambling units. Affiliates in the East and Central time zones will receive their units between four and six months later.

The unit is designed to allow a signal that is sent in an unscrambled mode to pass through unaltered. Each 5.25-inch-high unit can be installed by the operator, and will be as easy to put in place as a video tape recorder, according to Horowitz.

The scrambling specifications call for digitally-encoded audio and video signals. While the actual video signal is transmitted in analog form, the digital encryption process will allow for easy detection of signal errors. Consequently, the encrypted video signal will actually be of enhanced, rather than inferior quality when compared to the present non-encoded signal, Horowitz said.

The unit's reliability will be as high as that of any other piece of equipment found in the cable system's head-end. While the unit has been designed to accommodate present TV standards, it is also "compatible" with future standards. In addition, the digital encryption of the audio signal will eventually be able to serve as a bridge between the transmission of a digitally-transmitted radio signal and its reception in the home.

Britain's Plessey Co. to buy Scientific-Atlanta stock

ATLANTA—Scientific-Atlanta, preparing for what many believe may be an explosion of cable business in Western Europe, has aligned itself with Plessey Co. of England.

The British company, a leader in electronics, said it would buy up to three million shares of Scientific-Atlanta's common stock, or about 13 percent of the currently outstanding shares. Plessey said it may buy as much as 30 percent of Scientific-Atlanta's stock during the course of the 18-month option. Plessey said it wouldn't take any action during the 18 months relating to a merger or acquisition of Scientific-Atlanta without the approval of Scientific-Atlanta board of directors.

The two companies also have formed a joint venture satellite and cable communications equipment business, Plessey S-A Limited, in Western Europe. About \$1 million will be invested in the joint venture initially. Plessey controls 51 percent of the venture, S-A the remaining 49 percent.

The agreement to buy 3 million shares could cost Plessey \$50 million. If it exercises the option to buy the maximum allowed, it could cost the British firm as much as \$114 million.

Scientific-Atlanta Chairman Sidney Topol said the arrangement positions Scientific-Atlanta to take advantage of the development of cable television in the United Kingdom and the Middle East, which he said together make up the next satellite-cable frontier.

Plessey, with \$2 billion in sales last year, is a leader in telephone switching equipment, semiconductor, fiberoptic and military communications products.

The joint venture will give Scientific-Atlanta access to Plessey's technical expertise in the design of certain products.

Ed Turville, first vice president at the Atlanta brokerage house of Robinson Humphrey/American Express, said, "Scientific-Atlanta and Sid Topol have always been very good at being at the right place at the right time with their products. They see that things are on the verge of cranking up in the United Kingdom and Western Europe. What better way to be there than to find a partner that is already established to get you into those countries and adapt your product to the new market?"

Both Topol and Turville said that Scientific-Atlanta agreed to the arrangement because it is still reeling from problems with its 6700 addressable converter and needed money. Financial projections have been down and the company's stock exchange trading price fell to the low teens in recent months.

"We get no additional cash out of this

deal," Topol said. Plessey's stock acquisitions will be from existing outstanding shares. Topol added he thought the slowdown in Scientific-Atlanta's spiraling growth of the last decade had more to do with decreased capital expenditures by the cable companies than with the 6700 addressable converter.

Turville added, "Scientific-Atlanta doesn't need the money. The balance sheet and borrowing power are super strong and fairly substantial. We are talking about a company with a net worth of more than \$170 million with only \$11.5 million in long-term debt and only \$6 million in short-term debt. They could borrow a lot more if they wanted to."

According to Turville, the cable industry's response to Scientific-Atlanta's new 8500 converter, made in the Far East, has been favorable. "Scientific-Atlanta lost \$40 million on the 6700 model. But all indications are that they will ship \$20 million worth of the 8500 model in 1983 and another \$55 million worth of them in 1984," Turville said.

Scientific-Atlanta's trading price went up the day of the announcement but then dropped slightly the day after, closing at \$16.62 a share. The stock's annual low is \$10 and the annual high is \$28.

Westinghouse urges CARS band overhaul

WASHINGTON—Westinghouse Broadcasting and Cable Inc. has petitioned the

Federal Communications Commission for a rule-making for added frequency space and for an overhaul of other cable television relay service regulations.

The 44-page petition, filed Jan. 7 by attorneys William Reyner and Sylvia Winik, says the scarcity of CARS space must be alleviated by authorizing CARS to share frequencies currently assigned to the television broadcast auxiliary service. Specifically, Westinghouse proposes that CARS be extended to more of the 13 GHz band and the 2-2.5, 6.425-7.125, 17.7-19.7 and 38.6-40 GHz frequencies.

Westinghouse asked the FCC to exclude master antenna television systems from CARS use. The petition says rules "must be strictly construed to restrict access to these scarce facilities to bona fide cable television operators." Last May, the FCC authorized a CARS license for an SMATV operator in Dallas. There are several similar requests by SMATV companies pending before the commission.

The petition also asks the FCC to:

- Provide for short-term operation of CARS facilities and certain equipment changes without prior FCC approval.
- Streamline the CARS application process.
- Consider merging CARS and BAS into a single service to be regulated by a single FCC microwave branch.

A source said the FCC currently is drafting a notice of proposed rule-making

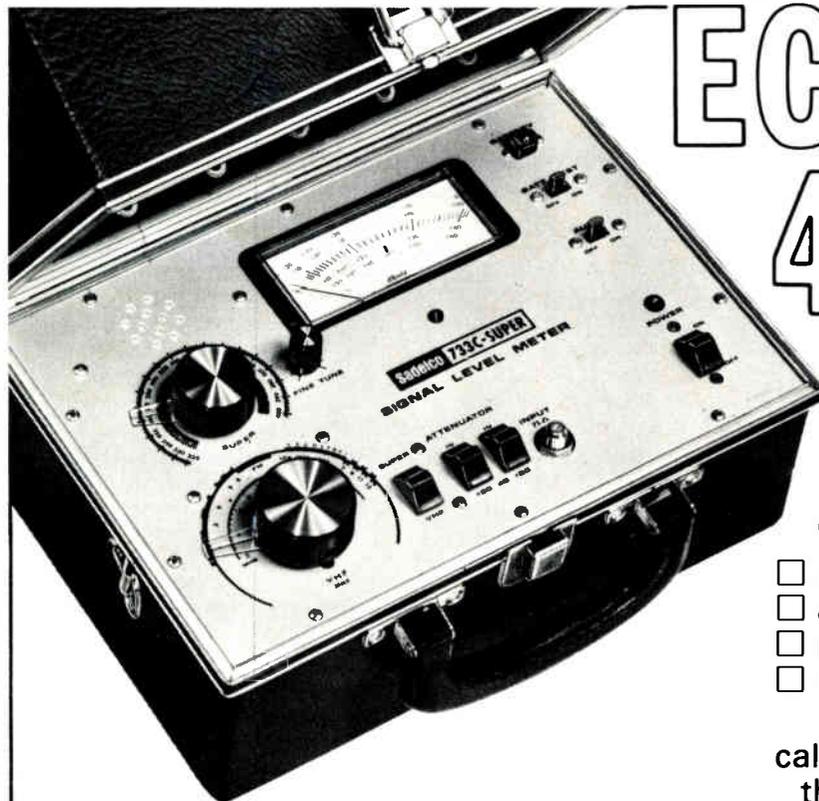
to modify the use of some frequency space and give more bandwidth to CARS. The proposal, currently undergoing final revisions, is expected to be released within several weeks. The notice is likely to address many of the issues raised in the Westinghouse petition, although it may not include the issue of CARS for MATV systems.

The cable industry has long pushed for more CARS space. In its petition, Westinghouse cited microwave congestion in Los Angeles, San Francisco, Seattle, New York, San Diego, Atlanta, Phoenix, Dallas, Chicago and Houston. FCC officials are said to be sympathetic to the problem and ready to act.

Reyner and Winik wrote, "Perhaps most importantly, failure to adopt the proposed changes in the face of dramatic changes in the cable television industry will block the further development and distribution of cable services. Where technology has taken us so far, we cannot allow regulations adopted almost 15 years ago to stand in the way of reaping the benefits of such innovations."

Jerrold claims converter lead

HATBORO, Pa.—Jerrold Division of General Instrument has claimed market leadership for all types of converters. According to the company, it has supplied more than half of



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the converters currently in use in American homes.

Ed Ebenbach, Jerrold vice president of marketing, said, "Jerrold produces the most widely used converters in the industry and has more converters operating in the field than all other manufacturers combined." An independent report, which obtained information directly from Jerrold and other converter manufacturers, also has ranked Jerrold as number one in terms of addressable systems installed for all of 1982 up to Sept. 15. A total of 68 Jerrold Starcom systems were installed during this period. Oak Communications, which took second place, achieved a total of 41 installed systems during this same period. Zenith, TOCOM, Pioneer and Octagon-Scientific were ranked third, fourth, fifth and sixth, respectively. Zenith, with a total of 39 installed systems, was the only company out of the four that came close to competing with Jerrold or Oak. The report also estimated Jerrold's share of the market as 45 percent and Oak's as 35 percent. The remaining 20 percent of the market was divided evenly among other converter manufacturers.

In addition to its claim as converter leader, Jerrold professes to maintain leadership among wire link manufacturers. This claim is based on Jerrold's completion of 11 installations for customer service systems during the last six months of 1982, only seven months after the product was introduced at the NCTA show. According to a company spokesman, "Industry thinking has been tending toward combining customer service and addressable control in one unit costing up to \$750,000. The (Jerrold's) wire link connects a \$21,500 Jerrold addressable controller to any of the 47 different customer service computers now used by cable system operators that cost from \$21,000 to \$25,000."

The company claims that wire links not only reduce the operator's initial capital outlay but long-term labor expenses as well.

SCTE Spring Engineering Conference

WASHINGTON—The SCTE will hold its eighth annual Spring Engineering Conference at the Los Angeles Biltmore Hotel, March 6-8. This 1983 program features discussions on engineering and management issues as well as presentation of 20 papers on business and data services.

W.A. Devereaux, American Cablesystems, Boston, Mass., will lead a discussion entitled "Engineering Decisions on Business and Data" to kick off the conferences' formal program. According to the SCTE, 12 system-operating and full-line manufacturing company decision-making engineers will talk about their experiences in addressing business, data and networking through broadband systems.

Management's view will be delivered

when B. Douglas Jarvis, Jack Barry Cable Management, Los Angeles, gathers presidents and managers of cable operating companies together to address "Managing Decisions on Business and Data."

For more information on the Spring Conference, contact the SCTE, (703) 823-1911.

Tele-Engineering to design Columbus interconnect

COLUMBUS, Ohio—Tele-Engineering Corp., a Framingham, Mass., engineering firm, is designing a two-way broadband system that will tie all five Columbus, Ohio, cable companies together in a municipal interconnect network. The city of Columbus expects completion of the Institutional Cable Interconnect System by this spring.

Anne Meier, director of energy and telecommunications for the city of Columbus, said future benefits will range from telephone network bypass uses for data communications to traffic control and utility meter reading.

Ernest Tunmann, president of Tele-Engineering, said, "Our expertise in this field of technical design for the bi-directional, broadband system began several years back when we installed a similar system at Dartmouth College. The city of Columbus has, in the past, had great vision in usage of cable and, with the completion of this project, will continue to be a leader in that area." Tunmann added, "We are pleased to have this opportunity to work with them."

The initial phase of the project will connect the five existing cable companies with City Hall and will provide interconnection with the 150,000 homes now subscribing to cable TV in the Columbus area. Also, data, voice, slow-scan video and real-time video services will be available to city agencies.

The second phase is the Institutional Cable Interconnect Network. Eleven institutions within the Columbus "inner belt" will have interconnect capabilities. The cable and duct work will be completed by the city in the late spring of 1983. The individual institutions will be responsible for their own connection to the interconnect network.

Funds to cover the costs of the interconnect and related research into applications come from the annual franchise fee paid by the four cable companies in Columbus for the regulation, supervision and development of cable communications.

According to Ralph Squires, cable television administrator for the city of Columbus, "Although we have several initial applications in mind, many others will be developed by the Metropolitan Telecommunication Research Committee, a group established to determine how telecommunications can be used and coordinated in local government."

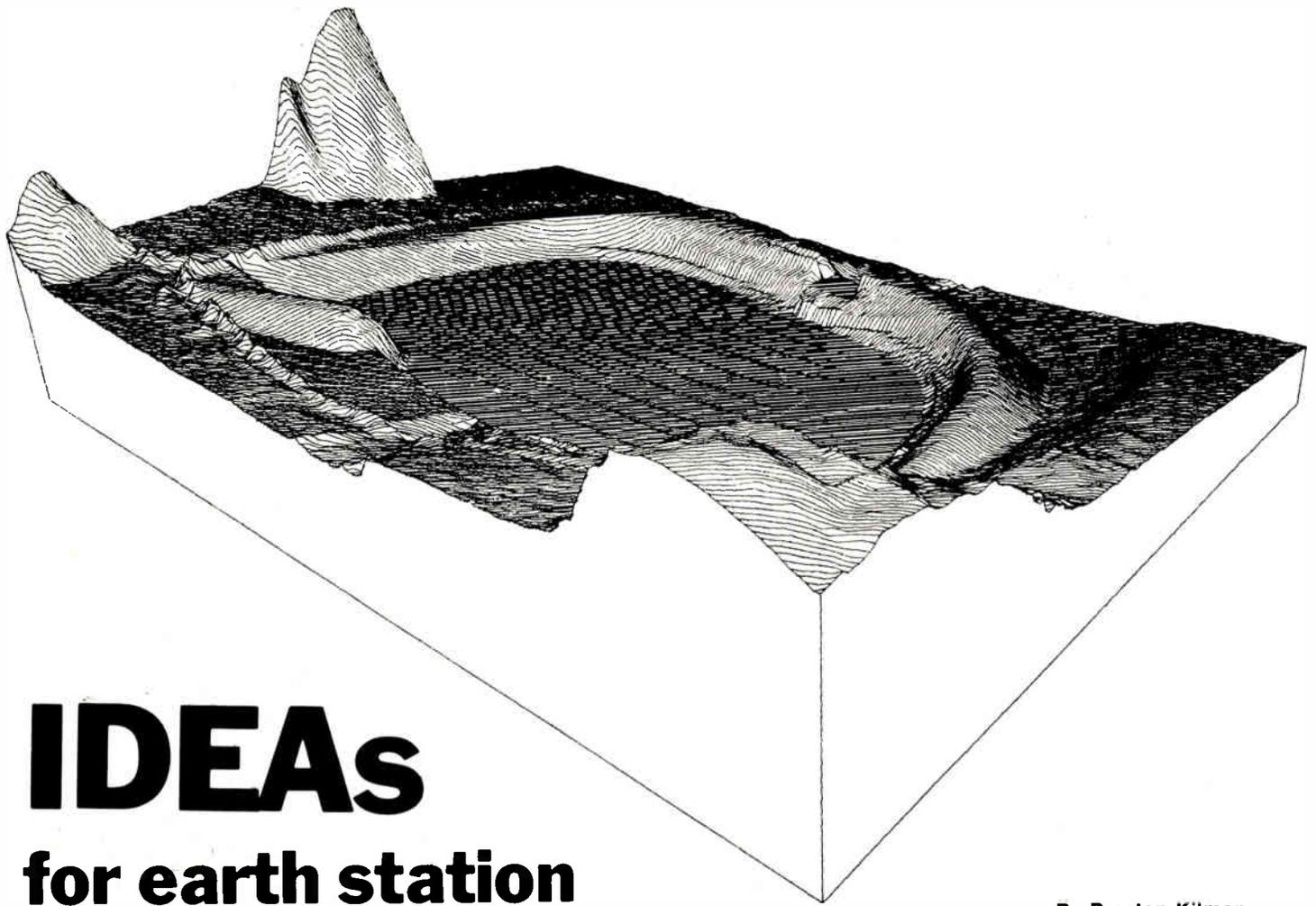
■ **Datavision Inc.** has received approval from the U.S. Patent Office for a patent on its CATV PSK decoder. According to the company, the PSK decoder facilitates interactive services—such as home shopping and banking—that require rapid data transmission. Datavision's PSK units currently are operating at 19,200 bits per second and can operate at increased speeds with a slight modification. The decoder's bandwidth efficiency allows Datavision to serve an entire city without using any valuable video channel space.

■ **US Cable Corp.** of Hackensack, N.J., has signed a purchase agreement for \$5 million worth of **Jerrold** (a division of General Instrument) digital converters. Approximately one-third of the converters covered by the agreement are updated 66-channel STARCOM 450 units that feature remote control and are designed to offer up to 132 channels with the addition of an optional A-B switch. These units are earmarked for a system extension in Waukegan, Ill. Construction of the system began in June 1980 and is scheduled to be completed in September 1983. Another major US Cable build will receive STARCOM IV 58-channel converters. These converters will be used for a 28-month Jerrold turnkey extension in northern Indiana that will be completed this September. Converter shipments started last October and will continue throughout 1983. The finished system will total about 420 miles of plant.

■ **AM Cable TV Industries Inc.** has announced its receipt of a contract, valued at more than \$5 million, to perform all of the aerial cable construction and underground cabling for the city of Boston's cable TV franchise. This franchise is held by **Cablevision of Boston**. Work for the contract was expected to begin in December. According to an AM Cable official, the Cablevision system will have a capacity of 104 channels and will offer two-way interactive services.

■ **Cable TV Industries** has announced a profit of \$247,000 for its third fiscal quarter ended October 31, 1982. The company had reported a loss of \$90,000 in its second quarter ended July 31, 1982.

■ **Florida Satellite Network** has awarded the construction contract for the Land O'Lakes franchise area to **CATV Subscriber Services Inc.** (CSS) of Greensboro, N.C. Francis Fries, vice president and general manager of **Moffat International Corp.**, the company which holds the franchise, said the contract would cover approximately 80 miles of aerial and underground construction. According to G.F. Haisman, general manager of the CSS Construction Division, CSS is designing the Land O'Lakes system and mapping various other prospective franchise areas. When



IDEAs

for earth station site location

By Preston Kilman
Engineering consultant
Compucon Inc.

As new business opportunities emerge for the cable industry in the rapidly growing communications arena, cable companies will continue to expand their services to take a larger share of multibillion-dollar revenues projected for the telecommunications industry. The advent of two-way cable in the '80s allows subscribers to circumvent local telcos in the exchange of information within a particular cable system, while similarly, two-way satellite communications allows cable companies to provide nationwide distribution of voice, video and high-speed data. Whether upgrading an existing cable system or building a new system, transmit-receive satellite capability should be considered in planning and design stages in order to take full advantage of opportunities afforded by this country's changing telecommunications infrastructure.

Just as technological advances have led to the improved design and development of satellite systems, new techniques have evolved to locate the earth station site that best accommodates the user's present and long-term communications requirements. Enhanced computer capabilities using demographic, terrain and communications

data bases have resulted in a dynamic new approach to the site selection process. Based upon extensive experience, Compucon has developed new and innovative methods to effectively locate C-band earth station sites in today's increasingly congested interference environment. By using Integrated Demographic Engineering Analysis (IDEA), it is now possible to locate and rank earth station sites according to spectrum availability and market demand. IDEA draws upon the requirements of a variety of users and entails evaluation of sites for a wide variety of telecommunications applications to provide complete radio frequency options and allow flexibility for future expansion as market demands dictate.

Effects of market research

The interrelation of marketing research and engineering design has had a great effect on earth station site selection. Demographic analyses result in an accurate forecast of demand and geographic distribution of cable communications users; engineering evaluation of the microwave environment results in definitions of pocket areas for voice, video and data satellite

access. By combining geographic distributions of high-potential users with areas of low-interference intensities, earth station sites that best accommodate user demands over time, provide spectrum flexibility for a variety of communications applications, increase efficiency of cable routing and AML distribution equipment, and maximize long-term revenues can be identified. IDEA provides the most accurate and complete study for effective location of transmit-receive earth station sites by coordinating engineering with both present and future market needs.

Congested microwave paths

Using different user-density maps compiled during an initial market study, geographic areas are chosen for engineering evaluation of satellite access. Sharing the same frequency bands with point-to-point microwave systems owned and operated by common

Preston Kilman is an engineering consultant in the communications services group of Compucon Inc. To date, he has been involved in well over 100 earth station site selections.

carriers such as American Bell, BOCs, Southern Pacific and MCI, C-band earth stations must be located using careful engineering practices to avoid harmful interference. Figures 1 and 2, respectively, illustrate the vast number of 4 and 6 GHz terrestrial microwave systems that criss-cross the United States. It is evident that locating an earth station site in today's microwave environment is not a simple process.

Earth stations transmit to satellites in the 6 GHz (5925-6425 MHz) band. Satellite transponders effectively downconvert the received signal by 2225 MHz, so that signals are transmitted back to earth in the 4 GHz (3700-4200 MHz) band. Therefore, 4 GHz terrestrial transmitters represent sources of potential interference to the receive mode of an earth station, and 6 GHz terrestrial receivers represent sinks of potential interference when uplinking to the satellite. To determine the interfering level an earth station receives from a 4 GHz transmitter, we have:

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

where: P_r = interfering signal level received at the earth station (dBw)

P_t = terrestrial transmit power (dBw)

G_t = gain of the terrestrial transmit antenna toward the earth station (dB)

L = propagation loss over interfering path—including free-space, tropospheric scatter, terrain and diffraction losses (dB)

G_r = gain of the earth station antenna toward the terrestrial transmitter (dB)

By reciprocity theory, the same equation holds true when calculating interfering levels from the earth station into 6 GHz terrestrial receivers.

Using contour maps

To obtain an overview assessment of the microwave environment for a large geographic area, interference-intensity contour maps are generated using computerized techniques. Regions of interference impact for each terrestrial microwave system vary according to antenna gain and performance characteristics, transmitter power and radiation center above ground level. The composite mapping of these regions, using sophisticated software, results in contours of different interference intensity. By analyzing these intensity contours in conjunction with terrain, pocket areas of minimal-interference probability can be identified for further evaluation.

In the past, terrain analyses have been made using USGS topographic maps. Today, increased computer capacity has made possible terrain data bases with an accuracy equivalent to 7.5 minute USGS maps. At Compucon, topographic data has been digitized and stored in a terrain data base housed by VAX computers. To the delight of the engineer, special software has been written to graphically display



Figure 1 4GHz route map



Figure 2 6GHz route map

terrain features in three dimensions. Figure 3 shows an example of digitized terrain in two dimensions, identical to a 7.5 minute USGS map. Figure 4 shows an example in three dimensions, with terrain variations more readily discernible. The software allows the user to specify the angle from which to view the topographic features. For example, one could view the surrounding terrain from the same angle at which a satellite signal would "view" it, or one could analyze the terrain from the viewpoint of a terrestrial antenna oriented in a given direction and at a fixed height above ground level. This new capability has had a tremendous impact on the site selection process.

With three-dimensional terrain graphics, the engineer is able to refine the interference-intensity contours. Effects of propagation losses and reflections are anticipated by carefully analyzing terrain features along interfering paths so that a more realistic scenario of the interference environment is developed. As a result, areas are chosen for investigation of land availability and zoning.

