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Communications Engineering Digest/The Magazine of Broadband Technology

May 1982

## Cable and Computers

- Two-way Interactive Systems
- Addressability
- Computer-Aided Plant Design

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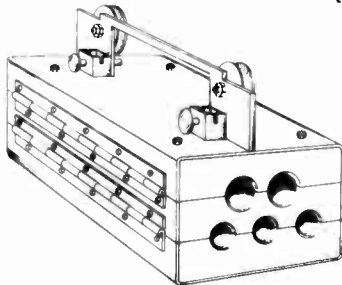
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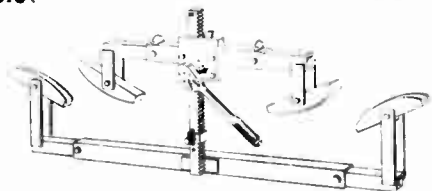
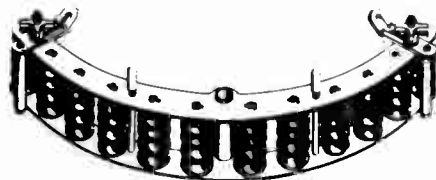
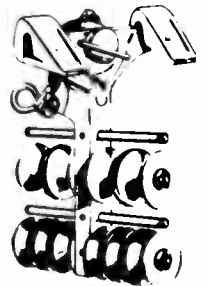
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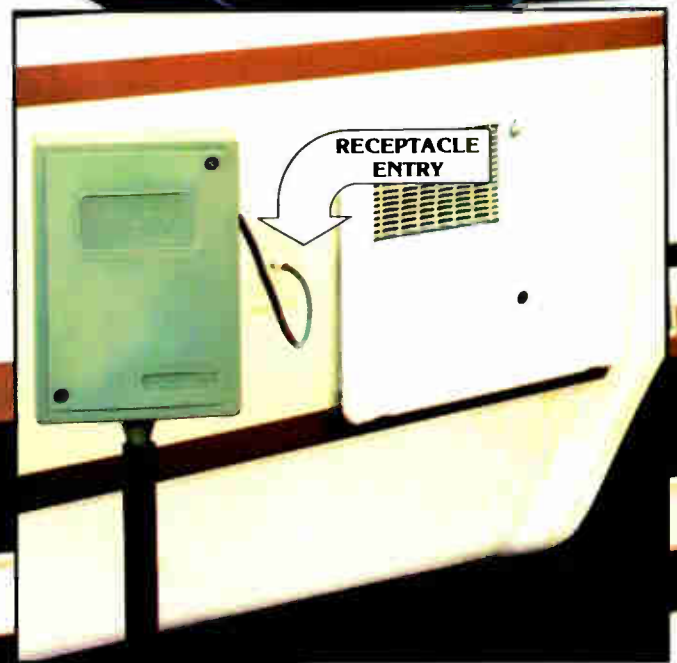
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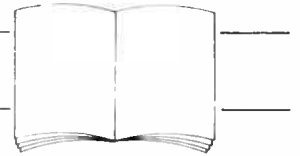


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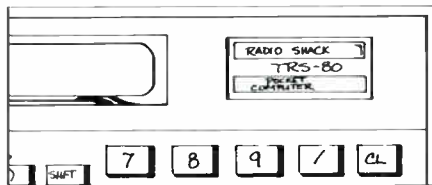
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The convenient (it fits in your pocket) and

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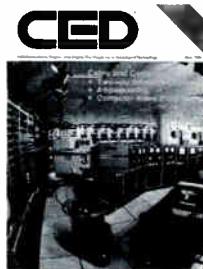
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The Pittsburgh headend, as seen through a fish-eye lens, is a cable computer jewel. Turned on April 13, the system is an 80-channel, two-way interactive member of Warner Amex Cable's QUBE Club. Photo courtesy of Warner Amex Cable Communications.





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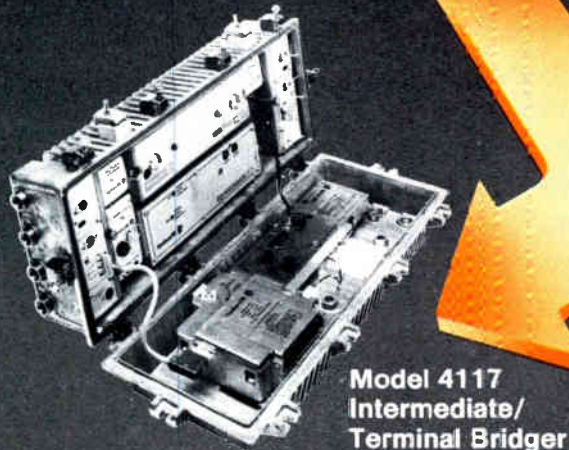
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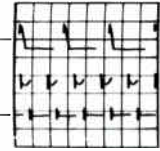
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## Only A Toy

For all those technically minded engineers sharing this simple writer's frustrated obsession with the dreaded Rubik's cube but whose professional reputations prohibit them from admitting defeat: Take heart—technology has done it again! Microtech is offering a step-by-step solution on Great Britain's Prestel Pages.