After specific sites are identified, a more rigorous analysis must be undertaken to document compatibility of the earth station with the microwave environment. Unlike TVROs, it must be shown to the satisfaction of other users that the proposed transmit-

continued on page 35

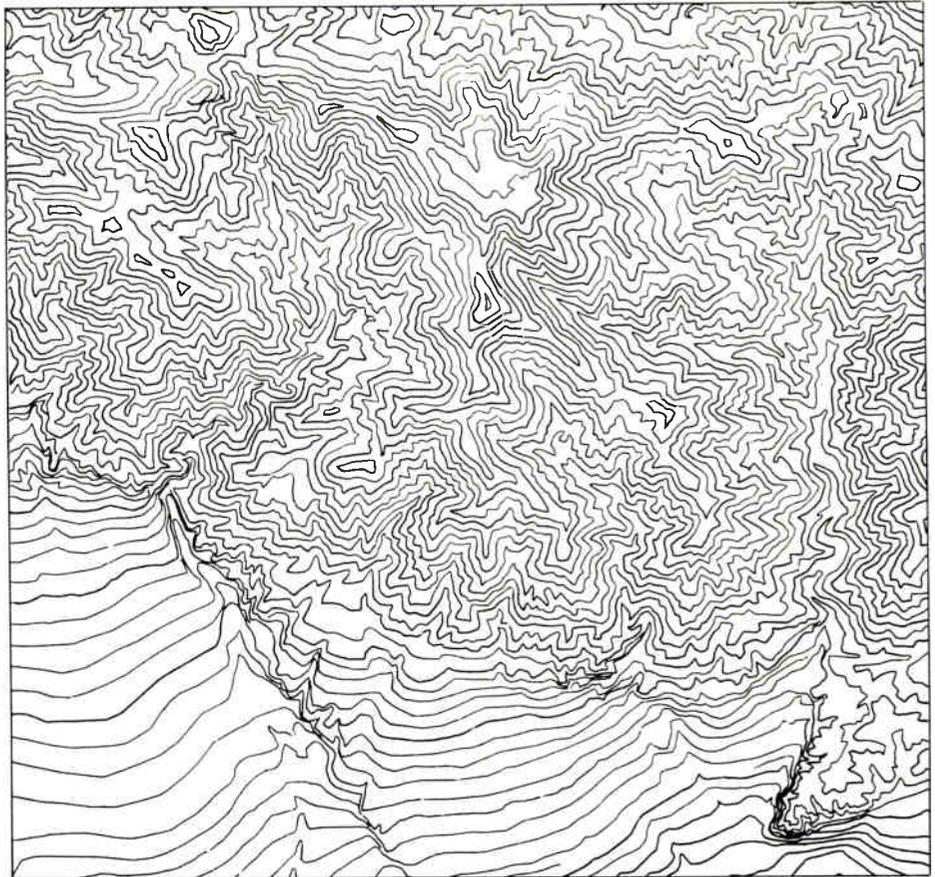


Figure 3 Two dimensional terrain graph

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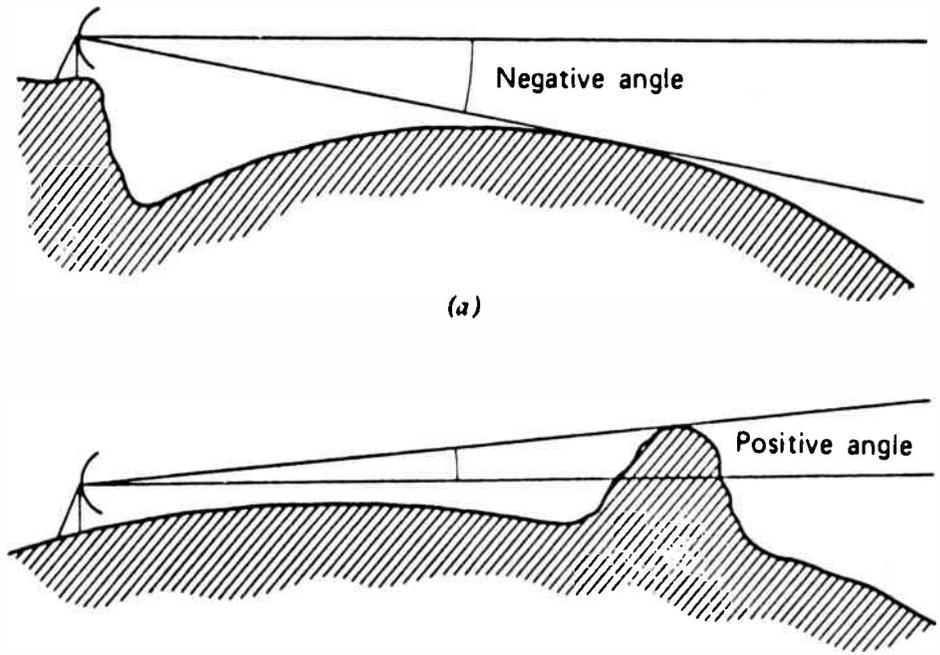
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Engineering principles of earth station site selection

By Dom Stasi

Director of Engineering
Warner Amex Satellite
Entertainment Company

Earth station site selection criteria fall loosely into two categories: criteria we impose upon ourselves, such as ownership of a tract of land or co-location with existing facilities (offices, studios, etc.); and those criteria largely outside of our control, imposed upon us by others. As an earth station builder, you are responsible for selecting a site that is not only suitable for your own needs but also compatible with the needs of other frequency users operating in the congested 4 and 6 GHz bands. This responsibility requires you, as an earth station builder, to conform to existing conditions. Such conformity serves the best interests of both existing and prospective frequency users. While FCC rules encourage the proliferation of new services, the commission considers the protection of existing channels a higher priority. Allocation or denial of frequencies is predicated upon this consideration. The commissions' rules clearly state that, when applying for transmission frequencies, your allocation must bear minimum interference potential, not only to any and all licensed existing carriers, but also to those not yet licensed, whose applications bear an earlier filing date than your own.

More often than not, objections can be cleared through site engineering during the prior coordination stage of an application. It

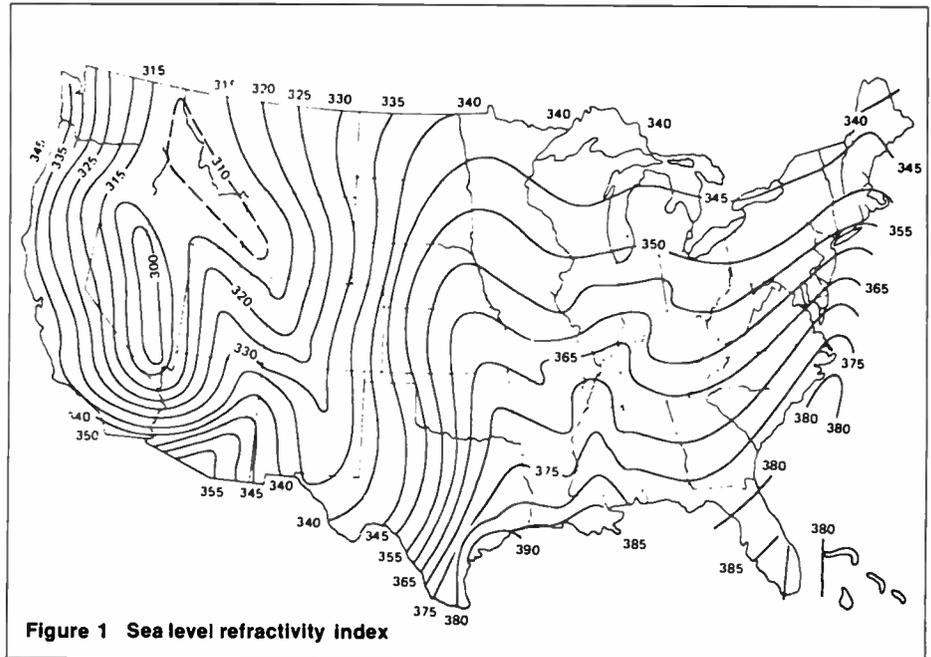


Figure 1 Sea level refractivity index

is important to remember, however, that objections to proposed routes are not measured witnessed phenomena but are only postulations calculated against a set of worst case parameters.

In the course of coordinating a Smithtown, Long Island, N.Y., location for Warner Amex' Network Operations Center, no fewer than 66 objections were posed and ultimately cleared.

It's axiomatic in designing satellite earth

station facilities that, if it works in terrestrial systems, do the opposite in a satellite system (i.e. put a tower on a hill; put an earth station in a hole). The extent of this simple philosophy is very surprising. All of those physical obstacles that were so troublesome when path profiling microwave links and those properties of electromagnetic waves that conspired to make point-to-point reliability seem unachievable, will, almost without exception, work to the advantage of

the satellite system planner.

Shielding, both natural and man-made, has been shown to be a highly effective method of eliminating interference. Micro-waves do not substantially penetrate mineral substances and are virtually devoid of ground wave components. Thus, fences, walls, buildings or earthen mounds can serve as highly effective shields when located between the interference source and receiver. When a carrier objects to your application, the objection is generally a computer spit-out based upon a flat earth model. Careful examination of USGS contour maps and great circle calculations will go far in reducing interference impact.

After a tentative site has been selected and interference sources identified, a path profile may be undertaken. The objective: to determine the extent of terrain shielding existing between your site and the interference source(s). In the case of transmitting, earth station interference is both received and generated. Given antenna reciprocity theory, however, both may be handled similarly. A path profile is best plotted on rectilinear graph paper with obstacle information taken from USGS topographical charts of 1:7500 scale. Draw straight lines on the topos between your site and the interference sites, identify obstacle elevations between them and transfer this data to

the graph paper in the 'y' axis.

Mark the midpoint between the two objects. This is maximum earth bulge and should be considered an obstacle. Transposing all major vertical elevations from the contour map to the 'y' axis graph sheets will yield a vivid representation of your line of site situation. Earth curvature (bulge) should be added to each obstacle height as it effectively raises those obstacles higher into the path. Earth bulge (h) may be calculated as follows:

$$h = 0.677 (d_1 d_2)$$

where: (1)

d_1 = distance from near end of interference path to obstacle.

d_2 = distance from far end of interference link to obstacle.

Determination of *actual* relative obstacle heights between the candidate and interference sight is easily the most important factor in the designer's favor. If it can be shown that the aggregate obstacle height extends above the radiation center of either antenna at midpath, a radio horizon exists. "Take off angle" between the radio horizon and the affected antenna's radiation center may contribute a loss between source and sink. This loss is roughly the complement of the affected antenna's off-axis gain at a similar angle and can be controlled to a considerable degree by site engineering.

Diffraction and refraction

Radio waves traveling through the atmosphere do not follow true straight lines. Even at microwave frequencies, they are actually refracted or bent. More importantly, they may also be *diffracted*. In designing the Warner Amex Smithtown site, the phenomenon of ray diffraction was applied extensively. To make the equation for earth bulge (Eq. 1) more effective, it may be modified to include the effects of departure from straight line propagation, which is assumed in Eq. 1.

Refraction

Refraction may cause a transmitted wave to be "bent" toward or away from the earth. If it is bent away from the earth, it is effectively the same as if earth bulge were increased. The effects of refraction may be determined mathematically through the inclusion of a K-factor to (Eq. 1) as follows:

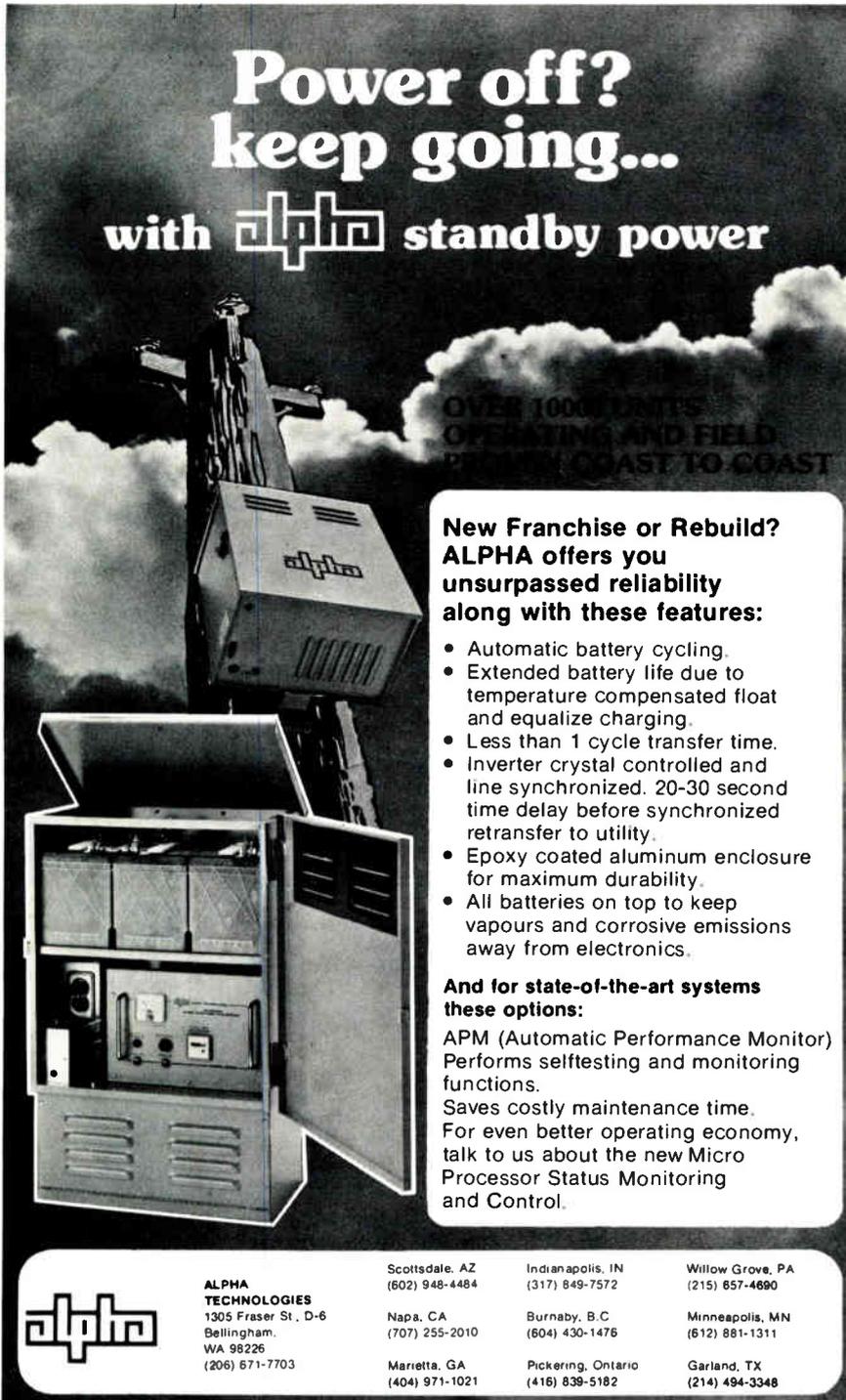
$$d \text{ (ft)} = \frac{0.667 d_1 d_2}{K}$$

where: (2)

$d_1 d_2$ are expressed in miles
K = effective earth radius

true earth radius

The standard K factor is 4/3 and as such, will yield negative results in most cases. This, however, should not be accepted *carte blanche* when optimizing a candidate site. Refer to the sea level refractivity chart in figure 1. *continued on page 35*



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continued from page 32

receive earth station will not cause interference to existing or previously planned microwave systems. The extent of the analysis required for this effort varies, as each site differs in its physical surroundings and degree of microwave congestion. Consequently, resolutions to interference objections raised in the frequency coordination process are often unique to a particular site.

Planning for future growth

In order to ensure maximum flexibility for future growth, the approach taken during frequency coordination should be broad in

scope so that spectrum availability for a wide range of user applications may be realized. Using interference criteria based upon system specifications for a variety of communications applications, a complete radio frequency assessment results in an earth station site that will continue to serve new markets. For example, an earth station frequency coordinated for reception of video is not necessarily protected against interference when receiving data. Therefore, as market demands dictate data information processing, an earth station may be rendered obsolete by more stringent interference requirements. Emphasis should be placed on frequency clearance over the

full satellite bandwidths, and for the full geostationary arc, using a range of interference criteria for voice, video and data.

Frequency engineering involves optimizing spectrum availability by using all available physical surroundings and taking complete advantage of the frequency coordination process. Buildings and dense, non-deciduous trees can provide excellent shielding from interfering microwaves. Consequently, placement of the earth station with respect to physical obstructions can often be critical in reducing interference levels to within acceptable limits. If necessary, artificial shielding in the form of a diffraction screen or earthen mound can be

Principles . . .

Find the refractivity index for the area of interest. As can be seen for K factors of less than 1, a significant improvement in terrain blockage can be achieved.

Diffraction

The other factor that must be added to obstacle height when optimizing shielding pertains to the effects of *diffraction*. A wave front exhibits expanding properties as it travels through space. These result in phase transitions and reflections as the expanding wavefront passes over obstacles.

As with refraction, these properties, known collectively as fresnel effect, result in increases or decreases in signal strength, relative to free space propagation. First, fresnel zone clearance may be estimated by the formula:

$$R = \frac{13.58 \sqrt{\lambda d_1 d_2}}{D}$$

where: (3)

λ = wavelength of signal (ft)

d_1 = distance from transmitter to path obstacle (statute mi)

d_2 = distance from path obstacle to receiver (statute mi)

D = $d_1 + d_2$ (total path length in statute mi)

If fresnel zone clearance is not present between your antenna centerline and that of the interference facility, some diffraction loss exists and may be considered in your optimal mode. Surprisingly effective results may be obtained by deliberate injection of diffracting apparatus into the interference path. These may take the very substantial form of an earthen mound or be as simple as metal fencing, properly placed.

Once this evidence was gathered, I spent three days with the building architect at Compucon Corp.'s computer in Dallas. Various combinations of building size, location and elevation were tried and fed to the computer along with antenna locations and elevations in an effort to achieve optimum diffraction losses. **CEB**

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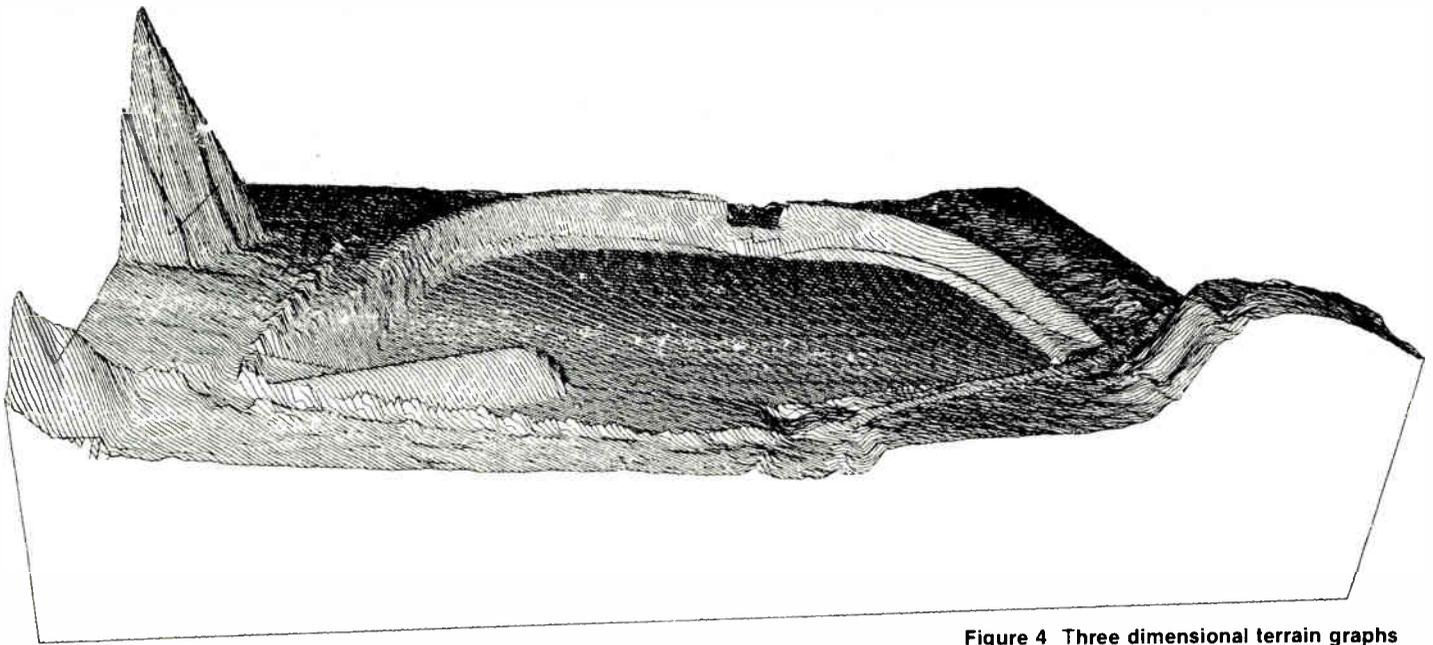
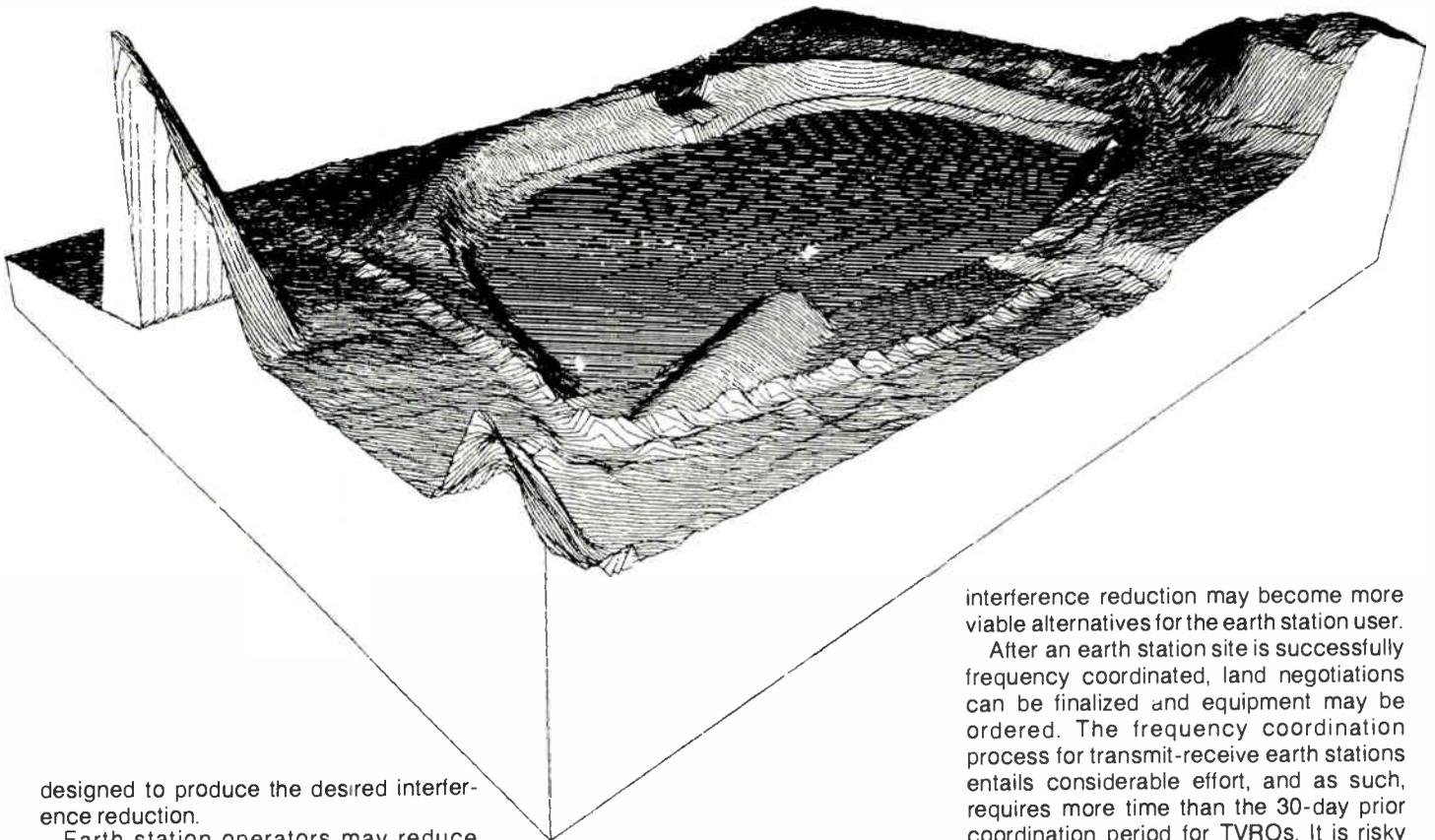


Figure 4 Three dimensional terrain graphs



designed to produce the desired interference reduction.

Earth station operators may reduce interference by upgrading terrestrial antennas. During the frequency coordination process, it may be determined that, by replacing an existing terrestrial antenna with one of improved performance characteristics, interference can be avoided. If the current antenna does not meet the FCC's Standard A radiation pattern, it is the responsibility of the terrestrial user to upgrade the antenna to this specification to avoid interference.

While it is desirable to frequency clear a site for the full satellite spectrum, bandwidth restrictions may be required to avoid

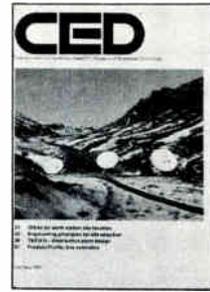
interference. At 6 GHz, terrestrial systems transmit and receive either the lower or upper half of the 500 MHz bandwidth. Thus, a satellite user can transmit over frequencies in the opposite half of the band used by a particular terrestrial station and avoid interference that otherwise would occur if the entire bandwidth was utilized. In addition, limiting the satellite arc at which an earth station can transmit may be required to reduce sidelobe interference levels. As more satellites and transponders are put into orbit, these methods of

interference reduction may become more viable alternatives for the earth station user.

After an earth station site is successfully frequency coordinated, land negotiations can be finalized and equipment may be ordered. The frequency coordination process for transmit-receive earth stations entails considerable effort, and as such, requires more time than the 30-day prior coordination period for TVROs. It is risky business to commit to land and equipment prior to completion of the coordination process; however, with proper engineering, sites can be selected with a high degree of confidence they will work.

As satellite use soars, communication opportunities will continue to emerge for cable companies looking for long-term growth. Two-way satellite communications offers new and promising horizons for the cable industry. In today's increasingly congested microwave environment, it's a good IDEA to start planning now for the future.

CEC



TECH II

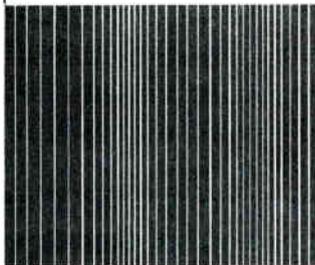
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Plant design must be cost-effective

Distribution plant design has come a long way since the days of one-way only delivery systems. Computer-aided design, two-way cable distribution systems, increased and increasing channel capacity and the need for zero down time in systems' operations have all contributed to the development and maturity of cable as an entertainment medium and cable as an institutional tool for business needs. Hardware manufacturers are hard pressed to keep pace with the demands of this "here today, gone tomorrow" industry. Equipment needs and applications are quickly outdated as cable fulfills its enormous potential for signal delivery.

Cable system design today must meet not only present requirements but future needs as well. Capability for full data, voice and video "is here and now," and a system that cannot meet these needs is doomed to economic failure. In putting together TECH II this month, we found that one element of concern common to everyone involved in plant design is the cost of constructing two-way broadband systems. As you take a closer look at the components of this section, you will find that the cost of designing, building and operating cable systems is of paramount concern.

Bob Sturm, president of Cable Systems Design Group has put together a piece for us on pole/pedestal configuration manuals. He contends these manuals can help control cable and equipment placement errors. Sturm and others recognize that the shortage of qualified manpower in the industry is a serious problem.

Country Cable Systems, a northern California system operator, has installed a system for a small number of subscribers, and the company describe its experience with getting the system up and turned on to the satisfaction of both the bank and its subscribers. Once again, Country Cable designed its system by making decisions that, in the long run, will keep it cost-effective.

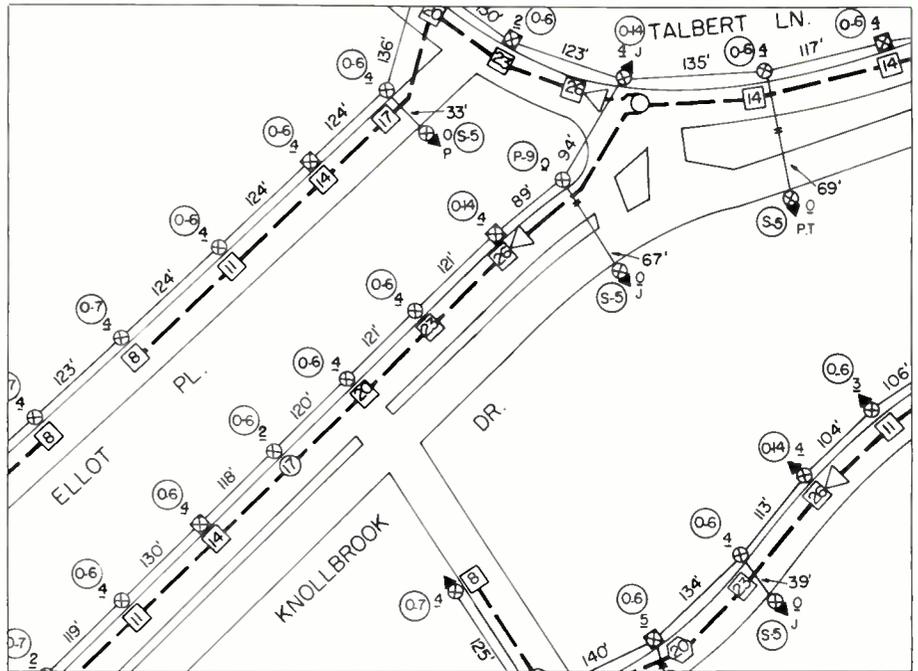


Figure 1 Strand map shows pole/pedestal locations marked with appropriate designations from a construction manual.

Design manuals save time, money

By Robert Sturm
Cable Systems Design Group

Broadband cable communications systems have made a quantum leap in the past 10 years. The technology of delivering signals on these systems has advanced from tube-type amplifiers to state-of-the-art integrated circuits, wideband amplifiers and optical fibers.

Accordingly, the pace of building new systems in the past five years has accelerated to a phenomenal rate. Due to this rapid growth, the industry has experienced a shortage of qualified personnel. One area particularly hard hit is the construction sector. A number of the larger, well-established and well-supervised construction firms have been able to overcome this handicap. But due to the transient nature of the work, many have not been able to develop adequately trained field personnel. The lack of properly trained personnel and the increased pressure to turn out more miles of plant in a shorter time frame has led to a high incidence of errors made during construction phases. These errors typically manifest themselves in the form of inefficient system strand maps—which can result in an over- or under-designed system—improper cable placement and inadequate equipment slicing. Any of these

oversights can result in costly down time and missed completion schedules, which increase plant costs.

One area the modern system operator often overlooks is the efficiency of his system strand (or route) maps. As a large amount of capital investment costs are developed from the map information, which typically is supplied by others, the operator should take steps to ensure that his system has been properly mapped. The operator should conduct an in-depth review of the routing maps prior to the design process. There are certain items that have a direct bearing upon the profitability of the system and can be reviewed very easily. The minimal time required to complete this review can save the operator thousands of dollars in direct plant costs.

One of the first areas that should be reviewed is total plant mileage and the types of plant construction needed. The system operator should pay particularly close attention to the underground construction areas. If the strand mapper has made the determination in the field as to what types of construction are needed—plowing, trenching, boring or earth sawing—he should check this information against the actual construction costs. Under-The strand mapper usually is not privy to these local construction costs until the strand map is complete.

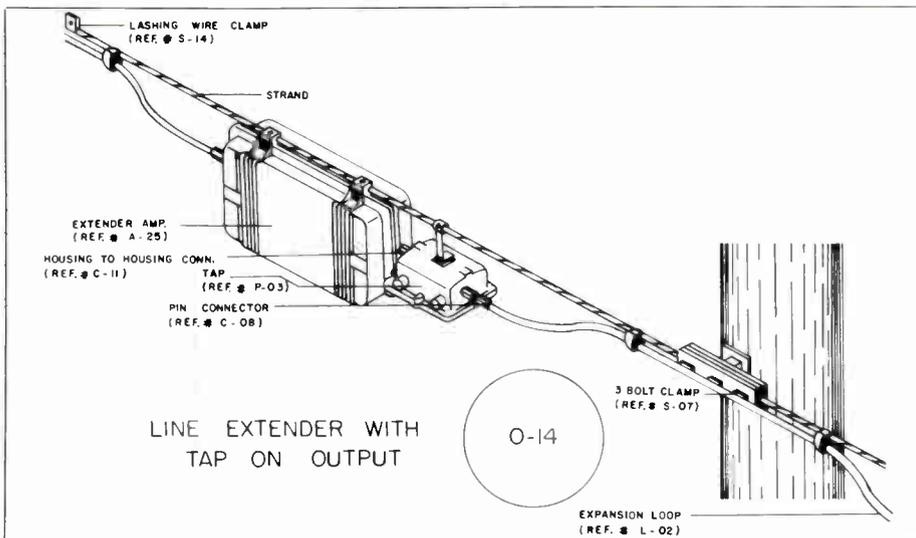


Figure 2 This drawing from a construction manual illustrates the type of equipment and ancillary items required at a particular pole or pedestal location.

The system make-ready rearrangement work is typically in progress prior to the completion of the system design. The operator should review the maps with his system designer to ensure that he will not incur unnecessary make-ready costs for poles not used, i.e., excessive railroad crossings, canal crossings and highways crossings. Cost-effective system design can be

completed at a remote location only if the information supplied the system designer is complete and accurately reflects the system needs and requirements.

One method that recently has been developed to help reduce the potential of cable and equipment placement errors is the use of a pole/pedestal configuration manual. The idea is quite simple: Upon

completion of the system design maps (figure 1), each pole or pedestal is assigned a corresponding number with a drawing in the configuration manual (figure 2). The drawings in the configuration manual illustrate the type of equipment and ancillary items (pin-type or feed-through connectors) required at a particular location. As illustrated in configuration manual figure #0-14, a line extender amplifier with a subscriber directional tape is drawn in detail. Each component of the total assembly is assigned a reference number that provides additional details, if necessary. The manual also includes drawings of specified expansion loops, assembly instructions for the loop, proper installation of the lashing wire clamp and drawings illustrating power supply installations and procedures.

If a crew has a question concerning a particular location or a specific piece of equipment, the answer is readily available in the manual. The manual proves to be an excellent tool for use by skilled labor with little experience in coaxial cable system construction.

These procedures can save system operators valuable time and money and can assure that a state-of-the-art communications network will be built to exact specifications with minimal delays.

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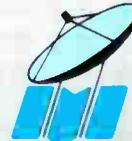
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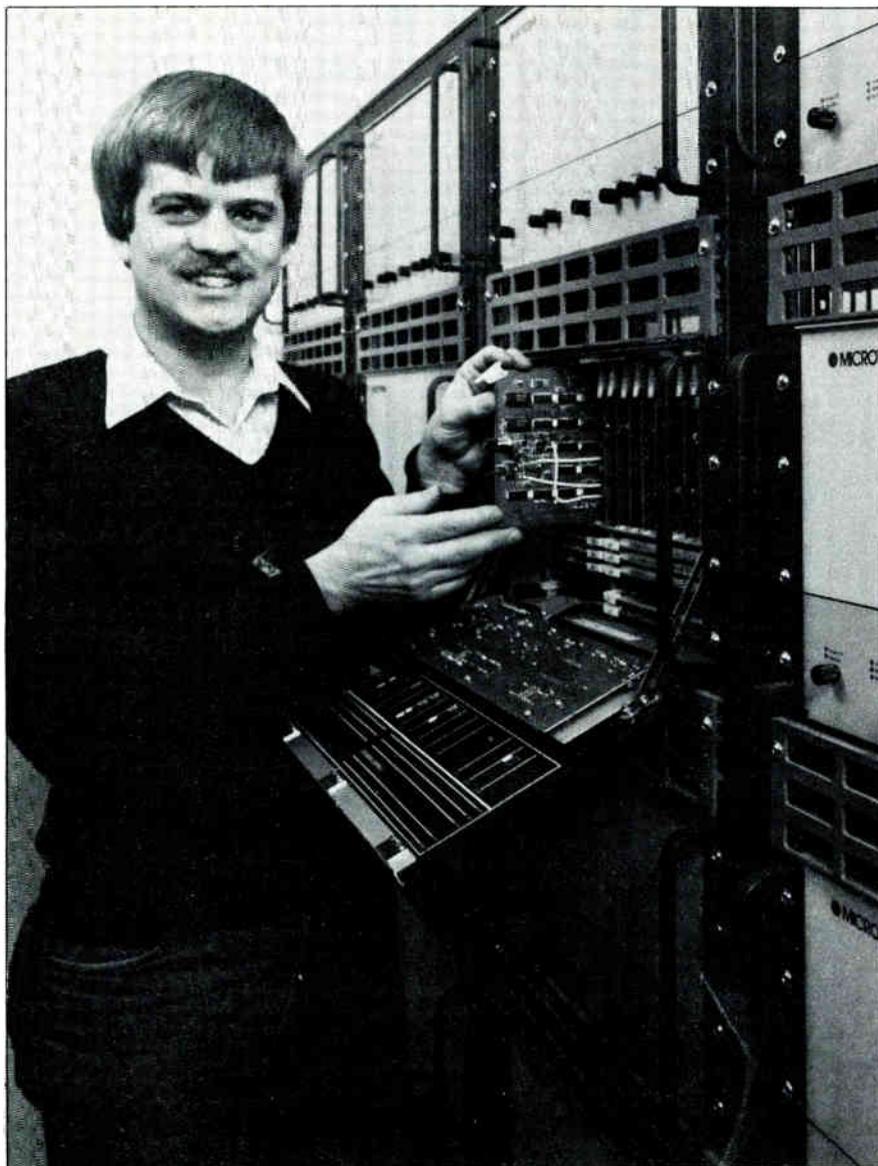
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Cablenet's synchronized system

Cablenet Inc. has installed a totally synchronized cable system serving ten communities in the northwest suburbs of Chicago. Cablenet's distribution plant is a dual-cable 120-channel 440 MHz system that uses 50 Microtime 2520 frame synchronizers. The TBC synchronizers control every channel and are driven from one master sync generator that puts all the horizontal and vertical timing faults on the same frame so they all come out of the headend together. The system "hides" all the horizontal and vertical sync pulses off the screen in the vertical and horizontal blanking bars. According to George Steiger, Cablenet vice president, "This yields about a 3 dB improvement in the picture quality, and it gives us a subjective 10 dB improvement in crossmod on the end of the cable system, which allows us to go longer cascade lengths with better performance." The system currently is going 28-32 amplifiers deep in 440 and Steiger claims they are getting good pictures in the end. Cablenet's master headend utilizes approximately 160 modulators and a custom-built alphanumeric generator from MSI with 128 channels and ten remote keyboards. The various franchise areas are loading their own channels from their respective village halls.

Economy in rural design

Country Cable Services has been involved in the development of rural cable television systems in the Pacific Northwest for a number of years. Most of their cable operations have been typical compact community units offering 50 to 100 potential households to the mile of plant placed. Country Cable Services has concentrated on developing cable systems that are not so much franchise-competitive as cost-effective. The first service area for the northern California build referred to here is exposing 715 households in 20 miles of plant and the system is averaging \$6,000 per mile, including earth station and headend. When their entire franchise area is developed, it will serve 5,000 households in 175 miles of plant, using three satellite-fed stand-alone systems.

Economics currently predicate system

size to cash flow. A cable system with a subscriber base of less than 1,000 has a serious cash flow problem. This is evidenced by the lack of cable television development in those less-than-1,000 household markets. It could be assumed that if we cut costs to build lesser markets, then we could improve, but not solve, the cash flow problem. If we also could increase the per-household revenue, then the cash flow problem indeed would be solved.

Economic parameters

In designing our system, financial *pro-forma* was built to establish the cost requirements for a reasonable return on investment. We discovered that we could provide cable service to 36 homes per one mile of plant. The penetration expectations would have to approach at

least 70 percent for basic and 100 percent pay-to-basic. So as not to price the services beyond the customer's reach, basic service was established at \$100 per month and \$10 for each of two pay services. The total project cost could not exceed \$6,000 per mile of plant, all costs included. For ease of discussion, all costs included franchise, acquisition, engineering, headend, earth station, start-up operations and marketing. The subscriber base would have to be at least 500 customers, which translates roughly into exposing 715 households in 20 miles of plant.

A cost-effective design concept was adopted from a technical paper published and distributed by the Society of Cable Television Engineers on *Cost Effective System Designs for Rural Cable Television*, written by William Grant, a com-

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munications specialist with the REA. It was discussed that one might place a single cable 18.9 miles from the headend with a 45 amplifier cascade and still have a salable picture at the end. While it is possible from an engineering standpoint to go out 18.9 miles on a four-tap-per-mile system, the banker wouldn't agree that the cash flow was available to retire the debt. But the concept of placing a single cable to reduce overall construction costs is sound. The RF levels in the system were to be maintained at 40 dBmv outputs, or halfway in between typical trunk/distribution systems. This would place enough signal on the cable to tap for service drops, except for the last 700 feet to an amplifier station. This "no tap" zone would become serviceable by placing a "back feed cable" from the output of the preceding amplifier. The distortion buildup was calculated to be acceptable at the end of 45 amplifiers. Automatic gain control and automatic slope control would be minimal if the cable was placed underground, and finally, it was concluded that this system could be built at \$6,000 per plant mile.

Design parameters

The northern California system was designed to operate out to 300 MHz, providing up to 36 video channel capability. To meet the high-gain amplifier requirements of 32 dB, the Magnavox 5-LEX/34 line extender was used. It offers good electrical performance while providing 34 dB of gain for the full bandwidth of 50-33 MHz. This feature, and the 5-LEX/34's low power consumption, .25 amps at 60Vac, indicated that it was the best amplifier for the money. The modular design of the 5-LEX/34 allows flexibility for the initiation of two-way services. By using the 4-A*/T15, the unit will thermally compensate 15 dB of cable.

Typical system construction with strand and lashed-up cable is very labor intensive. To minimize the labor costs, self-support half-inch cable was used. It is very light in weight, 14.5 lbs./100 ft., and easy to handle. The messenger is class A.H.S. galvanized steel, with a minimum breaking strength of 1,800 lbs. Times Wire and Cable's 4000 series Lumifoam III allowed the best amplifier reach for the cost of cable.

Mapping of the system was done in conjunction with "land use maps" provided by the Planning Department of the county. These maps were helpful in determining the direction of future growth in the area. With that in mind, a dedicated system was designed. So many times a cable system becomes electronically saturated. This usually inhibits growth without extensive rebuilding. There was no need to place taps at every potential building lot.

Instead, phantom insertion loss was designed within the system to accommodate the loss at a future date. Service drops are not typical within a rural area. Therefore, each drop potential was noted as to length, if excessive, and the proper amount of signal was made available to drive it. Different types of service drops were used from RG/59 to .412JM, depending on the signal requirements. The main concern was to minimize the number of active electronics within the system.

Automatic Gain Control and Automatic Slope Control devices are, for the most part, manufactured for the typical trunk/distribution systems. There is no applicable data base for a single-wire cable system using AGC and ASC. Aerial plant will be subject to thermal changes and will need compensating devices to keep it in control. The only low-cost, high-gain line extenders currently available offer limited thermal control. This is accomplished by placing heat sensitive thermistors within the amplifier housings. We hope the housing temperature change will represent the change in the cable feeding it. Thermal equalizers were placed in every back-bone amplifier station. If the system is not stable enough, the customers will let us know. Ground level test points were established at every cascade double. A log book of system performance will reveal seasonal changes and system behavior. If the system is not stable enough to maintain customer satisfaction, the AGC/ASC devices will be employed. They will be placed at the 16th cascade doubles first, and then added, as necessary, to reach stability. Meanwhile, the cable customers are staying on-line, and we are making the bank payments.

Summary

Less compact community units can be developed for cable television. Low-cost single-cable systems are affording the means to do so. While there is no statistical data available to ensure the stability of such a system, they are being built anyway. They are being asked to operate with a 36 video channel capability and a two-way interactive. Since only 12-15 channels of this capability are initially being used, there is quite a window available for error in system performance. The problems will be worked out as they arise.

Economics still predicate system size. Even at plant costs of \$6,000 per mile, there must be at least 715 potential households available to be economical. This includes high basic penetration (70 percent) and premium penetration (100 percent to basic) expectations of the services offered. Service charges greater than \$10 per service could price you beyond the customers' reach. **CED**

On the following chart (pages 48 and 49), we have limited our presentation of line extender models from the various manufacturers to those extenders that operate up to 400 MHz and beyond. It is improbable that systems built either today or in the future will be utilizing bandwidths less than 400 MHz. Most manufacturers offer options on their line extenders ranging from power supplies to plug-in pads for variable slope and gain control, as well as options for upgrading one-way extenders to two-way by inserting equalizers, hybrid amplifiers and diplexing filters. Thermal compensation options are also available.

Most of the line extenders on the following pages are sub-split, offering reverse transmission in the 5-30 MHz band. C-COR offers mid-split (5-83 MHz, reverse) and high-split (5-112 MHz, reverse) extenders as well. As always, for more information on options and specifications tailored to the needs of your system, we suggest you contact the manufacturers. We hope the following list, which offers brief biographical information on some of the companies listed, will help you in this endeavor.

Blonder-Tongue Laboratories Inc.