In a mere 40 frames at 1/2 pence each, the cube will be diagramed with the appropriate twists and turns. (Don't worry, it's in color and you might like to have a video tape recorder.) If that still isn't enough, try asking your kids. After all, it is only a toy, isn't it?

## To The Rescue

Fifteen service crews have been called in from Warner Amex Cable Communications QUBE systems in Pittsburgh and Columbus to assist Warner crews working in the greater Cincinnati system to meet the tremendous subscription demand for QUBE service.

A caravan of 15 trucks and crews, 10 from Pittsburgh and five from Columbus, arrived recently at Warner Amex facilities in Cincinnati serving subscribers along with regular Cincinnati area crews.

There are currently 32,000 QUBE subscribers in the Cincinnati area and, according to Robert L. Montgomery, president and general manager for Warner Amex Cable Communications of greater Cincinnati, subscriptions requests are coming in at a "record pace." The additional crews will remain in Cincinnati until all audience subscription demands have been met.

"By marshaling our forces to meet this demand, we can provide our subscribers with quick and efficient service," Montgomery said.

## Name Changes

Effective immediately, two major communications companies have changed their corporate names to better reflect their involvement and commitment to the cable industry. Cox Broadcasting has now become Cox Communications Inc., to prevent a distinction, or perhaps a preference for one communications medium over the other. Cox Cable Communications retains its name, and company figures indicate that this division contributed more gross revenue than the broadcasting division (\$188 million to \$182 million). Group W Broadcasting, also known as Westinghouse Broadcasting, has changed its name to Westinghouse Broadcasting and Cable Company Inc., to incorporate its cable division, formerly Teleprompter, now called Group W Cable. Westinghouse purchased the number three MSO last year for a record \$646 million.

## HDTV By 1984?

While U.S. and Japanese television manufacturers claim they are not close to developing an effective high definition television set, a German research & development subsidiary of ITT last year introduced a TV chassis which boasts digital signal-processing circuits. The announcement triggered an

expansion in the testing and development of HDTV products, yet some manufacturers have expressed a desire to remain with the current standard of 525 lines. They have also indicated that, before embracing HDTV, digital circuitry be developed for use in today's sets. Nevertheless, an HDTV set may appear on markets by 1984. Which company, or rather, which country makes the first plunge is the issue.

## Drawing Battle Lines

As a result of AT&T's intensive campaign to deride the House Telecommunications subcommittee bill which proposes certain divestiture legislation for the communications giant, thousands of letters have appeared in the in-baskets of congressmen. The message is coming from AT&T's employees and three million stockholders. In addition, there have been newspaper ads that call for "orderly policy-making." The participants of the campaign were urged to write (or perhaps preferably call) their respective congressmen and request that the bill be defeated. Rep. Tim Wirth (D-CO), chairman of the House Telecommunications subcommittee personally received "a large amount" of mail, according to one staffer, who was quick to add that it had been both "pro and con." The legislation itself has in fact drawn lines among many other sections of the communications industry, many of which are beginning to make their opinions known. Most notable among them is the National Association of Regulatory Utility Commissioners and the Communications Workers of America.

## Taping The Tube

Ever since the 9th U.S. Circuit Court of Appeals in Los Angeles overturned the decision by a lower court declaring home videotaping of broadcast programs legal and not liable for copyright fees, there has been a rather nebulous aura surrounding the taping of films and other material off television. Videotape companies, however, have not reported a decline in recorder sales that can be attributed to the court's decision, but Congress has responded with the introduction of two bills designed to assure the legality of home taping. The Senate Judiciary Committee was the first to hold hearings on the issue, followed by the House Copyright subcommittee, which held meetings in Los Angeles. Bills introduced by the respective houses are S.1758 and H.R. 5488. Further action is pending.

## Pittsburgh Gets QUBEd

Pittsburgh, a city that prides itself on its Golden Triangle, now has a QUBE to be proud of as well. On April 13th, the city and Warner Amex Cable Communications formally launched the two-way interactive system, making Pittsburgh the first city in the nation to sport an 80-channel system. Mayor Richard Caliguiri declared the day "QUBE Day" in Pittsburgh. The system includes five tiers of service, an institutional loop with the capacity for a 41-channel network still under construction, and a fiber optic link for business data transmission. The Renaissance City joins Columbus, and Cincinnati, Ohio in the QUBE Club.

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# Seminars



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## May

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**10-11:** A seminar on "Teleconferencing Technologies," sponsored by **Cross Communications** and **Colorado Video**, will be held in Coronado, California. Contact Thomas Cross, (303) 499-8888.

**11:** A meeting of the **Southern California Cable Club** will be held at the Sheraton La Reina in Los Angeles. Contact the club, (213) 655-4150.

**12-14: Magnavox CATV Systems** will be conducting a field training seminar in its Mobile Training Center in Detroit. Contact Kay Hinkle, (315) 682-9105.