One Jake Brown Road
Old Bridge, N.J. 08857
(201) 679-4000

On May 18, 1950, Ben Tongue and Isaac Blonder formally acted in response to their perception of the need for inexpensive broadband amplifiers to boost weak TV signals and improve fringe area reception: they co-founded Blonder-Tongue Laboratories. As engineers for the same electronic manufacturing company, both men left their jobs to build the amplifier that would solve these TV reception problems. After an initial investment of \$5,000, they began work in a tiny loft in Yonkers, N.Y. Shortly thereafter, they marketed what, the company maintains, was the first commercially successful broadband TV booster amplifier, the HA-1-L. Today, Blonder-Tongue is one of the largest U.S. producers of UHF converters and MATV equipment and a principal patent holder of equipment in this field.

continued on page 51

PRODUCT PROFILE

Model	Bandwidth (MHz)	Minimum Full Gain	Noise Figure	Gain Control Range	Slope Control Range	Cross Modulation	Second Order Distortion	Composite Triple Beat	Power Requirements
C-COR Electronics									
E-506	54-400 (5-30, reverse)	28 dB	12 dB	0-8 dB	-4 dB	-65 dB	-66 dB	-63 dB	11 W, min.
E-536	118-400 (5-83, reverse)	27 dB	12.5 dB	0-8 dB	-3 dB	-64 dB	-65.5 dB	-62 dB	11 W, min.
E-546	150-400 (5-112, reverse)	27 dB	12.5 dB	0-8 dB	-3 dB	64 dB	65.5 dB	62 dB	18 W, min.
Century III Electronics									
2132/400	50-400 (5-30, reverse)	28 dB (33 dB optional)	12 dB max. at 400 MHz	10 dB continuous, 0-3, 6-9, plug-in (fixed)	0-6 dB continuous, fixed components available	at 48.5 dBmV: -62 dB max.	at 50 dBmV: -62 dB max.	at 48 dBmV: -57 dB max.	320 mA max.: 24 V
4130/400	50-400 (5-30, reverse)	39 dB (34, 29 dB optional)	10 dB max at 400 MHz, full gain, no equalizer			at 44 dBmV, -85 dB max.	at 50 dBmV, -77 dB max.	at 44 dBmV, -87 dB max.	switching mode regulator, 30-60 Vac
Delta Benco Cascade									
602-428	50-410 (reverse module optional)	27 dB	7/8 dB	20 dB continuous	6 dB continuous (highest frequency)	-65 dB at 40 dBmV	-69 dB	-67 dB	13.75 W at 24 Vdc, 10 W at 20 Vdc
602-429	50-460	29 dB	4.5/6 dB	20 dB continuous	6 dB continuous (highest frequency)	-65 dB at 40 dBmV	-74 dB	-67 dB	14 W at 24 Vdc, 9.25 W at 20 Vdc
501-002-36	53-400 (5-30, reverse)	27 dB	12.5 dB max.	16 dB continuous	2 to -4 dB	-65 dB at 40 dBmV	-69 dB	-67 dB	19 W at 60 Vac, 24 Vdc
Jerrod Division, General Instrument									
JLE-6-400-2W		41 dB	9/10 dB				-70 dB	-58 dB	16.9 W, min.
JLE-7-400-2W	52-400 (5-30, reverse)	33 dB	9/9 dB	6 dB min. (manual), all models		-60 dB or better, all models			14.7 W, min.
JLE-6-450-2W		41 dB	10 dB, ref. to channel 61				-72 dB	-59 dB	16.9W, min.
JLE-7-450-2W	52-450 (5-32, return)	33 dB	9 dB, ref. to channel 61			0-9 dB (referenced to 450 MHz)			14.7 W, min.

Model	Bandwidth (MHz)	Minimum Full Gain	Noise Figure	Gain Control Range	Slope Control Range	Cross Modulation	Second Order Distortion	Composite Triple Beat	Power Requirements
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Lindsay Specialty Products

977 BTR	50-450 (5-33, reverse)	33 dB at 20°C	9 dB max	4 dB min. (manual)	6 dB min. (manual)	-55 dB	-66 dB	-52 dB	18 W, max.
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Magnavox CATV

5-MLE	50-440 (5-30 reverse)	28 dB	10 dB	0-8 dB	1-6 dB at 440 MHz	-64 dB at 50 dBmV	-70 dB at 50 dBmV	-61 dB at 50 dBmV	16.9 W min., in 30 or 60 V configuration
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RCA Cablevision Systems

450	54-400 (5-30, reverse)	28 dB	12 dB	0-7 dB (manual)	4 dB at 54 MHz (manual)	-64 dB	-76 dB	-65.5 dB	12 W, min., at 60 or 30 Vac operation
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Scientific-Atlanta

6554-400	54-400 (5-30, reverse)	28 dB	12.5 dB	0-15 dB	3-24 dB	-70 dB	-73 dB	-61 dB	345 mA at 60V
6554-440	54-440 (5-30, reverse)	33 dB	8.5 dB	0-15 dB	3-30 dB	-55 dB	-70 dB	-55 dB	420 mA at 24 Vdc

GTE/Sylvania

215	54-450 MHz	23 dB	11 dB	N.A.	8-12 dB	-62 dB	-63 dB	-60 dB	20-30 Vac at 30V, 40-60 Vac at 60V
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Texscan Theta-Com

T4LE-53	47-400 (reverse modules, 5-30)	27 dB	9 dB	5 dB min. (manual)	5 dB min. (manual)	-67	-73	-68	12W min. at 60 V
T4LE-60	47-440					-66		-67	

Winegard CATV Division

M400XP	50-400	27 dB	9 dB	10 dB (manual) 0, 3, 6, 9, 12 dB with plug- in pads.	0-5 dB (manual)	-64 dB at 43 dBmV	-72 dB at 43 dBmV	-60 dB at 43 dBmV	15 W, min.
M400XR	(5-30, reverse)				0-5 dB at 400 MHz				23 W, min.

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Company Name _____

Name _____ Phone _____

Company Address _____ Street _____

City _____ State _____ Zip _____

Code 2, _____

AML
Any
Amplitude
Modulation
Link

continued from page 47

Broadband Engineering Inc.

211 Commerce Lane
Jupiter, Fla. 33458
(800) 327-6690

Broadband Engineering was incorporated in 1975 as a supplier of repair parts to the CATV industry. It has grown to become the largest independent supplier in the industry, according to company officials. The company manufactures push-pull hybrid replacement electronics for a number of older, vintage line extenders, including the BMK-53 and BMK-53M. The BMK-53 is used to upgrade Jerrold SLE 1, 20 or 2P single-ended and push-pull discrete amplifiers to push-pull hybrid circuits and are made of completely new printed circuit boards that drop into the old module. The BMK-53M series are complete, ready-to-use modules that plug directly into the existing SLE housing. These amplifiers are available in 300 or 400 MHz bandwidth, with gains of 28 and 32 dB.

Century III Electronics Inc.

610 Neptune Avenue
Brea, Calif. 92621
(714) 671-2800

Century III Electronics was formed originally in 1975 out of the Anaconda Co. Not long afterwards, senior management of Anaconda purchased the cable TV division

it had created and named it Century III Electronics. In 1976, Century III began marketing the Feedforward product line, which presently includes trunk, bridger and line extenders. All of these products are available above 400 MHz. Headquartered in California, the company's current manufacturing capability includes three separate facilities, two of which are located outside of the U.S. Together, these three facilities manufacture the company's full line of conventional trunk and distribution equipment.

C-COR Electronics Inc.

60 Decibel Road
State College, Pa. 16801
(814) 238-2461

C-COR Electronics was incorporated by George Haller, John McLucas and Walter Brown in 1953. Since its inception, C-COR has been involved in the manufacturing of all types of electronic equipment necessary for transmitting the signal along the coaxial cable portion of the cable system. Over the last three years, it has realized a compounded annual growth of 89 percent and, in 1976, introduced what was, according to company officials, the first two-year warranty of distribution equipment in the cable industry. One of the company's founders, John McLucas, still remains on the company's board of directors. The company is headquartered in a 43,000 square-foot facility in

State College, Pa., and leases two additional facilities in Altoona, Pa., and Madera, Pa. Warner Amex Cable Communications is the company's largest customer.

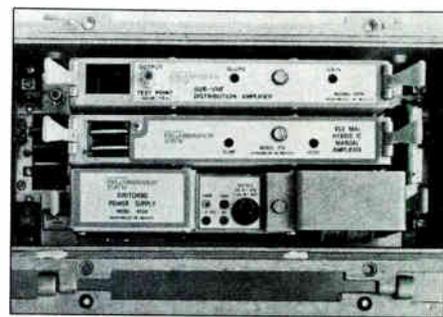
Delta Benco Cascade Ltd.

124 Belfield Road
Toronto, Ottawa M9W1G1
Canada
(416) 241-2651

GTE Products Corp., Sylvania CATV Division

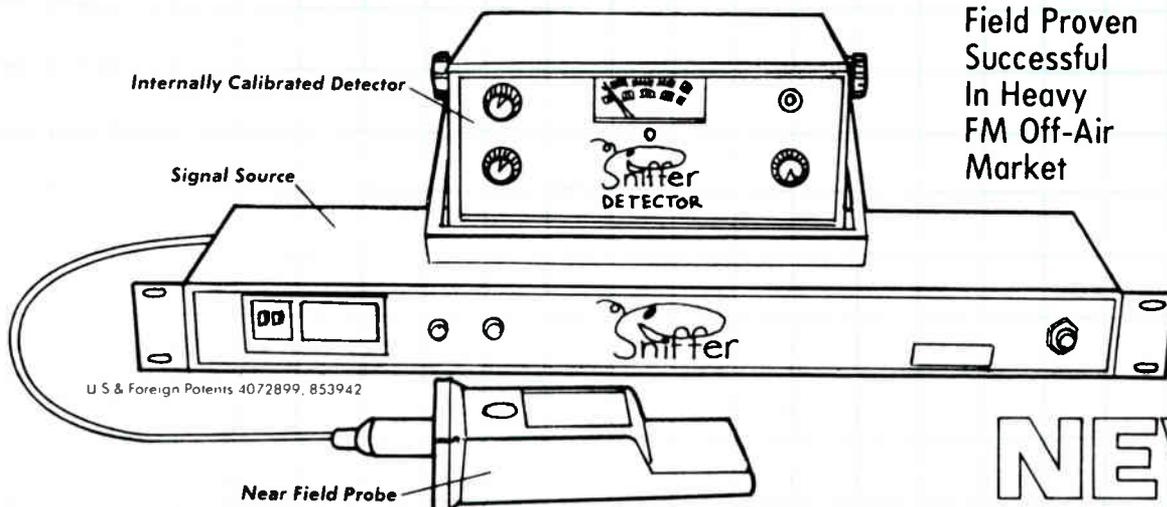
10841 Pellicano Drive
El Paso, Texas 79935
(800) 351-2345

The Sylvania CATV Division of GTE Products Corp. began operation in the late 1960s and shipped its first unit of transmission equipment in 1969. In early 1978, GTE



Sylvania line extender

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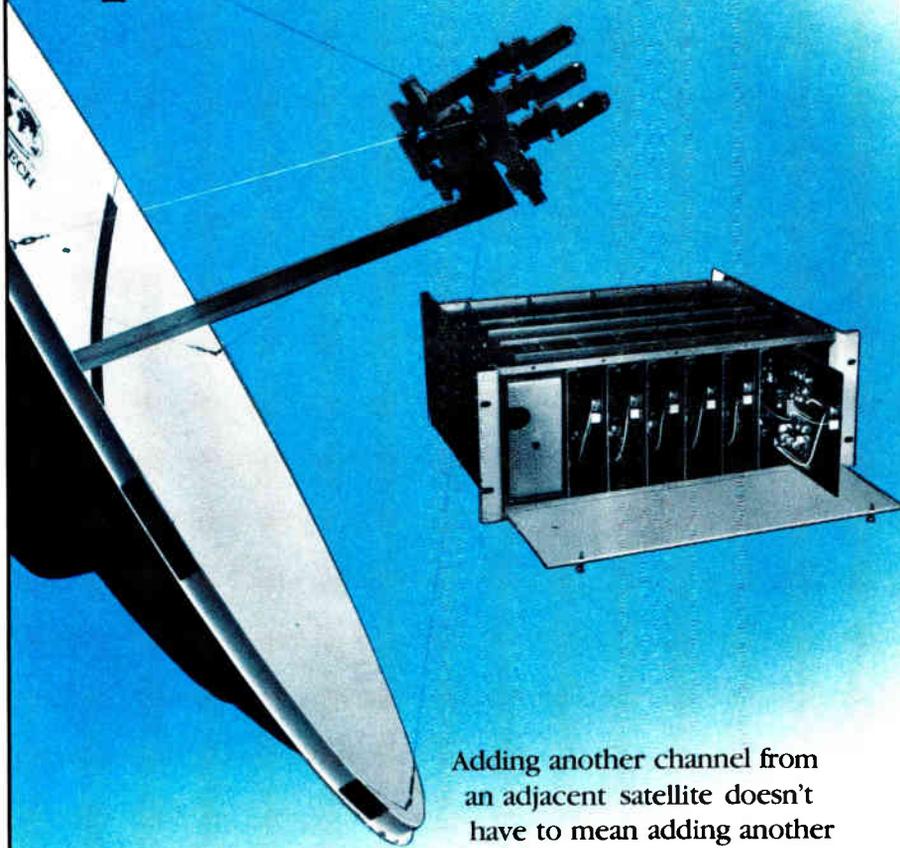
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LES ÉLECTRONIQUES
INCOSPEC
ELECTRONICS INC

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St-Léonard (Québec), M1R 1A8
Tél: (514) 322-9540
Télex: 06-829713

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Any combination of modulator and receiver modules can be accommodated in the 6 slot Uni-Shelf housing. Comtech receivers meet EIS-RS250B standards. Comtech modulators feature SAW filtering and optional IF loopthru. Remote control capability is available for both cards.

Comtech's engineering excellence, cost-effective manufacturing and sustained inventory are helping cable TV and radio network operators grow. For details and prices, call Comtech Data Corporation, 350 North Hayden Road, Scottsdale, AZ 85257, (602) 949-1155, TWX 910-950-0085. Or contact Comtech Antenna Corporation, P.O. Box 428, St. Cloud, FL 32769, (305) 892-6111, TWX 810-870-0220.



COMTECH

Comtech Data Corporation
Comtech Antenna Corporation

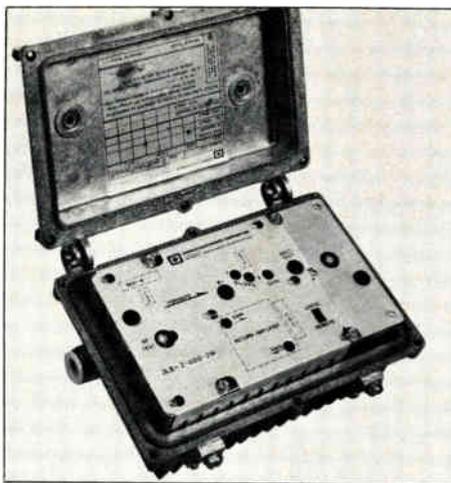
Subsidiaries of Comtech Telecommunications Corp.

introduced a microprocessor-controlled converter, which the company has replaced since with the 40-channel wired remote version, the 58-channel converter and a third generation converter with plug-in upgrades. The Sylvania 3000 series line extenders, which can transmit bandwidths of up to 450 MHz, are the division's most updated series of line extenders. In addition to line extenders, GTE Products, CATV Division manufactures and markets a complete line of transmission equipment, including trunk stations, passive equipment and converters. Within the confines of 120,000 square-feet of manufacturing facilities and 60,000 square-feet of administrative and laboratory space, the division houses departments the following: engineering development, quality assurance, manufacturing, materials control, system design, marketing research, field service, warehouse, distribution and customer service.

**Jerrold Division,
General Instrument Corp.**

2200 Byberry Road
Hatboro, Pa. 19040
(215) 674-4800

In 1948, Milton Jerrold Shapp formed a Philadelphia partnership that sold antenna boosters designed to enhance TV reception. Two years later, after designing a single, large antenna for an appliance



Jerrold JLE series line extender

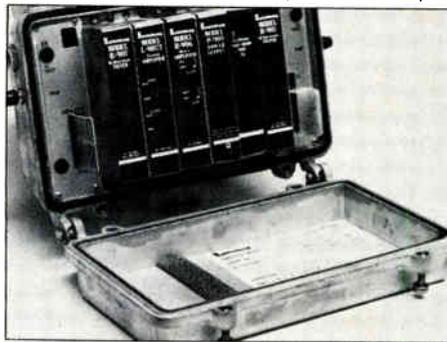
dealer who wanted to bring Philadelphia TV signals over the mountains into the town of Lansford, Pa., the partnership actively became involved in cable TV. According to Jerrold spokesmen, the system that Shapp's partnership made for this appliance dealer (including the coaxial cable connecting the antenna to Lansford homes) marked the birth of cable TV. While Shapp went on to become governor of Pennsylvania, his partnership became a subsidiary and then a division of the billion-dollar General Instrument Corp. Current major activities of the division include: design and manufacture of headend, distribution and subscriber

CATV equipment; design, construction and engineering of complete CATV systems; training; and developing and conducting technical seminars for industry professionals.

Lindsay Specialty Products Ltd.

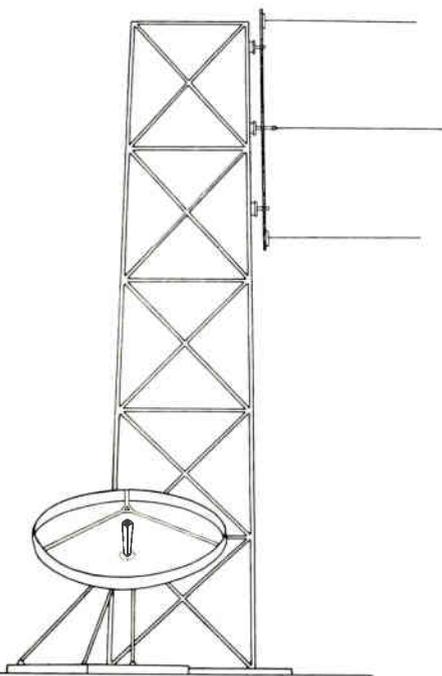
50 Mary Street, West
Lindsay, Ottawa K9V4S7
Canada
(705) 324-2196

Lindsay Specialty Products, the parent company of Lindsay America, will be 30 years old this year. During these 30 years, the Canadian company has specialized in manufacturing domestic antennas. In 1960, it became active in CATV. Products the company currently manufactures include: the Colorflex tap line 900 series mini-trunks; line extender products 700 series two-way and CAP apartment ampli-



Lindsay 977-TBR line extender

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fiers; and the recently-introduced 1000 series urban trunk interactive amplifiers. Approximately 75 percent of the company's products are sold and exported to Europe, the Caribbean, the U.S., China and Australia.

Magnavox CATV Systems Inc.

100 Fairgrounds Drive
Manlius, N.Y. 13104
(315) 682-9105

RCA Cablevision Systems

8500 Balboa Boulevard
Van Nuys, Calif. 91409
(800) 423-5651



Scientific-Atlanta 6550 line extender

Scientific-Atlanta Inc.

One Technology Parkway
Box 105600
Atlanta, Ga. 30348
(404) 441-4000

Six Georgia Institute of Technology engineers originally conceived of Scientific-Atlanta Inc. in 1951 as a company that would specialize in manufacturing experimental earth station receiving equipment for government applications. In the 1960s, however, the company expanded into the CATV field and began manufacturing standardized, commercial earth station antennas. Through the 1970s and up to the present, the company has continued to experience the growth of the cable industry. According to S-A officials, the company has pioneered modular headend design, SAW (surface acoustical wave) filter technology and TED (Threshold Extension Demodulation) technology and was first to make the block downconversion technique economically viable for commercial use. In addition to being the exclusive manufacturer of CableFlex, a patented coaxial cable designed for drawing through conduit and wrapping around tight bends, the company is investigating means for extending the applications of addressable control with addressability-via-satellite systems.

Superior Electronics Center Inc.

2010 Pine Terrace
Sarasota, Fla. 33581
(813) 922-1551

Established in 1967 as a test equipment repair center, Superior Electronics Center Inc. first became involved in the cable industry in 1968, when the company was asked by a local CATV system to investigate some malfunctioning Jerrold trunk amplifiers. Extensive research resulted in the advent of a modification that improved the reliability of these and other types of trunk amplifiers. Since the introduction of this modification, Superior's list of services for the cable industry has grown to include: modifications of trunk equipment, mobile laboratory testing, on-site equipment repair and modifications, headend alignment, system proof of performance, FCC compliance testing (computer based) and the selling of quality tested parts. The company promises fast turn-around time and offers a three year warranty, an extended warranty program and fixed repair rates on installer SLM's.

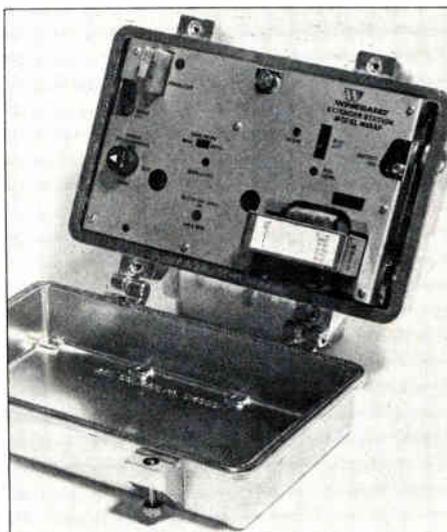
Texscan Theta-Com CATV

2960 Grand Avenue
Phoenix, Ariz. 85061
(602) 252-5021

Winegard CATV Division

P.O. Box 329
Montgomeryville, Pa. 18936
(215) 822-6731

John Winegard incorporated the Winegard Co. in 1954 and, not long afterwards, moved it to its present-day location. Winegard, himself, invented and introduced the first all-channel yagi TV antenna, known as the Interceptor, which not only retained the physical size and mechanical design of the single-channel yagi but also provided high-quality performance on all VHF channels. After the Interceptor was introduced, the Winegard Co. began to



Winegard M4XAP line extender

expand. In 1980, it purchased the AEL cable business and relocated its manufacturing plant to Burlington, Pa., while retaining its sales and engineering staff in Colmar, Pa. Winegard presently manufactures over 1,600 different models of antennas and electronic products, including CATV, MATV and TVRO equipment. These products are distributed both domestically and internationally. The company has four manufacturing plants and employs approximately 450 people.

Manufacturers

Amplica Inc.
Blonder-Tongue Laboratories Inc.
Broadband Engineering Inc.
C-COR Electronics Inc.
Carson Industries Inc.
Century III Electronics Inc.
Channel Master Division of Avnet
Courtney Communications
Delta Benco Cascade Ltd.
General Instrument, Jerrold Division
GTE Products Corp., Sylvania CATV
Lindsay Specialty Products Ltd.
Magnavox CATV Systems Inc.
RCA Cablevision Systems
RMS Electronics Inc.
Scientific-Atlanta Inc.
Superior Electronics Center Inc.
Texscan Theta-Com CATV
Transifier Inc.
Winegard Company

Distributors

American Television Systems
Anixter-Prusan
AVA Electronics Corp.
Cable Services Co. Inc.
Cable TV Supply Co.
Cablevision Equipment Co.
CATV Services Inc.
Communications Comm-Plex Inc.
Communications Supply Inc.
CWY Electronics
D B CATV Supply Inc.
Electroline Television Equipment
EM Electronics Inc.
Graybar Electric Co. Inc.
Jebsee Enterprises Inc.
Jerry Conn Associates Inc.
Klungness Electronic Supply Inc.
Lightning Electric of Pennsylvania
Mega Hertz Sales Inc.
Merrill Cable Electronics
Micro-Sat Communications Ltd.
Midwest Corp.
National Com-Serv Inc.
NCS Industries
Nelson Electric Supply Co.
Priester Supply Co. Inc.
RCA Cablevision Systems
S.A.L. Cable Communications Inc.
Satellite Communications Systems
Satellite Systems
Tele-Wire Supply Corp.
Tierra-Com Systems
Toner Cable Equipment Co.
T.R. Pitts Co.
TVC Supply Co. Inc.

STANDBY POWER, OR PLEASE STAND BY.

Consider your entire cable network, from the time it leaves the signal source until the time somebody sits down to watch it. (Consider something else: Somewhere along the line something could go wrong. A fallen tree, a lightning strike, a utility failure.)



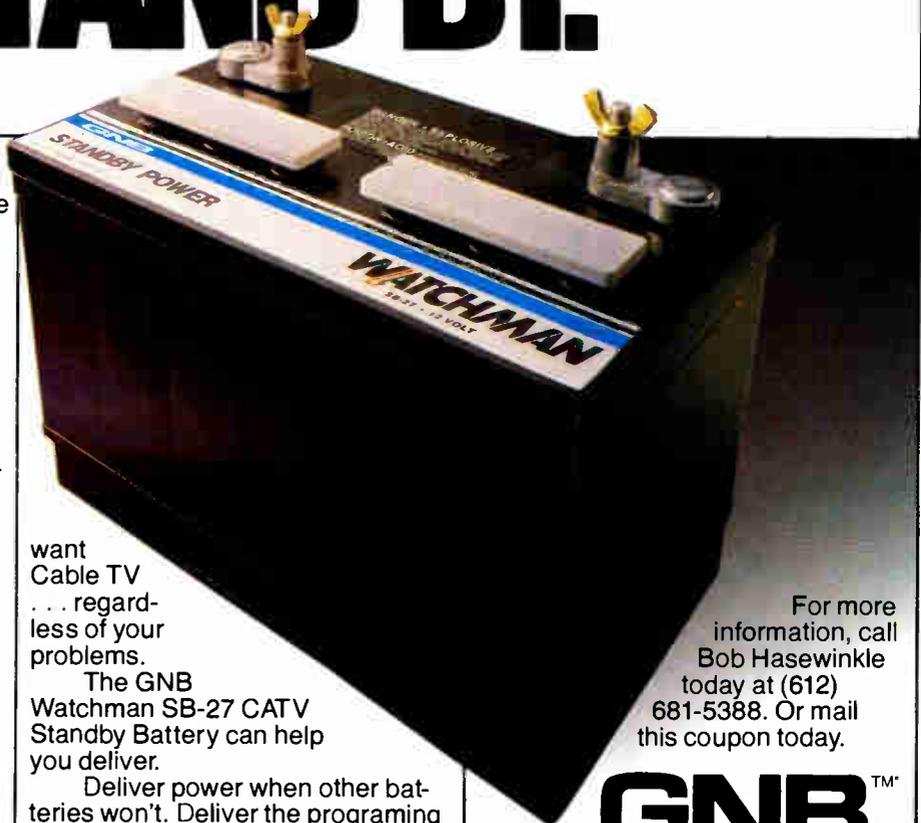
Now what do you do? Well, in the past, you've had to rely on conventional batteries for standby power . . . to amplify cable signals during the power outage. Well, stand by for something new. Indeed, the GNB™ SB-27™ WATCHMAN™ BATTERY is the only battery designed specifically for CATV signal amplification. The GNB SB-27 Watchman Battery for CATV.

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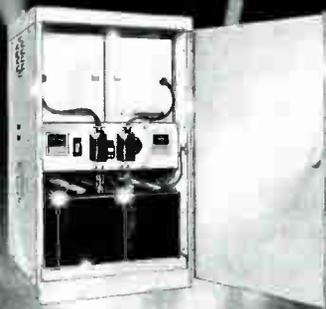
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 Company _____
 Address _____
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 Telephone (area code) _____ (number) _____

MAIL TO: GNB, P.O. Box 43140, St. Paul, MN 55164, Attn: Bob Hasewinkle

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inverter cards, with test points
on the control panel,
automatic switch-over, surge
protection and is available with
a status monitoring interface.**



We go beyond.



Lectro Products

Burnup & Sims Company

650 Athena Drive • Athens, Georgia 30601 • (404) 353-1159

People News

■ **Ron Pitcock** has been appointed manager of **Anixter Communications'** sales and distribution facility in Houston. Prior to this appointment, Pitcock was the CATV products manager for Anixter Communications in Skokie, Ill.



Ron Pitcock

■ **Marvin Garber**, has been named account executive for the **Jerrold Division** of General Instrument Corp. Garber will service customer accounts in South and North Dakota, Minnesota, Nebraska and Iowa. Previously, Garber was general sales manager for Hamilton-Avnet Electronics. He holds a bachelor's degree from the University of Pennsylvania and an M.B.A. from the Wharton Graduate School.

Jerrold also has appointed **Joseph O'Malley, Jr.**, account executive, in charge of covering the southern Texas territory for the company. Most recently, O'Malley was vice president and Dallas operations manager for Apartment Cable Television, a cable system marketing and construction firm. Before that, he was a partner in Silver Screen, Inc., a CATV service contractor. O'Malley is a graduate of Fullerton Junior College in Fullerton, Calif.

Wayne Neumann also has joined Jerrold as an account executive based in the company's Plano, Texas office. Neumann, formerly an outside sales representative with Oak Industries, will be responsible for customer accounts in Louisiana, Arkansas, Oklahoma and northern Texas.

Jerrold has named **Steven Adams** account executive for the state of Pennsylvania. Adams will be based at the company's Hatboro headquarters. He most recently was marketing manager for Allied Electronics Inc., a company that manufactures electronic equipment for the petroleum industry.

The appointment of **Terry Jenkinson** to district sales manager for the southwestern U.S. also was announced by Jerrold. In this position, Jenkinson will oversee Jerrold account representatives in Texas, Oklahoma, Arkansas and Louisiana. Before joining Jerrold, Jenkinson was a regional sales manager for CableData. He holds a B.S. in Psychology from London University.

■ **C-COR Electronics Inc.** has announced three promotions among its manufacturing personnel. **William Kosik**, who has been promoted from purchasing agent to materials manager, now will supervise the purchasing department and handle materials

control responsibilities for the company. Kosik joined C-COR in June 1981.

James Shamp was promoted from supervisor to production manager at the C-COR State College, Pa., facility. He has been with C-COR since August 1977.

John Gummo also was promoted from supervisor at C-COR Altoona facility to production manager at the Madera, Pa., facility.

■ **National Microtech Inc.** has named **John Grantham**, former secretary-treasurer of the firm, chief executive officer. Grantham is one of the original founders of the company.

To fill the position left vacant by Grantham's recent appointment, National Microtech has named **Brenda Gerard** as secretary-treasurer.

The company also has elected **Larry Ward** as its new president. Ward brings to National Microtech nine years of experience with M/A-COM. He most recently held a position with the TVRO division of M/A-COM Video Satellite.

■ **American Spliceo Inc.** has named **Doug Gilchrist** director of marketing. For the past four years, Gilchrist has been vice president of Video East Productions Inc. His responsibilities at American Spliceo will include advertising, implementation of a nationwide construction survey, research and development for expanding construction services and development of video training programs.

■ **Stu Figenholz** has been appointed operations manager for **Anixter Communications'** Chicago office. In this new position, Figenholz will be responsible for the operation of the Chicago office facility and the district warehouse. Figenholz's career began with Anixter Communications as purchasing agent at the corporate offices.



Stu Figenholz

■ **Reliable Electric/Utility Products** has named **Bill Sedlacek** general manager of the company's six-plant operations. Sedlacek will succeed **Hubert Owen**, who has been appointed general manager of **Federal Pacific Electric**, a Reliance Electric Company. Prior to this appointment, Sedlacek served as vice president of engineering for Reliable Electric/Utility Products.

■ **Eagle Comtronics Inc.** has made **William Lyon** district sales manager for the Southeast region. In this position, Lyon will be responsible for direct sales to CATV systems in Alabama, Florida, Georgia,

Eastern Mississippi, North Carolina, South Carolina and Tennessee. Prior to joining Eagle, Lyon was Great Lakes district sales manager for Jerrold and a sales engineer in the Chicago district for Tektronix Inc.

■ **Tele-Wire Supply Corp.** has appointed **Lance Belcher** to the position of national sales manager. A regional sales manager for the company since 1980, Belcher now will oversee the operations of the company's national branch offices.

In addition, Tele-Wire Supply Corp. has named **Brian George** sales representative. George will operate out of the Tele-Wire Texas facility.

■ **Magnavox CATV** has promoted **Robert Finnerty** to manager, sales operations. With the company since 1969, Finnerty has been sales manager, passives division, a sales representative, manager of telephone sales and major accounts manager for Magnavox.



Bob Finnerty

In addition to Finnerty's promotion, Magnavox has appointed **Chris Frederick** as field engineering representative. In this position, Frederick will be responsible for conducting training seminars throughout the U.S. and for helping the customer field installation department streamline installation of company equipment. Frederick previously worked as a district engineer for Group W Cable.

J. Richard McKennie also has joined Magnavox CATV as a field engineering representative. McKennie's duties will be the same as those of Frederick. Before joining Magnavox, McKennie was the chief field technician for AM Cable TV Industries.

■ **R.L. Welsh**, formerly a CATV sales manager for Wavetek and a sales representative in Florida for Comse Sales, has founded a new manufacturers representative company, to be known as **Welco & Associates**. According to a company spokesman, Welco & Associates will cover Florida with in-depth technical penetration for its principals. Currently, Welsh is acquiring product lines to represent in the state.

■ **Tribune Cable Communications Inc.**, named **Robert Heide** vice president—general manager of its Tampa, Fla., cable system. Most recently, Heide was vice president-regional manager of Tribune Cable's systems in New York state. There, his responsibilities included overseeing operations in Glens Falls, Fredonia, Oneida and 27 other municipalities with more than

20,000 subscribers. He began his career with Tribune Cable in 1971 and, from 1967 to 1970, served in the U.S. Air Force as an electronic technician and in special project development for the Air Force Communications Service.

■ **American Cablevision** of Wheat Ridge, Colo., has elected **James Waldorf** as chief technician for its cable television system. Waldorf previously worked with another ATC system in Two Rivers, Wis., where he was chief technician in charge of supervising the technical requirements of a 42-channel system.

■ **The Sylvania-CATV Division** of GTE Products Corp. named **Gary Sandusky** to the position of director of research and

development engineering. He will be responsible for the design and development of active and passive transmission products and subscriber devices, and for product support, purchased parts specification and quality assurance.

■ **Tribune Cable Communications Inc.** has named **Reavis Gibb** as general manager of its Lakewood, Calif., cable system. Prior to this appointment, Gibb was regional vice president/general manager of Times Mirror Cable Television's Irvine, Calif., office, where his responsibilities included developing and operating new franchises that together totaled more than 200,000 homes. From 1967 to 1972 and from 1976 to 1979, Gibb worked for Viacom

International's California cable operations as director of premium services, marketing director and area manager. During the interim from 1972 to 1975, he was vice president of operations for Cablecom General Inc. in Denver, Colo.

■ **Ann Muller** has joined **The Bertman Group Inc.** as director of gateway systems. In this capacity, Muller will be responsible for developing institutional network communications services. Muller previously served as director-engineering for CTIC Associates.

The Bertman Group also has announced the appointment of **Hossein Sarrafzadeh** to engineering associate.

Built To Take It!

A Cable TV Security Pedestal has to withstand a lot! There's rain and snow, there's blazing sun, there's the kid who hits it each week with the lawn mower, and there's the guy who tries to tamper with your cable lines. A Cable TV Security Pedestal had better be tough! If it's from CWY, it is!

CWY takes great pride in producing the highest quality product at the lowest possible price. Coated with a zinc primer then heavy baked on enamel, CWY Pedestals feature heavy gauge, built-to-last welded construction. There's a heavy hasp lock for complete security and knock outs on the back to make the installation easy.

Available in a variety of sizes, CWY

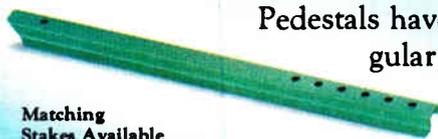
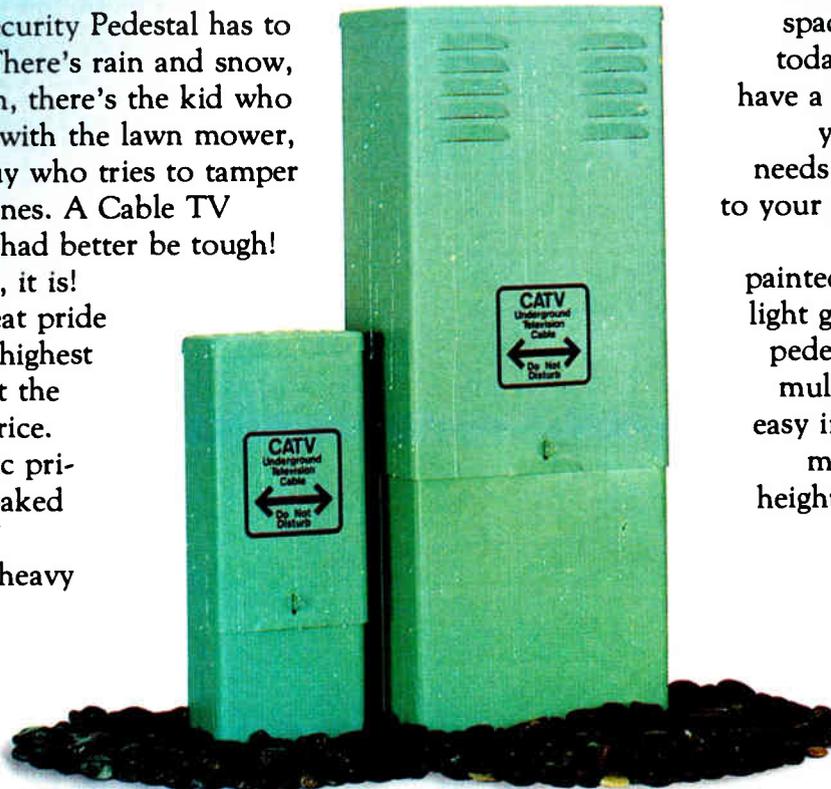
Pedestals have a rectangular design for maximum use of

space. Contact us today. If we don't have a pedestal to fit your particular needs, we can build to your specifications.

Stakes are all painted an attractive light green to match pedestals and have multiple holes for easy installation, no matter what the height requirement.

Call or write CWY today! We know what you need in a Cable TV

Security Pedestal, and we've built it!



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CWY
Electronics

FUSED DISC M-III

Now  Listed for Plenum Use



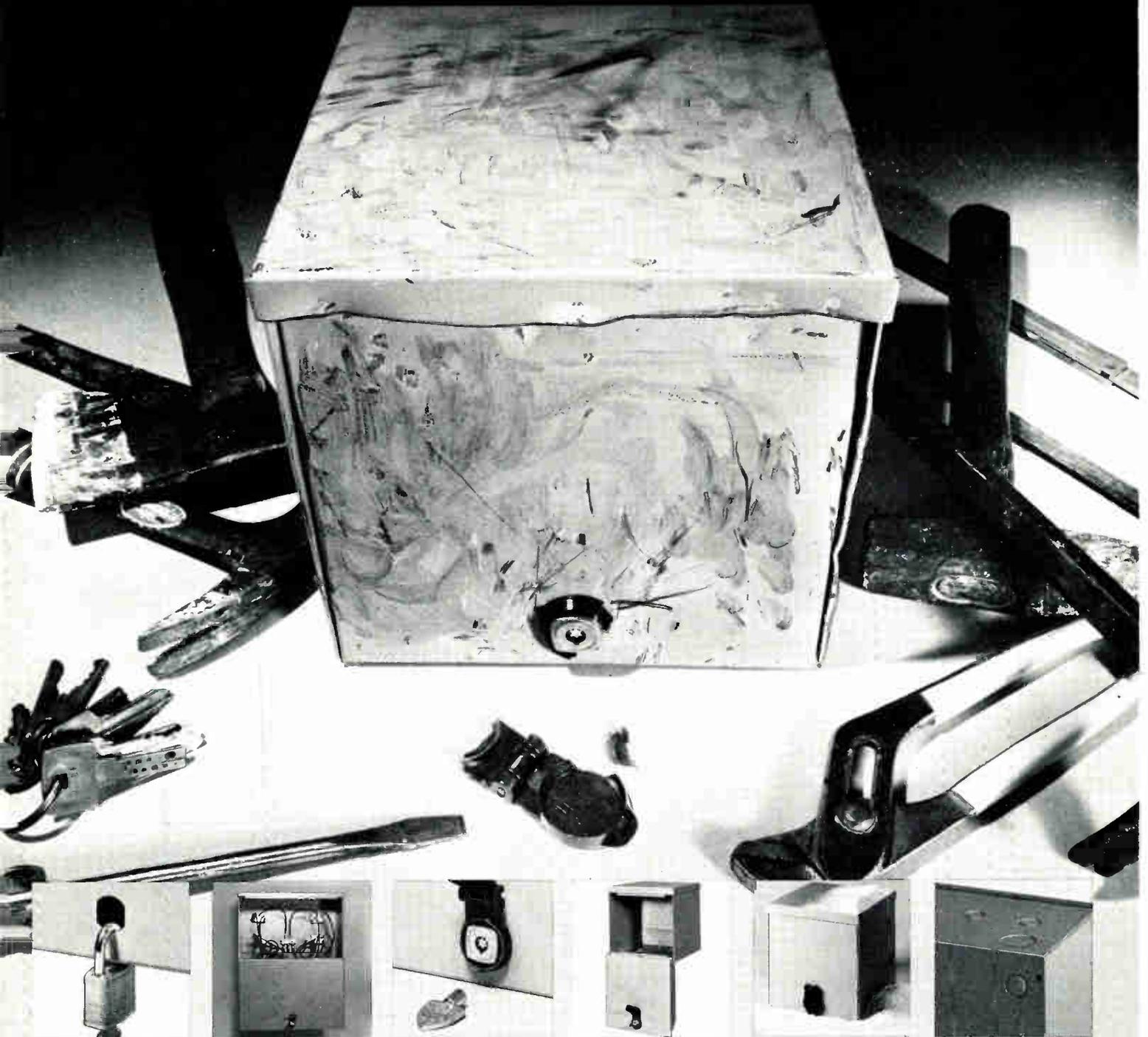
General Cable's 13.0mm (.500") Fused Disc M-III coaxial cable is now  listed and classified for plenum installation. Receipt of  listing for all sizes is anticipated in the near future.

Contact your General Cable Sales Representative for a catalog and a sample or call the Customer Service Center at 800-526-4385 or in New Jersey 201-636-5500.

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Because for protecting cable-TV service in apartment and high-rise complexes, it's toughness, not looks, that counts.

Toughness. And well-thought-out design for ease of

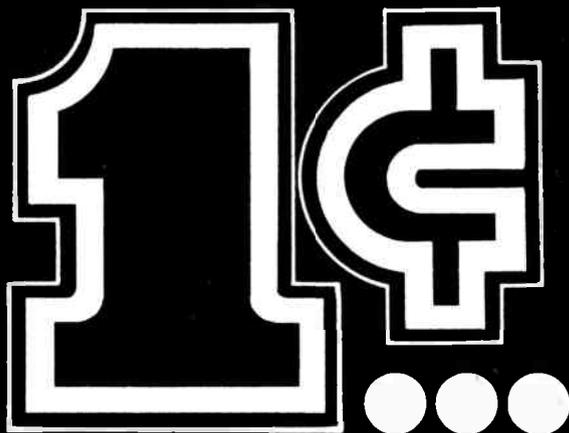
installation. With four standard sizes for most needs. And custom designs and sizes available.

We call it our proprietary apartment security box. Our customers call it "Beautiful, absolutely beautiful."

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Get 100 Miles of Construction Labor Services for



It's part of our exclusive LABOR TURNKEY® approach to cable construction....

If we charge a penny more than we said, you get 100 miles FREE.

How can we do it? Read on...

Q. *You state that 1¢ in overruns will get me 100 miles of construction labor. Why are you making such an outrageous offer?*

A. Because we're tired of hearing about "model mile" pricing — and of seeing their eventual — and serious — project cost overruns.

Because we're confident — and our customers will confirm that in 2000 miles and 2½ years of LABOR TURNKEY® construction, we haven't had to charge a single cent in overruns.

Because we want you to seriously consider the LABOR TURNKEY® approach for your next system — so you can bring it in at budget.

Q. *What is a LABOR TURNKEY® Contract?*

A. It is a flat rate per cable bearing strand foot guaranteed not to be exceeded within the scope of the project. The contractor assumes the risk of overruns, and "on schedule" completion of the system.

Q. *What is a cost overrun?*

A. When the project labor cost exceeds the project budget as calculated from the model mile cost times the project miles.

Q. *How can it be a cost overrun if extra work was performed or invoiced for the additional cost?*

A. There is additional work on every project. However, under a LABOR TURNKEY® contract there is no extra charge within the scope

of the project. Therefore, any extra charges are cost overruns since they are not necessary.

Q. *How is it possible to accurately forecast a project budget?*

A. CATV is now a full-fledged industry. There is no reason that justifies open end project costs. A fixed price LABOR TURNKEY® contract is just as feasible in CATV as it is in other industries.

Q. *I want to know more about the LABOR TURNKEY® approach to cable construction. Who do I contact?*

A. Project Packaging, the originators of LABOR TURNKEY® construction. Just call or write Frank W. Allen, Sr., President, or Matt Lysek, VP of Sales.



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IT'S TIME YOU SWITCHED TO di-tech's PACE 1000 COMPUTERIZED REAL-TIME WEEKLY EVENT CONTROLLER!

It's the ultimate sophistication that anyone can use and everyone can afford! Automatically execute up to 935 or more switching events every seven-day period.



SIMPLE
OPERATION
UNDERSTANDS ENGLISH
NO "LOOK-UP" TABLES
NECESSARY!

INTEL SBC 655



The expandable **di-tech Pace 1000** is a real-time computer event controller that automatically executes up to 935 events in a 7 day period. It employs solid-state memory: 30k is in EPROM and 34k is in RAM. The video terminal and keyboard are designed for simple English communication with the computer.

The Pace 1000 features these 7 particular function modes:

1. **HELP** mode displays a list of the modes and their mode keys and a list of commands.
2. **REALTIME EVENT MONITOR** mode displays the most current events (those that were most recently executed and those that are about to be executed), and any current display messages.
3. **EDIT** mode permits you to create, select and edit, or select and delete events in the database. You can also select and immediately execute an event in the database. The repeat day feature is also performed in this mode.
4. **HOLD** mode permits you to select and release a **HOLD** event, either with or without execution.
5. **MANUAL OPERATION** mode permits you to enter a special list of events for manual execution and to execute those events.
6. **SET** mode permits you to set the Auto Control on or off, set the Message Display on or off, re-sequence the event item numbers for the entire database or set the system clock or the calendar date.
7. **DEFINE** mode permits you to define or delete names of sources, destinations, units or functions or to define or delete Display Messages.

With the proper interface you can also control audio and/or video
switchers, IF processors, any on-off function,
even your light switches!

It's everything you want in an affordable weekly event controller!

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OUR NEW
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ADD ANOTHER TOOL TO YOUR BELT



In this issue
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the cable industry's technical journal:
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Special editorial emphasis will include:
History, development and trends of the product being profiled
and the business it serves
Applications—hands-on—articles concerning that product
Product Showcase, highlighting company products
(Contact your Account Executive for placement)
All in a new section expanded to meet your needs.

Latch on to it today!

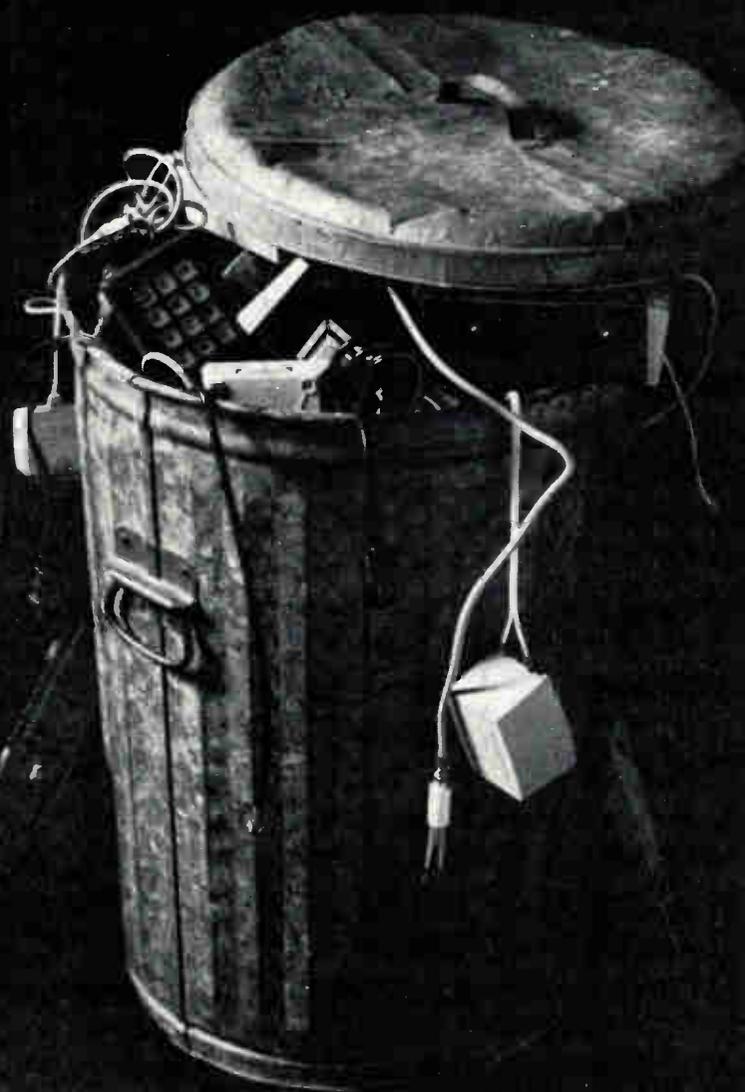
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**IN 3 YEARS, MOST
ADDRESSABLE SYSTEMS
SOLD TODAY WILL BE
OBSOLETE.**



BUT NOT TOCOM'S! 55 PLUS® BASEBAND TECHNOLOGY IS DESIGNED TO LAST.

Obsolete is not a pretty word. For too many years, cable operators have bought converters, even addressable converters, that seemingly would handle the job today and for the foreseeable future, only to see them become obsolete within a few short years. Why? Because those converters did not have the security, flexibility and capacity to accommodate the requirements of the future. The result? Poor return on invested capital and lost marketing and revenue opportunities.

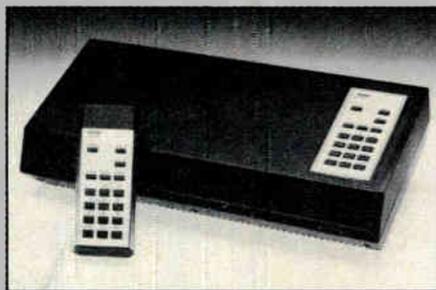
TOCOM has designed its 55 PLUS baseband addressable converter family to last. TOCOM has been addressing terminals by computer over cable since 1970. With more than a decade of experience and engineering expertise, TOCOM brought the first baseband addressable converter to market in 1981.

Compare the 55 PLUS addressable system with any other in use today and you'll see why it is the best choice to provide flexible pay packaging, secure baseband signal scrambling, a range of revenue-producing features and, most importantly, the capability to accommodate the requirements of the future, such as teletext and interactive videotex transactions.

FLEXIBLE PAY PACKAGING

Other addressable converters still use the restrictive concept of tiering. TOCOM's 55 PLUS replaces tiering with a new concept called "Service Classes." This new concept allows cable operators to package channels and programs in any conceivable configuration to fit subscriber demand. Moreover, it provides pricing alternatives not possible with tiering. There are no restrictions. The same channel can belong to every Service Class and Service Classes operate free from channel-sequential constraints.

In addition to Service Classes, the 55 PLUS has a unique delivery system for pay-per-view called "Subscription Programming." Up to 256 Subscription Programs can be delivered per channel. Each subscriber's 55 PLUS converter can retain authorization from the headend to receive up to four of those subscription programs. Another subscriber may choose four totally separate programs. Subscription events can run the gamut



from championship fights to blockbuster movies, to a series of basketball games, to community college courses offered throughout a semester. No other addressable converter provides as many levels of flexibility in channel and programming delivery.

SECURE BASEBAND SCRAMBLING

The 55 PLUS is a microprocessor-controlled converter featuring baseband operation and the industry's most advanced design. The baseband

55 PLUS baseband operation provides remote volume control and muting.

The UHF dual-gate MOSFET RF amplifier achieves extremely low noise figures for superb picture quality.

design of the 55 PLUS is the key to a number of its special features. Data required for addressing and program control is encoded in the vertical interval at the headend and transmitted entirely within the standard NTSC video format.

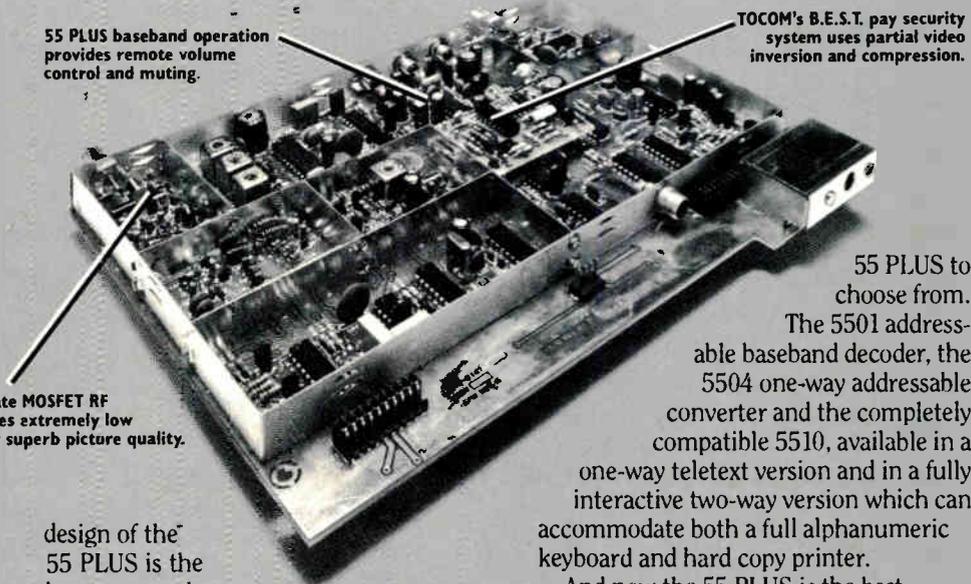
There are widely known ways to defeat the RF scrambling techniques used in most addressable converters. But TOCOM has virtually eliminated the theft-of-service problem with the 55 PLUS Baseband Encoded Scrambling Technique (B.E.S.T.). In addition,

TOCOM's baseband design provides automatic sound suppression and blanked screen for unauthorized pay channels.

BEST PRICE PERFORMANCE

The 55 PLUS offers more features than any other addressable converter made today. Digital on-screen clock and channel display, parental discretion coding control, single key preferred channels stack and emergency alert are all standard features. So is the digital self-diagnosis code which appears on the subscriber's TV screen in case of technical trouble. TOCOM's optional full-function, wireless remote control has on/off, sound muting, volume control and preferred channel selection. Only baseband design can deliver a full-function remote control. Electronic A/B switch and baseband video/audio output are also options.

TOCOM's baseband design provides an architecture for four models of the



TOCOM's B.E.S.T. pay security system uses partial video inversion and compression.

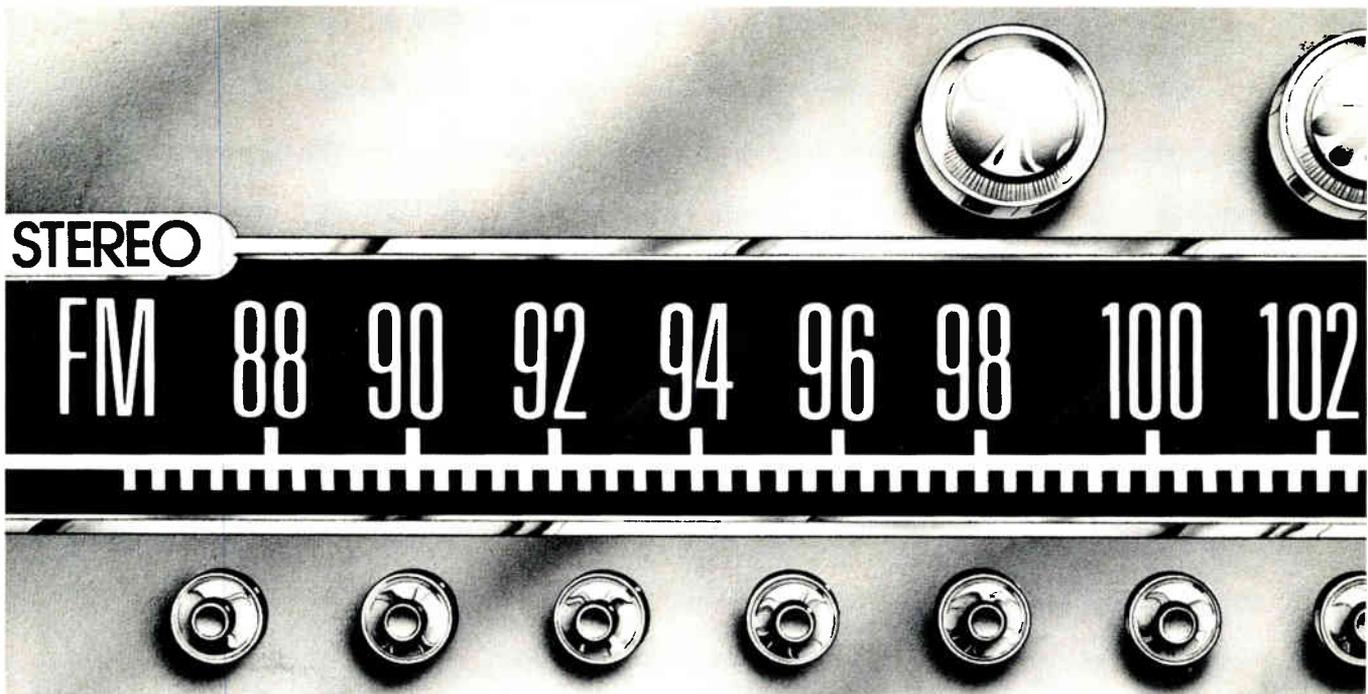
55 PLUS to choose from. The 5501 addressable baseband decoder, the 5504 one-way addressable converter and the completely compatible 5510, available in a one-way teletext version and in a fully interactive two-way version which can accommodate both a full alphanumeric keyboard and hard copy printer.

And now the 55 PLUS is the best priced baseband addressable converter system in the industry. To place your order or receive more information, contact Sid Prothro, National Sales Manager, TOCOM, P.O. Box 47066, Dallas, Texas 75247. (214) 438-7691.

TOCOM 55 PLUS — DESIGNED TO LAST

TOCOM®
The Leader in Interactive
Cable Technology.

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A close-up photograph of a car stereo's control panel. The top part shows a frequency dial with the word "STEREO" in a white box on the left. The dial has numbers from 88 to 102 in increments of 2, with "FM" to the left. Below the numbers is a scale with tick marks. Below the scale is a row of seven circular buttons. The lighting is dramatic, with strong highlights and deep shadows.

STEREO

FM 88 90 92 94 96 98 100 102

Introducing cable markets where you never had them before.

Tune in to exciting growth markets and untapped profits when you discover the newest segment of the cable industry—satellite-delivered full stereo and enhanced quality cable TV audio.

The Wegener Series 1600 Expandable Satellite Audio System makes it all possible—satellite audio, synthesized TV stereo, and local origination FM. For a lot less than you think.

Its modular design gives you the flexibility of adding individual satellite audio services economically. So as the market for cable

audio continues to grow, you'll be able to grow right along with it.

Call or write for complete information on how you can start or expand your audio services. Give your subscribers a new dimension in cable entertainment. The stereo sound of the future is happening now—only on cable TV.



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Product News

Tektronix offers three new products

The new 110-S synchronizer, manufactured by Tektronix, is a frame synchronizer with both ten bits of resolution and accuracy. By locking an incoming nonsynchronous signal to a TV station's synchronization, the 110-S eliminates the need for locking the studio sync to that of the incoming signal. Operationally, the 110-S digitizes an incoming signal, stores the digital temporarily and then converts the digital signal to an analog signal that is locked to the reference synchronization. The synchronizer also features: two separate clocks that control "writing to" and "reading from" memory, optional adaptive or notch decoding and two-field or four-field memory, and 10-bit architecture. The 110-S is one in a series of synchronizers recently introduced by Tektronix. Prices range from \$13,000 to approximately \$18,000.

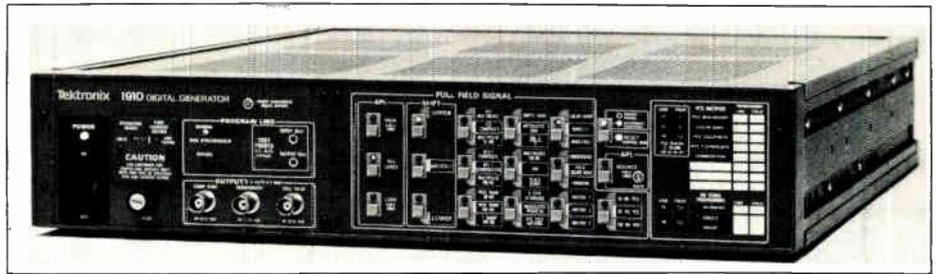
Along with the 110-S synchronizer, Tektronix has introduced its 1910 digital test signal generator and VITS inserter. The 1910 digital generator not only has all the capabilities of its predecessor, the Tektronix 1900, but also is comprised of a nonvolatile memory and four external VITS inputs that allow for full access to the vertical interval. The 1910 is RS-232 compatible and offers VITS rotation and flexibility for changing the front panel configuration for signal selection.

Tektronix also plans to make its new NTSC video monitoring software available shortly. According to the company, the software expands its 1980 automatic video measurement set's (ANSWER'S) capabilities so that it can automatically monitor a baseband video signal for the standard FCC, NTC-7 and RS-170A measurements; compare these measurements to user-defined limits; and print out alarm messages. Designed as a means for alleviating the tedium of routine tasks, the NTSC software, Option 04 software comes in a package consisting of a circuit board that contains PROMS, for storing the program written in the Tektronix ANSWER BASIC programming language, and an operator's manual. Option 04 software costs approximately \$6,000 and will be available for purchase with the 1980 ANSWER for \$26,800.

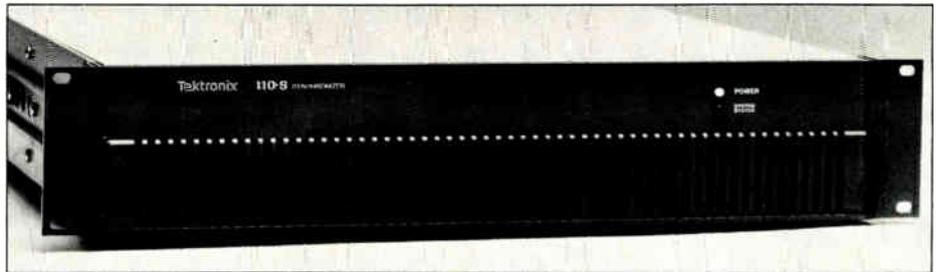
For more information, contact Tektronix, (503) 627-2230.

General Instrument TVROs

The RF Systems Division of General Instrument has introduced a new line of TVRO systems, including parabolic dish antennas that feature multimode corrugated feeds for maximum gain and pattern control. These systems' mounts can be assembled and positioned without the use of a crane or power tools. The



Tektronix 1910 digital test signal generator and VITS inserter



Tektronix 10 bit resolution/accuracy frame synchronizer

elevation and azimuth angular adjustment ranges, 0-70 degrees and 360 degrees respectively, allow for complete orbital coverage.

According to a company official, these systems are equipped with a low noise amplifier, have a minimum gain of 50 dB and low input VSWR and feature case grounding for protection against lightning. In addition, these systems are comprised of power conditioning circuits for wide dc input range and surge suppression, rugged low profile weather-proof enclosures with wave guide pressurization capability, parental lock-out controls, microprocessor-based receivers and cordless infrared hand-held remote controllers that make automatic and instantaneous channel switching possible.

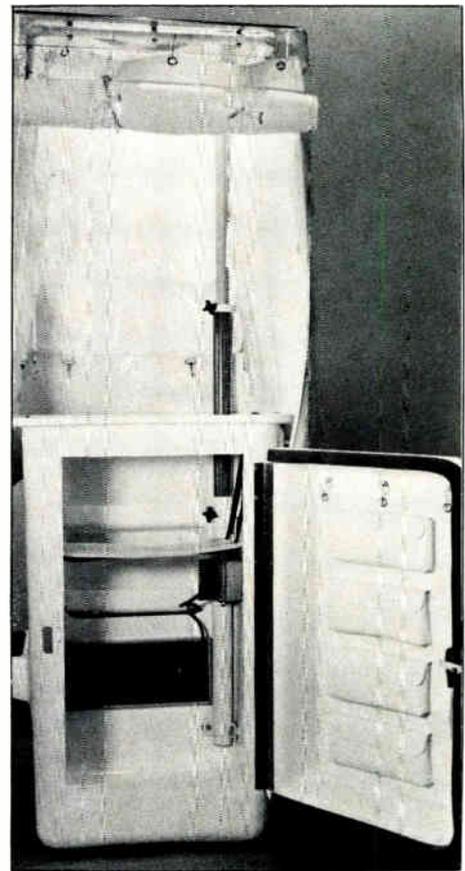
For more information, contact the RF Systems Division of General Instrument, (607) 674-2211.

Telephone splicer bucket

Plastic Techniques Inc. has unveiled a splicer bucket, available with a new bucket lid made from a transparent material. This material permits the operator to see overhead wires, tree limbs, or other obstructions while maneuvering the bucket. In addition, a shade flap is included with the tent to protect the lineman from the sun. The bucket is designed with a modular set of options to include the transparent or conventional lid, full curtains, seat, heater, electrical and air outlets, and a wide variety of tool tray and pouch configurations. Either the transparent or conventional lid can be locked into position in either the raised or lowered position. A lock also is located on

the side entry door. Splicer buckets are available with appropriate attachments to mount the bucket on almost any aerial lift truck.

For more information, contact Plastic Techniques Inc., (603) 487-5555.



Plastic Techniques telephone splicer bucket

If all the models and options of SAM Signal Level Meters were put in one room, they'd fill every measurement need you can think of.

For instance, you can choose frequency ranges to 300 or 450 MHz, plus UHF options. And they can be tuned with a five-band dial (SAM Jr. and SAM I), set with digital precision (SAM III), or controlled by a remote computer (SAM IIID and SAM IV).

If you need spectrum analysis, you can order it as an option with the

SAM I (it's a standard feature of SAM III and SAM IIID), and provide your own scope, or choose the rack-mounted SAM IV which includes the analyzer and a built-in display.

Of course they all have the performance that has made SAM such a big name in the industry., SAM I, SAM III, SAM IIID and SAM IV provide $\pm 0.5\text{dB}$ accuracy, and even the low-priced SAM Jr. offers $\pm 0.75\text{dB}$.

Most models are built to take the

road, with tightly sealed drawn-aluminum cases, and back-printed Lexan panels.

So no matter what you're looking for in a signal level meter, you'll find it in a Wavetek. For details, contact Wavetek Indiana, Inc., 5808 Churchman, P.O. Box 190, Beech Grove, IN 46107. Phone Toll Free 800-428-4424. In Indiana (317) 787-3332. TWX 810-341-3226.

Just tell them SAM sent you.

WAVETEK

We don't know which signal level meter you need, but we know its name: **SAM.**



SAM I/300 MHz
 SAM Jr./450 MHz
 SAM III/300 MHz with UHF
 SAM III/450 MHz with UHF
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 with Spectrum Analyzer
 SAM I/300 MHz
 SAM Jr./450 MHz with UHF
 with Spectrum Analyzer
 SAM I/300 MHz with UHF
 with Spectrum Analyzer and UHF
 SAM I/300 MHz with UHF
 SAM Jr./450 MHz with UHF
 with Spectrum Analyzer and UHF
 SAM I/300 MHz
 SAM Jr./450 MHz

Anixter to distribute regal passives

A new line of Regal passive electronics will be distributed exclusively by Anixter Communications. This line of Regal passives includes: 2-, 3- and 4-way horizontally- and vertically-mounted splitters; standard 75 ohm-300 ohm matching transformers; FM matching transformers; matching transformers with built-in high-pass filters; ground blocks; ground blocks with high-pass filter; dual 2- and 4-way splitters; and

TV-FM splitters. All Regal products operate in the 50-500 MHz bandwidth and are constructed with printed circuit boards to ensure electrical and mechanical consistency from unit to unit. According to Anixter officials, these products also feature housing fabricated from corrosion resistant zinc alloy and threads designed to achieve perfect F connector fits.

For more information, contact Anixter Communications, (312) 677-2600.

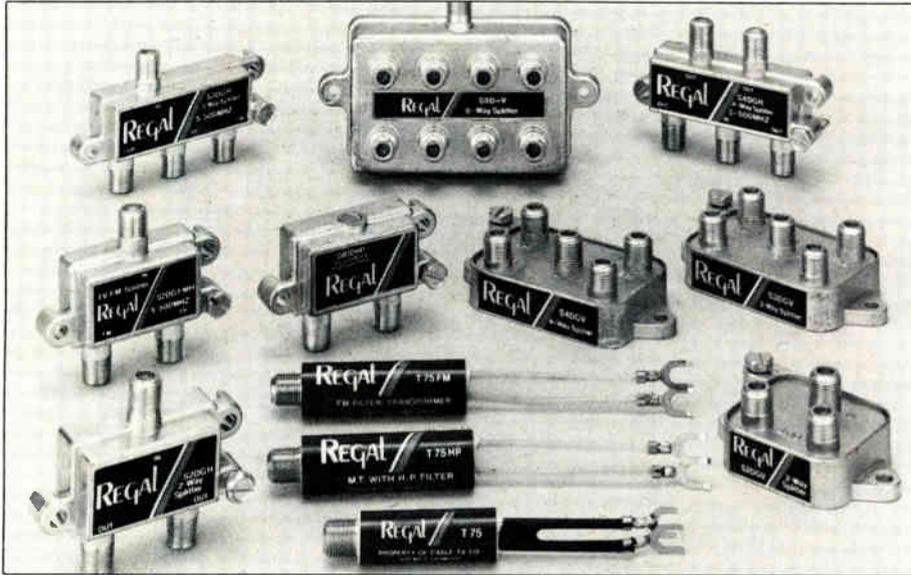
Phasecom data/voice modems

Phasecom's coaxial cable data modem is a spectrum efficient unit that can be used for synchronous or asynchronous and full or half duplex operation at multi-standard data rates. At 19.2 KBPS, each data channel occupies 50 KHz. Since Phasecom designed its model 401 to have a low noise figure and high sensitivity, it can operate at low levels on the CATV system without interfering with cable TV transmissions.

Phasecom has also designed signaling a new coaxial cable voice modem to provide full duplex operation over two-way broadband coaxial cable networks. The voice modem can accommodate 300 simplex voice channels within one 6 MHz channel. All signaling, including loop current sensing and tone ringing, is contained in the modem. Both the point-to-point and the standard 4-wire E&M central office interface versions of the modem, the model 450, were made to surpass the Bell Specification 3002 for voice transmission. In addition to offering improved frequency response and group delay characteristics, the model 450 also can be used for applications formerly restricted to twisted pairs.

The company has also introduced a new high speed, synchronous data modem designed for the carriage of multiplexed data and voice signals on coaxial cable. Designated the model number 415 T1, this modem is spectrum efficient and accepts

continued on page 74



Regal line of passive electronics

Addressable Editorial

Addressing your needs in technology in **CED** and the new feature supplement, **TECH II**.

Look for the following topics in **TECH II** in the months to come:

March Developing Maintenance Schedules
Product Profile — Standby Power Supplies

April Interfacing CATV Business Management Systems
Product Profile — Computerized Billing System



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As always, many CATV systems are turning to Vitek multichannel traps as the inexpensive solution to this multitude of problems.

Vitek traps have a unique multichannel design.

Vitek traps are custom-made to match each cable system's individ-

ual channel alignment. Flexible design allows configurations of contiguous and non-contiguous channels, and even tiers to be combined into a single trap.

Vitek multichannel traps provide maximum security.

Located outside the home, Vitek traps make it impossible for subscribers to tamper with service. And because Vitek traps have a unique construction, they provide stable performance and drift-free service for years to come.

Vitek traps are economical.

Vitek multichannel traps are easy to install and priced so inexpensively, they pay for themselves almost from the moment they are put up. They can even be color-coded so you can tell the "haves" from the "have-nots" with a simple visual audit.

To make sure your subscribers can't watch more than they're paying for, protect your multi-pay service with Vitek's unique patented multichannel traps.

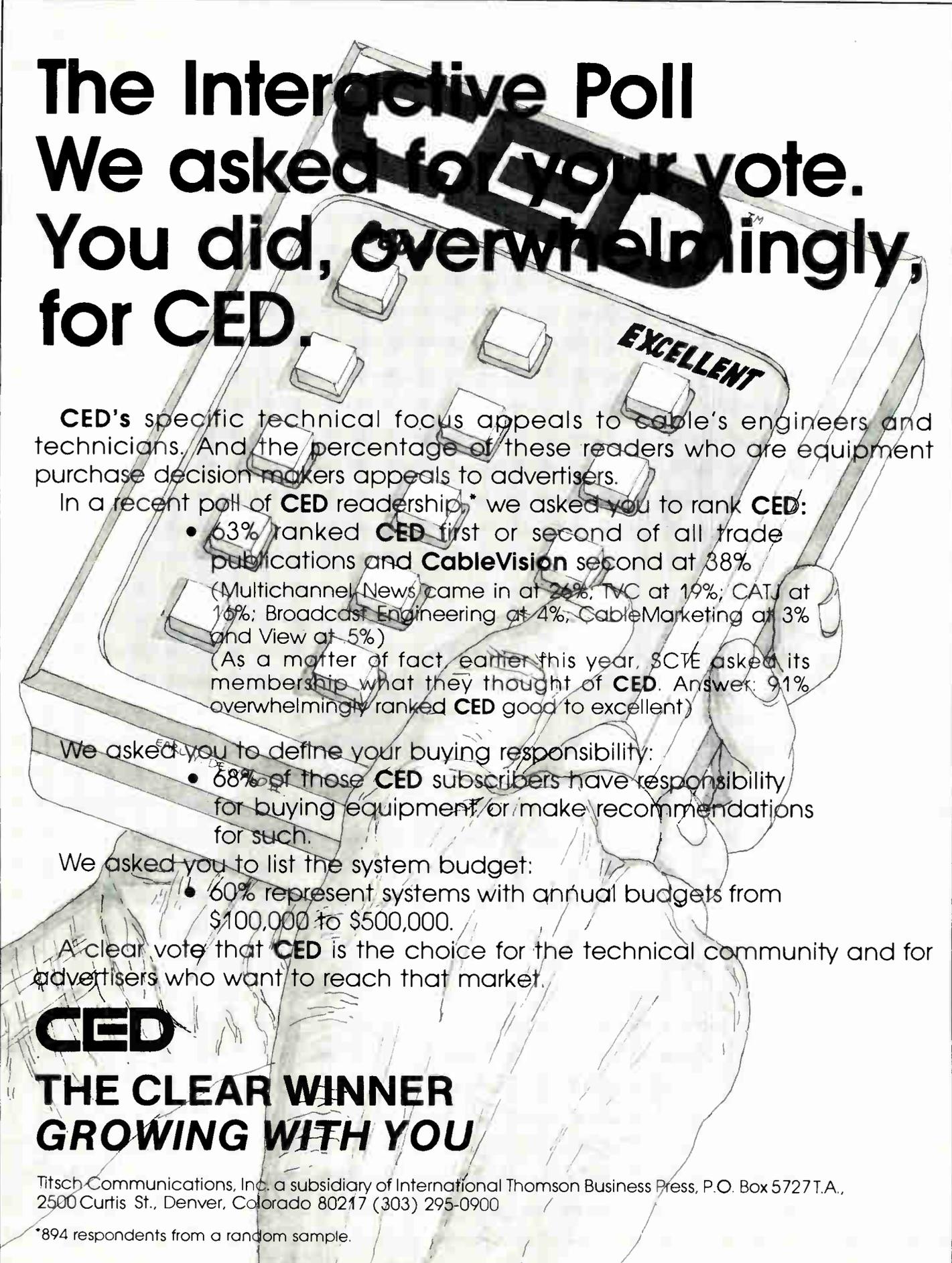
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- 63% ranked **CED** first or second of all trade publications and **CableVision** second at 38%
(Multichannel News came in at 26%; TVC at 19%; CATJ at 16%; Broadcast Engineering at 4%; CableMarketing at 3% and View at 5%)
(As a matter of fact, earlier this year, SCTE asked its membership what they thought of **CED**. Answer: 91% overwhelmingly ranked **CED** good to excellent)

We asked you to define your buying responsibility:

- 68% of those **CED** subscribers have responsibility for buying equipment or make recommendations for such.

We asked you to list the system budget:

- 60% represent systems with annual budgets from \$100,000 to \$500,000.

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*894 respondents from a random sample.

continued from page 71

and delivers a 1.544 MBPS data stream with all standard interfaces of NATO, DSI and HDB. It has a low bit error rate of 10⁻⁸ at 25 dB S/N. The receiver level is 0 dBmV + 10 dB. An optional 2.048 MBPS data rate is also available.

For more information, contact Phasecom Corp. (213) 641-3501.

SAT-TROL actuator/control system

Burr Engineering recently presented SAT-TROL, an actuator and control system for satellite earth stations. Designed to provide reliable and precise control, the system features east/west "touch label" switches with fast and slow travel rates for satellite location and a three-digit LED readout for satellite position. No programming or wiring complicates system installation. Other system features include a self-contained power supply with strokes to 52-inch, a 1,000 thrust capacity, an underground cable with shielded sensor cables that are terminated with end plugs and a die-cast aluminum power head with a zinc-plated inner and outer tube. Wire and attachment brackets must be purchased separately.

For more information, contact Burr Engineering, (616) 965-7255.

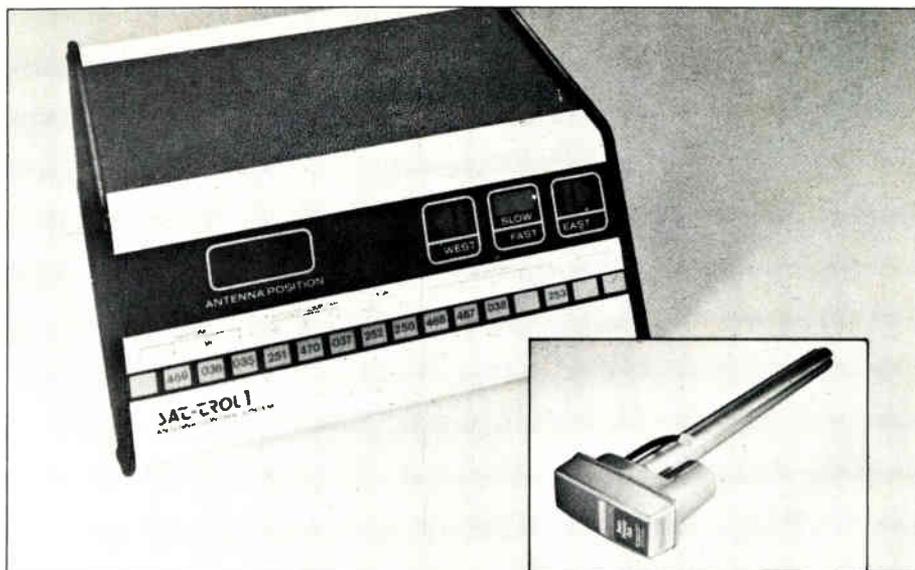
Winegard yagi antennas

A new series of ruggedized CATV/MATV yagi antennas have been introduced by the Winegard Company. Available in single-channel and both low- and high-band models, these completely anodized yagis come equipped with a downlead connection that includes a weatherproof boot. Each antenna features 75-ohm, low-loss, gamma-matched driven elements, with silver anodized 3/8-inch elements comprised of 7/16-inch external sleeves. Low-band models use seven elements while high-band models use eight. Elements are mounted on a heavy blue anodized boom that is supported by a parallel truss boom. The mast clamp located at the rear of the antenna can be adapted to a tower leg size of 1 and 1/2-inches to 4-inches in diameter. For each installation, all yagis are preassembled except for the boom and mast clamp. The desired channel must be specified when ordering.

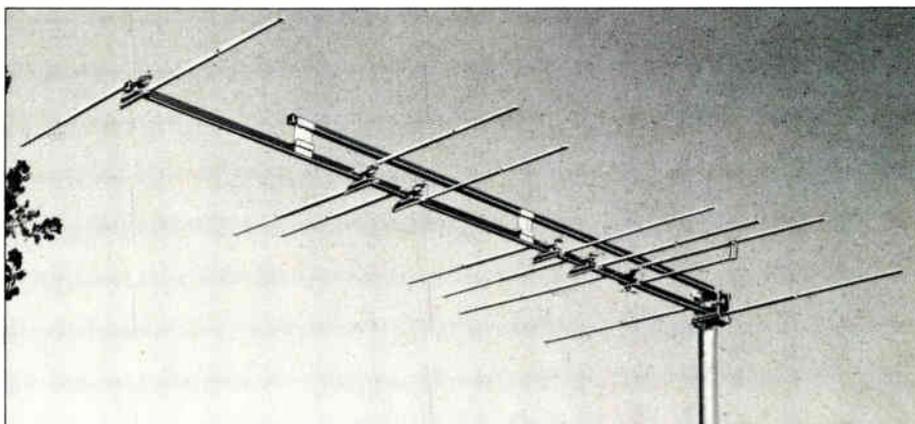
For more information, contact Winegard Co., (215) 822-6731.

Power inserter and line driver

Amplica's model A10021 power inserter was made to enable the user at the satellite earth terminal to DC power the LNA through the RF coaxial cable. By eliminating the need for separate cabling to provide power for the LNA, this inserter reduces expenses. This unit, however, can be used only with those amplifiers that were designed to be biased via the center conductor of the RF cable. In addition to type N female input and output connectors, the A10021 features



Burr satellite actuator, control systems



Winegard ruggedized Yagi antennas

a type N male-to-male adapter that permits insertion of the unit between two RF cables or at the input of the receiver. Other features the inserter offers are: reverse polarity, low insertion loss and transient protection. The inserter is compatible with any Amplica LNA series ACD3053, which is specified as requiring bias via the RF cable.

Amplica has also designed the model ACD353301 line driver to offset undesired signal losses and enhance receiver performance. The line driver provides 30 dB additional signal gain and comes equipped with type N female connectors for easy field installation. An internal voltage regulator that permits the line driver to operate with any applied voltage between +15 VDC and +25 VDC is featured.

For more information, contact Amplica Inc., (805) 498-9671.

Intercept introduces new products

Among new products Intercept Corp. recently has introduced are four series of band reject filters in configurations that cover low-, mid-, high- and super-band channels; and FM band. These band reject filters are constructed of nickel-plated

brass with weather-tight "O" ring seals in the outer sleeve. A PVC boot seals against the port to prevent degradation to the connection. Printed circuit-board construction also improves performance and provides stability over a wide temperature range.

Intercept also has announced four series of parental control traps that feature 60 dB attenuation for complete signal degradation; RFI shielding; a five-disc tumbler key lock with two keys; and printed circuit board construction in a rugged, miniature enclosure. There are models for low-, mid-, high- and super-band channels, two through W. All units enable the lower adjacent channel to remain fully usable. This series is comprised of the PTVA 40, which traps out both video and audio for any single channel; the PTV 100, a single channel trap for video only; the PTV 200 for two channel trapping video only; and the PTV 300 for three channels, video only.

To ensure security on premium channels, Intercept also designed a pay-TV tier trap series. These new traps do not affect the lower adjacent channel and are available in models for low-, mid-, high- and super-

continued on page 79

Classifieds

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LEAD TECH—supervise 2 Techs in this Southern 25-channel system. Must also have good knowledge of head-end and construction. \$20k.

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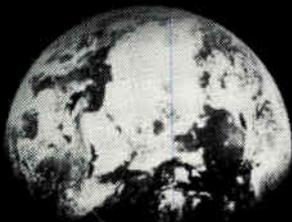


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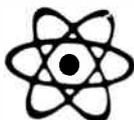


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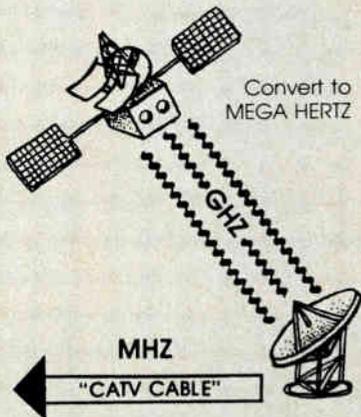
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Ad Index

Alpha Technologies	22
Anixter Communications	76
Ben Hughes	29
CableBus Systems	72
Compucon	10, 39
Comsonics	39
Comtech Antenna	52
Control Tech	30
CWY	46, 70
Di-Tech	50
D&D	41
Eagle Comtronics	75
General Cable	47
Gould, Inc.	55
Hooper & Son	59
Hughes Microwave	20
Lectro	17
Lemco Tool	68
Lineward	81
M/A-COM Comm/Scope	9-20
Magnavox	3
Microdyne Corp.	31
Phasecom	12
Pico	6
Pioneer	28
Ripley Co.	67
RMS Electronics	34
Sadelco	14
Standard Comm.	66
Sitco Antennas	16
TOCOM	54-55
Texscan	4
Times Fiber	8
Tele-Wire	2
Vitek	60
Wavetek	18, 58
Wegener	25, 56
Weldone	30
Western Towers	23
Westec	32

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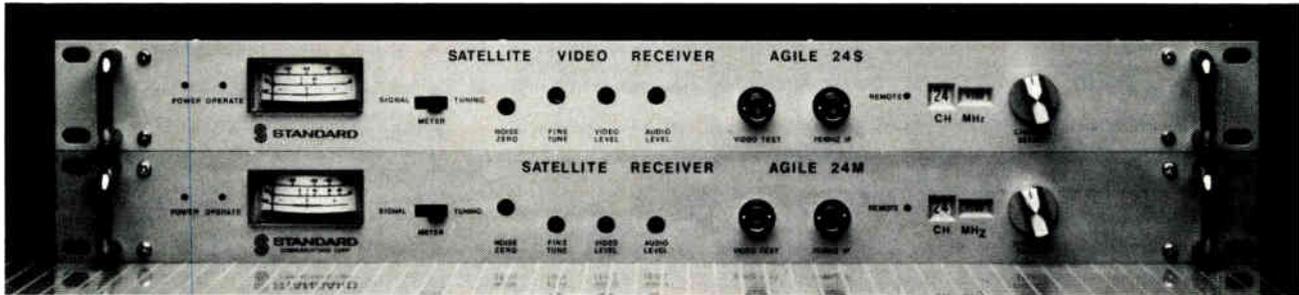


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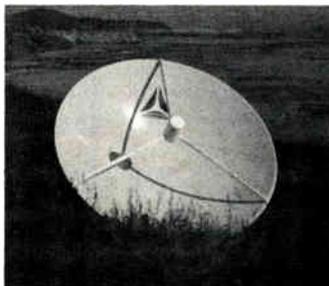


ODC24

cost cable runs to the satellite receiver.

Use our ODC24 Outdoor Down Converter with our Agile 24S slave receiver to block downconvert microwave signals from 3.7 to 4.2 GHz to 760 to 1260 MHz. By mounting the ODC24 on the LNA, longer cable runs to the receiver using low cost cable are possible. The ODC24 also features 16 dB conversion gain, and a weather resistant housing and built-in heater for all weather operation.

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continued from page 74

band channels two through W. Low and mid-band have -60 dB attenuation for complete signal degradation.



Intercept parental control and tier traps

Another product now being offered by Intercept is a metal cable closure. This closure comes in three models to accommodate closure requirements for mounting trunk, distribution and related equipment. They are fabricated of heavy-gauge, hot-dipped galvanized steel and feature an electrostatic painting system that uses a three-stage baking and curing process to provide a porcelain-like finish.

For more information, contact Intercept Corp. (800) 526-0623.

Weston Introduces 5-1/2 Digit DMM

For applications requiring only the measurement of dc voltages, Weston Instruments has developed a low-cost Model 7060A programmable DMM. Full scale ranges from 200 mV to 1000 V are displayed with 5-1/2 digits resolution to a

basic accuracy of 0.002 percent of reading. Resolution can be expanded to 6-1/2 digits for 1 V sensitivity. A fast-responding digital filter is available to permit accurate and stable readings in the presence of electrical noise. Although measurement speed is typically 48 readings per second, resolution can be reduced, through the use of an integral IEEE-488 bus interface, 3-1/2 digits. Ranging is automatic or manual while display can be continuous or triggered. A null function is available to eliminate spurious offset voltages. A patented pulse width method of A-D conversion improves linearity.

The model 7060A is priced at \$2,995 and offers automatic drift correction, LSI techniques and low printed circuit board count features.

For more information, contact Weston Instruments, (201) 242-2100.

The 6140 Stereo Processor

Channel Master's latest satellite stereo processing component, known as the model 6140 multi-mode stereo processor, takes audio sub-carrier signals from the satellite receiver and decodes them for use with an ordinary home stereo receiver system. As a result, home TVRO users are able to gain access to the auxiliary audio services carried on satellite. The model 6140 also permits monaural audio sub-carriers to be heard through "hi-fi" speakers.

Front panel, push-button selectors decode separate, multiplex or matrix stereo, while two independent tuning controls provide a means for selecting the desired sub-carrier channel within the 5.5 to 8.0 MHz range. A selectable IF filter allows reception of high fidelity programming with low distortion. Furthermore, through the use of the program switch, four independently pre-set positions may be selected for tuning into various stations. Recommended retail of the unit is \$359.00.

For more information, contact Channel Master, (914) 647-5000.



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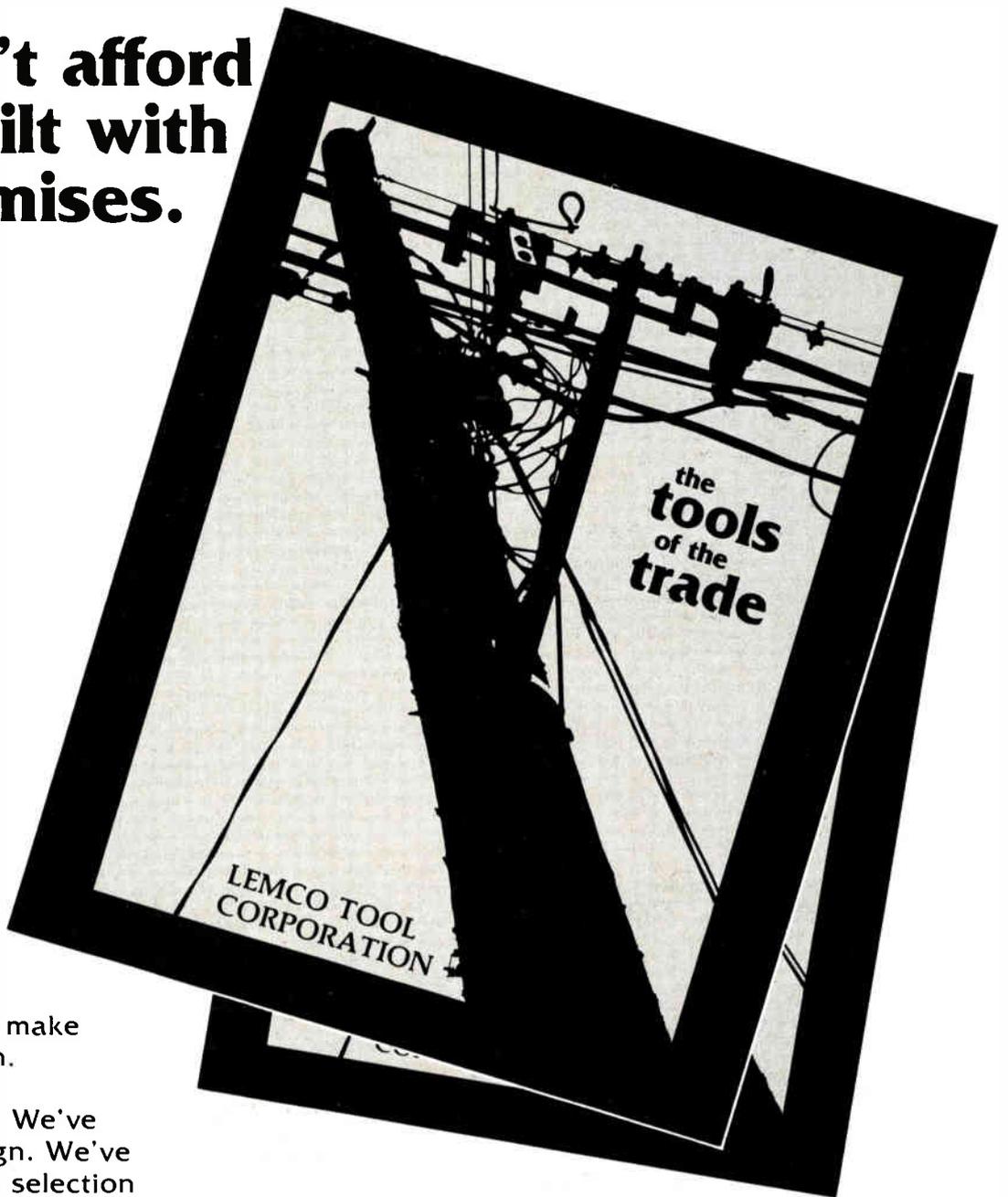
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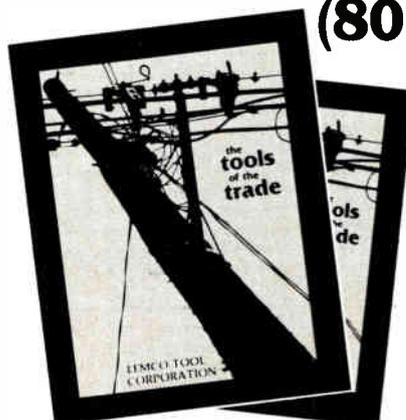
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Klungness KES receiver

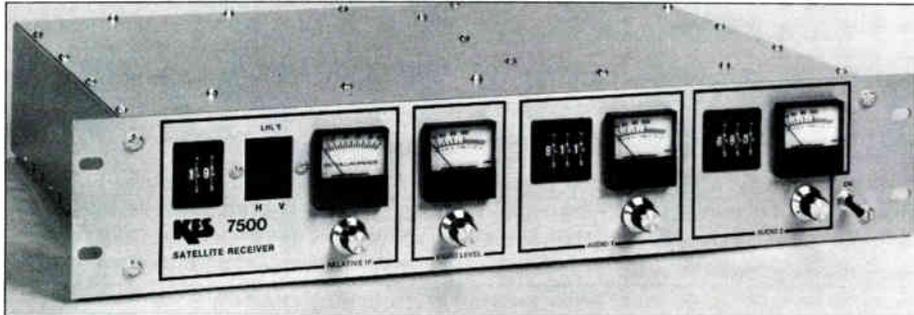
Klungness Electronic Supply introduced a parabolic deep-dish receiving antenna and a model KES 7500 satellite receiver. The antenna, which meets 2 degree spacing requirements, is convertible to 12 GHz and is precision formed of fiberglass with an inner metal fabric laminate. Accord-

ing to the company, the laminate provides a smoother reflecting surface for better reception and sharper image. The light-weight, three-panel antenna is available in 3-, 3.7- and 5-meter sizes with optional monopod or tripod polar post mounts. KES polar mounts require only a level post because they permit 360-degree rotation

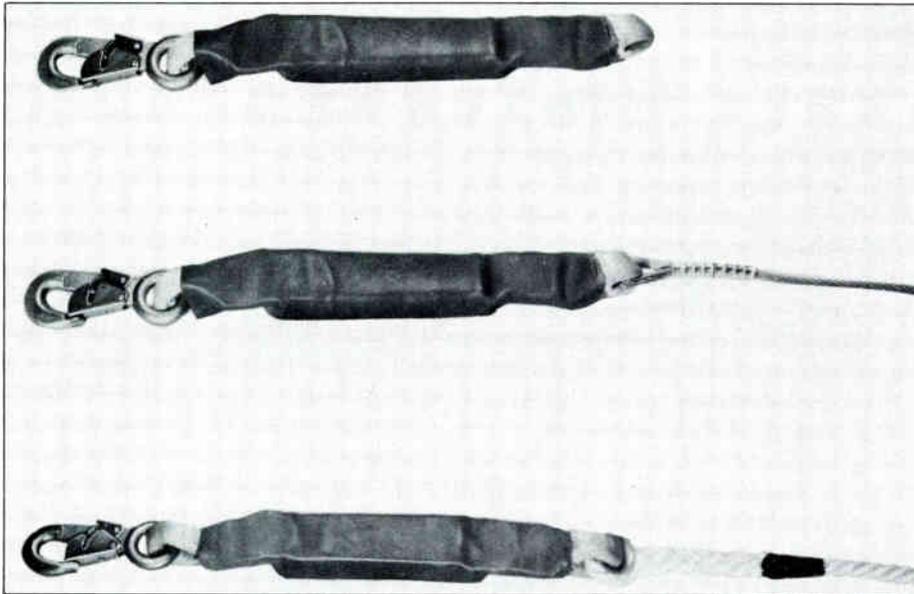
and eliminate the need to locate true north and establish center lines.

The 7500 satellite receiver features crystal-controlled frequency synthesis of thumbwheel selection of 24 transponders; two audio subcarrier demodulators with thumb wheel frequency, selectable to the nearest .01 MHz; four separate meters (relative IF/signal level, video level, two independent audio VU); unfiltered video output for external subcarrier demodulation; built-in ferrite isolator, power block and fused LNA power supply; and non-PLL digital FM detector.

For more information, contact Klungness Electronic Supply, (800) 338-9292; in Michigan, (800) 682-7140.



KES 7500 satellite receiver



Klein deceleration lanyards

Klein Tools adds lanyards

Klein Tools Inc. has added deceleration lanyards to its product line. These lanyards absorb most of the fall-arrest impact through a progressive tearing-away of the nylon stitching in the lanyard's heavily cross-stitched nylon webbing. Fully released stitching extends the original length of the lanyard by three feet, which, according to the company, eliminates rebound. Encased in a leather, break-away jacket, the lanyard is protected from adverse conditions such as welding sparks or common abrasion.

The lanyard is one and 3/4-inches wide, consisting of type 10 orange nylon web with a tensile strength of 8,700 pounds. It is available with fixed-length nylon rope or aircraft cable with snap hooks on both ends.

For more information, contact Klein Tools Inc., (312) 677-9500.

Gilbert connector receives patent

Gilbert Engineering recently received a U.S. patent for its coax push-on test connector. The connector, which maintains all electrical characteristics required for

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CABLE LINE LAYER

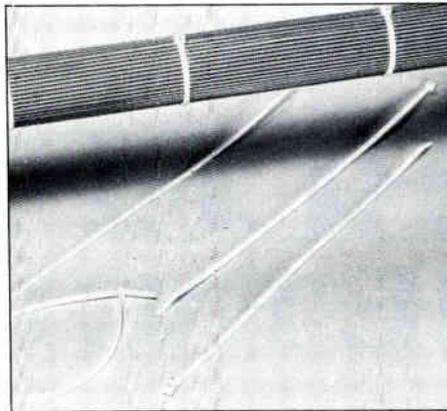
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carriers from reaching TVRO earth station downconverters. The trap can block out telephone carriers (offset 10 MHz from transponder center frequencies) with a 50 dB notch (minimum) and with a 3 dB bandwidth of 5 MHz (maximum). The unit passes DC power and can be tuned to customer specified microwave offenders. In addition to type N connectors, MFC is also making WR-229 waveguide connectors, available.

Priced at \$90 plus \$270 per microwave carrier trapped, units can be delivered within ten days.

For more information, contact Microwave Filter Co., (800) 448-1666.



Panduit PLT5S cable tie

Panduit PLT5S cable tie

Panduit Corp.'s PAN-TY PLT5S cable tie is a standard cross-section cable tie for bundle diameters up to five feet and, according to the company, offers an economical alternative for large diameter cable and wire bundles requiring minimum loop tensile strength of up to 50 lbs. Made of all nylon, the tie is available in eleven colors, including weather resistant black, when ordered in bulk. The PLT5S can be either hand installed or secured with installation tools and features one-piece construction.

This type of construction offers the following design advantages: low threading force, no sharp edges and a finger grip tip. A free sample of the tie is being offered by Panduit.

For more information, contact Panduit Corp., (312) 532-1800.

Lowell motion control catalog

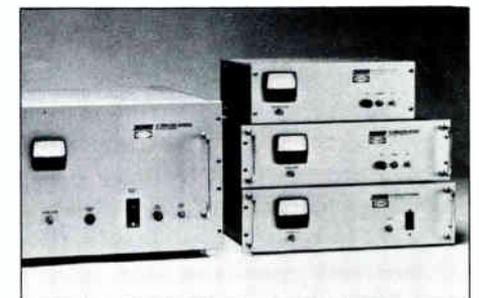
Lowell Corp.'s free illustrated catalog describes the company's complete line of mechanical motion control products, including its ratchet arms and turnbuckles; socket, strap and valve wheel wrenches; torque tools; and one-way clutches. The 28-page guide is indexed by product and provides information on dimensions and applications, detailed in a readable format. More than 1,000 products are described and guidelines for ordering are presented.

For more information, contact Lowell Corp. (617) 336-5801.

Sorensen line regulator

The Sorensen ACR series line regulator provides voltage regulation against +10 to -20 percent input voltage change or full-load change for 115/120 Vac single-phase lines. Regulation limits are ± 0.15 percent for models rated 5 kVA or over. The output voltage is continuously variable for 110 to 120 Vac (standard range). The unit can be programmed for resistance and wired for remote sense applications, is current limiting and offers low distortion sine wave output. While ACR line regulators have many applications, they are most frequently used for test and burn-in applications where regulated output is a nominal 115 Vac.

For more information, contact Sorensen Co., (603) 668-4500.



Sorensen ACR series AC regulators

Don't sell cable security because you promised it. Sell it to make money.

Early cable security systems were notorious money losers, primarily because of high installation and maintenance costs. Operational problems caused by false alarms, in-home terminal adjustments, stuck transmitters, and just plain unreliability kept crews on the go. CableBus and the MICRO-2 have solved these problems. The MICRO-2 is reliable, easy to install and operate, and can handle 1,000 subscribers efficiently, effectively, and economically. Your initial investment is under \$10,000.

As the industry leader in cable security, we can offer you proven equipment, not prototypes. We've been shipping systems for two years and have more in actual operation than anyone else. Typically, a standard-frequency system is shipped in 30 days.

Then, when you have more subscribers than your MICRO-2 can accommodate, we'll allow you up to 100% trade-in on a larger system.



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M/A-COM QR coaxial cables

M/A-COM Comm/Scope Inc.'s latest coaxial cables are the first in a series of "Quantum Reach" (QR) coaxial cables, featuring reduced attenuation and a new low-mass dielectric. This dielectric improves handling characteristics and, according to the company, provides more flexibility than any solid-sheath coaxial cable currently on the market.

Other features of these QR cables include: proven improved handling characteristics, 98 percent core-to-outer conductor strength even after extended thermal cycling, resistance to cable damage during construction and system installation, an optimum-thickness outer conductor tube that reduces the weld zone area to fractional proportions, improved cable jacketing of new medium density polyethylene (MDPE) and extended jacket life.

For more information, contact M/A-COM Comm/Scope Inc., (800) 438-3331.

Microwave filter bandsplitter

Microwave Filter's 3329-57 bandsplitter separates the entire sub-band and TV-IF from the remainder of the VHF spectrum channels three through W and can also combine these bands. Passband loss is 1.5 dB (maximum) and mutual isolation is 45 dB (minimum). The unit is available with 75 ohm type F connectors. Priced at \$125, the 3329-57 can be delivered within ten days.

For more information, contact Microwave Filter Inc., (800) 448-1666.

Fordham releases 1983 catalog

A new, 192-page catalog that covers a wide range of electrical and electronic test equipment; radio, TV and video equipment and components; phone, CB and telephone communication systems; repair tools and kits; and other related electronic products is now being offered by Fordham

For more information, contact Fordham Radio, (800) 645-9518.

Cable Graphic Sciences generator

Cable Graphic Sciences announced that its display generator comes equipped with an "instant graphics" feature. Designed for local access and advertising applications, the generator employs a microcomputer-based design that permits the user to create graphic displays within seconds.

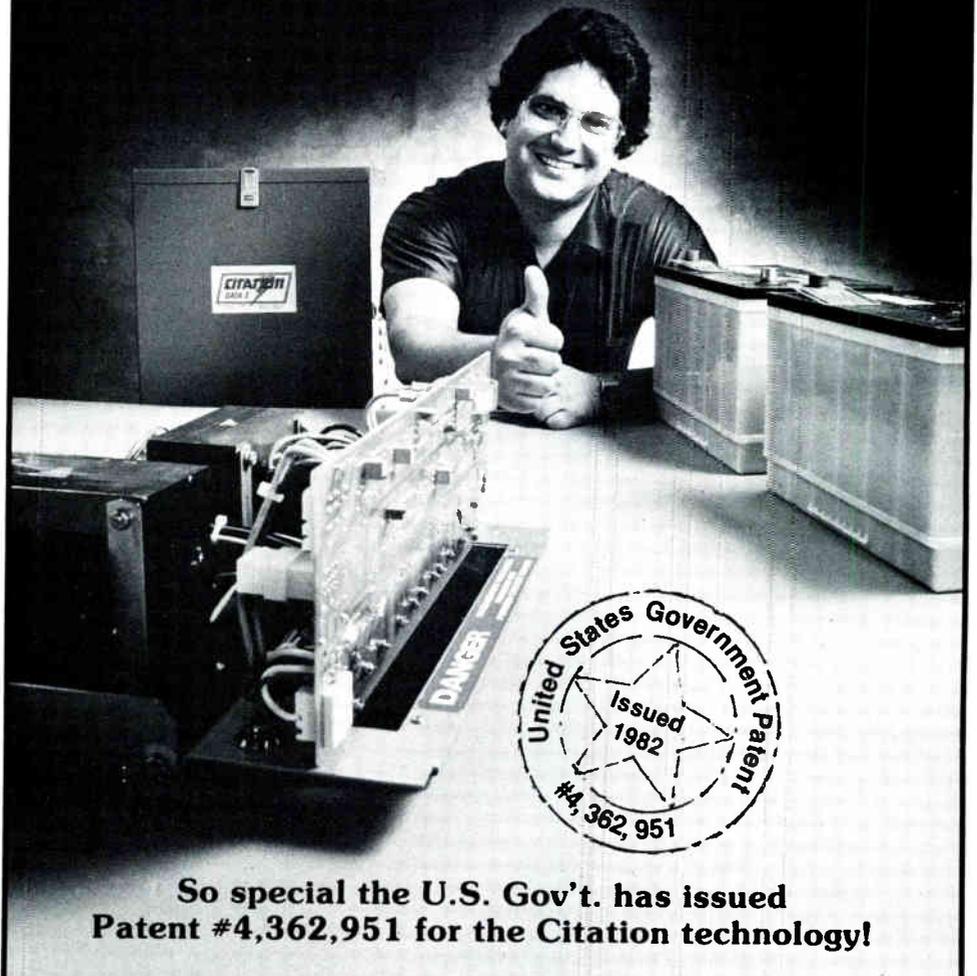
The Cable Graphic System 800/A features six formats and displays that may be copied to multiple floppy diskettes, which allows MSOs to prepare advertising or public access announcements at a central location well in advance of actual need. Floppy disks then can be distributed to local systems.

The System 800/A is priced at \$2,895 and includes a floppy disc drive and instant graphic designs.

For more information, contact Cable Graphic Sciences, (209) 297-0508.

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In Orbit

Signal	Day	Start/Stop	Alert Tone	Transponder	Signal	Day	Start/Stop	Alert Tone	Transponder																																																																																									
Satcom 3R					Modern Satellite Network Weekdays 10 a.m./1 p.m. 243*/# 421*/# 22																																																																																													
ASCN-The Learning Channel	Weekdays	6 a.m./4 p.m.	192*/#	16	MTV: Music Television		24 hrs.	None	11																																																																																									
	Weekends	6 a.m./1 p.m.			National Jewish Television	Sundays	1 p.m./4 p.m.	None	16																																																																																									
ARTS	Daily	9 p.m./12 a.m.	311*/# (E,C,M) 519*/#(P)	1	Nickelodeon	Daily	8 p.m./9 p.m.	311*/# (E,M,C) 519*/# (P)	1																																																																																									
Cable Health Network		24 hrs.	361*/#	17	PTL		24 hrs.	None	2																																																																																									
CBN		24 hrs.	None	8	Reuters	Weekdays	4 a.m./8 p.m.	None	18																																																																																									
Cinemax		24 hrs.	None	20 (E,C) 23 (M,P)	Showtime		24 hrs.	576*/#	12 (E,C) 10 (M,P)																																																																																									
CNN		24 hrs.	024*/#	14	Spotlight		24 hrs.	None	4																																																																																									
CNN Headline News		24 hrs.	635*/# 541*/#	15	USA Blackout Network		O/V after 5 p.m.	295*/#	22																																																																																									
C-SPAN		24 hrs.	195*/#	19	USA Cable Network		24 hrs.	438*/#	9																																																																																									
Daytime	Weekdays	1 p.m./5 p.m.	None	22	WGN		24 hrs.	None	3																																																																																									
ESPN		24 hrs.	048*/#	7	WTBS		24 hrs.	None	6																																																																																									
Eternal World Television Network	Daily	8 p.m./12 p.m.	762*/#	18	The Weather Channel		24 hrs.	None	21																																																																																									
HBO		24 hrs.	Program 729*/# Scramble 835*/# Duplication 940*/#	24 (E,C) 13, 22 (M,P)	Satcom 4																																																																																													
HTN Plus	Daily	4 p.m./4 a.m.	207*/#	16	The American Network	Daily	5 p.m./5 a.m.	None	19																																																																																									
The Movie Channel		24 hrs.	None	5	BizNet	Weekdays	9 a.m./2 p.m.	None	15																																																																																									
<table border="1"> <thead> <tr> <th colspan="3">Major Communications Satellites Serving North America</th> </tr> <tr> <th rowspan="2">Location: Degrees West Longitude</th> <th colspan="2">Satellite</th> </tr> <tr> <th>Present</th> <th>Future</th> </tr> </thead> <tbody> <tr> <td>70</td> <td></td> <td>Southern Pacific-2 (Oct 84)**</td> </tr> <tr> <td>74</td> <td></td> <td>Galaxy-2 (Mid 84)</td> </tr> <tr> <td>79</td> <td></td> <td>Advanced Westar-2**</td> </tr> <tr> <td>83</td> <td>Satcom-4</td> <td></td> </tr> <tr> <td>87</td> <td>Comstar-D3</td> <td>Telstar-2</td> </tr> <tr> <td>91</td> <td>Westar-3</td> <td>Advanced Westar-1**</td> </tr> <tr> <td>94.5</td> <td>SBS-3*</td> <td></td> </tr> <tr> <td>95</td> <td>Comstar-D2 & D1</td> <td>Telstar-1</td> </tr> <tr> <td>97</td> <td>SBS-2*</td> <td></td> </tr> <tr> <td>99</td> <td>Westar-4</td> <td></td> </tr> <tr> <td>100</td> <td>SBS-1*</td> <td></td> </tr> <tr> <td>103</td> <td></td> <td>GTE-1*</td> </tr> <tr> <td>104</td> <td>Anik D-1*</td> <td></td> </tr> <tr> <td>106</td> <td></td> <td>GTE-2*</td> </tr> <tr> <td>109</td> <td>Anik-B**</td> <td></td> </tr> <tr> <td>114</td> <td>Anik-2 & 3</td> <td></td> </tr> <tr> <td>117.5</td> <td>Anik C-3</td> <td></td> </tr> <tr> <td>119</td> <td>Satcom-2</td> <td>Southern Pacific-1 (Feb 84)**</td> </tr> <tr> <td>123</td> <td>Westar-2</td> <td></td> </tr> <tr> <td>123.5</td> <td>Westar-5</td> <td></td> </tr> <tr> <td>127</td> <td></td> <td>Comstar-D4 (Mid 82): Telstar-3 (1986)</td> </tr> <tr> <td>131</td> <td>Satcom-3R</td> <td></td> </tr> <tr> <td>135</td> <td>Satcom-1</td> <td>Galaxy-1 (Mid 83)</td> </tr> <tr> <td>139</td> <td></td> <td>Satcom-1R (Mid 83)</td> </tr> <tr> <td>143</td> <td></td> <td>Satcom-2R (1984)</td> </tr> <tr> <td>*Ku Band</td> <td></td> <td></td> </tr> <tr> <td>**Dual Ku/C Band</td> <td></td> <td></td> </tr> </tbody> </table>					Major Communications Satellites Serving North America			Location: Degrees West Longitude	Satellite		Present	Future	70		Southern Pacific-2 (Oct 84)**	74		Galaxy-2 (Mid 84)	79		Advanced Westar-2**	83	Satcom-4		87	Comstar-D3	Telstar-2	91	Westar-3	Advanced Westar-1**	94.5	SBS-3*		95	Comstar-D2 & D1	Telstar-1	97	SBS-2*		99	Westar-4		100	SBS-1*		103		GTE-1*	104	Anik D-1*		106		GTE-2*	109	Anik-B**		114	Anik-2 & 3		117.5	Anik C-3		119	Satcom-2	Southern Pacific-1 (Feb 84)**	123	Westar-2		123.5	Westar-5		127		Comstar-D4 (Mid 82): Telstar-3 (1986)	131	Satcom-3R		135	Satcom-1	Galaxy-1 (Mid 83)	139		Satcom-1R (Mid 83)	143		Satcom-2R (1984)	*Ku Band			**Dual Ku/C Band			The Entertainment Channel		24 hrs.	None	8
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					The Playboy Channel		8 p.m./6 a.m.	7																																																																																										
					National Christian Network		6 a.m./8 p.m.	073*/#	7																																																																																									
					Trinity Broadcasting Network		24 hrs.	None	17																																																																																									
					Westar 4																																																																																													
					Eros	Thurs-Sat	11 p.m./2 a.m.		10D																																																																																									
					Financial News Network	Weekdays	10 a.m./5 p.m.	975*/# 738*/#	9X																																																																																									
					GalaVision	Weekdays	4 p.m./4 a.m.		12X																																																																																									
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					BET	Daily	8 p.m./2 a.m.	406*/#	12X																																																																																									
					CBS Cable	Weekdays	4:30 p.m./4:30 a.m.	524*/#	4D																																																																																									
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E eastern M mountain
C central P pacific

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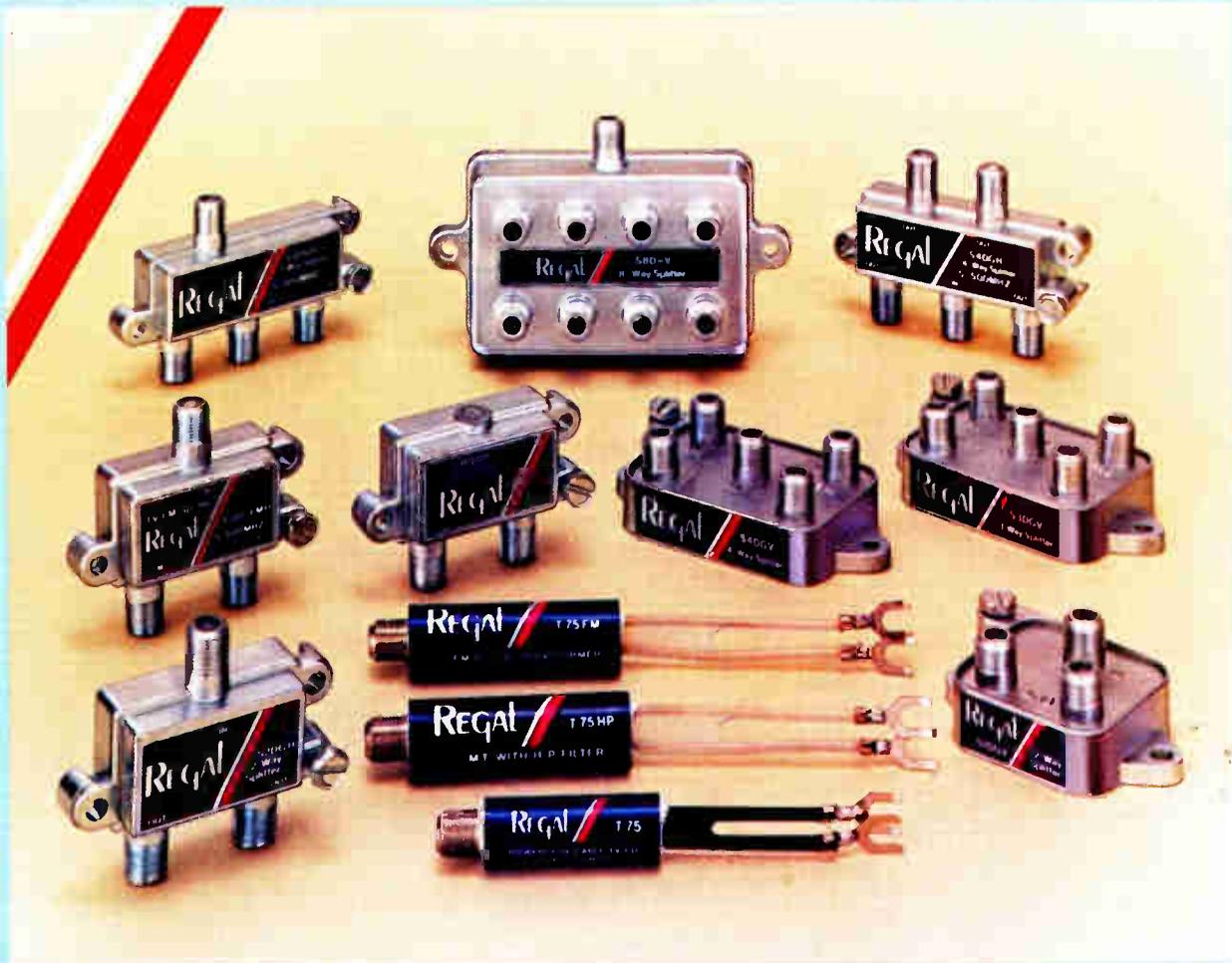
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