**16-18:** A conference on "Municipal Administration of Cable Television" will be held at the Wisconsin Center at the **University of Wisconsin** in Madison. Contact Barry Orton, (608) 262-2394.

**17-19: Magnavox CATV Systems** will be holding a field training seminar in its Mobile Training Center in Detroit. Contact Kay Hinkle, (315) 682-9105.

**19-21:** The eighth annual Los Angeles Professional Videoshow, sponsored by **Educational & Industrial Television** magazine, will be held at the Los Angeles Convention Center. Contact Ellen Parker, (203) 743-2120.

**20-22:** A field training seminar sponsored by **Magnavox CATV Systems** will be conducted in its Mobile Training Center in Detroit. Contact Kay Hinkle, (315) 682-9105.

**27-30:** The Northeastern Satellite/TV Exhibition, sponsored by **Satellite Services Bureau**, will be held at the Howard Johnson's Conference Center, Windsor Locks, Conn. Contact SSB, (800) 243-0480.

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## June

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**2-3:** A conference on "International Video Markets: Selling Programs to Cable, Cassette and Pay TV Outlets Worldwide" sponsored by **Knowledge Industry Publications** will be held at the New York Hilton. Contact Peter Caranicas or Anne Stockwell, (914) 328-9157.

**3-4:** The **New York State Commission on Cable Television** will hold its eighth annual Northeast Cable Television Technical Seminar at the Empire State Plaza Convention Center in Albany. Contact Robert Levy, (518) 474-1324.

**7-9:** The "Great Lakes Exposition," sponsored by the **Illinois-Indiana Cable TV Association**, will be held at the Indianapolis Convention Center. Contact Shirley Watson, (618) 249-6263.

**7-9:** A **Community Antenna Television Association** basic technical training seminar will be held in Winston-Salem, North Carolina. Contact the CATA Engineering Office, (305) 562-7847.

**8-9:** A **Business Week** conference, "Confronting the Communications Revolution," will be held at the McGraw-Hill World Headquarters, New York City. For information call (212) 997-4930.

**10-12:** The **Montana Cable Television Association** annual meeting will be held at the Sheraton Hotel in Great Falls. Contact Tom Glendenning, (406) 586-1837.

**10-13:** The first portion of 1982 National Video Festival, presented by **The American Film Institute** and **Sony Video Products Company**, will be held at the Kennedy Center in Washington, D.C. Contact Sue Donoghue or Patty Prendergast, (202) 828-4040.

**21-25:** A **Community Antenna Television Association** advanced technical training seminar will be held at the Best Western Colonial Inn in Austin, Texas. For more information call the CATA Engineering Office, (305) 562-7847.

**24-27:** The second portion of the 1982 National Video Festival,

presented by **The American Film Institute** and **Sony Video Products Company**, will be held at the AFI campus in Hollywood, California.

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## July

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**9: Introduction to Digital Electronics Workshop** taught by Joseph J. Carr, at the Baltimore Inner Harbor Hyatt Regency Hotel.

**14-17:** The **Florida Cable Television Association's** Annual Convention will be held July 14-17, 1982 at the Dutch Inn, Lake Buena Vista, Florida. For more information contact the FCTA, (813) 688-3787.

**19-21:** The annual convention of the **Cable Television Administration and Marketing Society** will be held at the Hyatt Regency in Chicago. Contact CTAM, (202) 296-4219.

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## August

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**2-4:** A **Community Antenna Television Association** basic technical seminar will be held in Boise, Idaho. Contact the CATA Engineering Office, (305) 562-7847.

**11-13:** The fourth annual Satellite Communications Users Conference, sponsored by **Satellite Communications** magazine, will be held at the Regency Hotel in Denver. Contact Anthony Chiaviello, (303) 694-1522.

**22-24:** The summer conference of the **Michigan Cable Television Association** will be held at the Hilton Hotel in Traverse City. Contact Sandra Applegate, (313) 235-6112.

**30-September 3:** A **Community Antenna Television Association** advanced technical seminar will be held in Phoenix, Arizona. Contact the CATA Engineering Office, (305) 562-7847.

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## September

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**9-11:** The annual convention of the **Southern Cable Television Association**, the Eastern Show, will be held at the Georgia World Congress Center in Atlanta. Contact Nancy Horne, (404) 237-8228.

**15-17:** The sixth international fiber optics and communications exposition, **FOC '82**, will be held at the Los Angeles Marriott Hotel. Contact Information Gatekeepers, (671) 739-2022.

**19-22:** The **Pacific Northwest Cable Communication Association** annual convention will be held at the Sea-Tac Red Lion Inn, Seattle. Contact Douglas Rice, (406) 245-3051.

**20-23:** The annual meeting of the **New England Cable Television Association** will be held at Durfeys Hyannis Resort in Hyannis, Massachusetts. Contact Gary Cain, (603) 224-3373.

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## October

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**10-12:** The 1982 **SCTE Fall Engineering Conference** will be held at the Don Caesar Beach Resort Hotel in St. Petersburg, Florida. The conference will focus on Business and Data Communications on CATV Networks. For more information call the SCTE at (202) 293-7841.

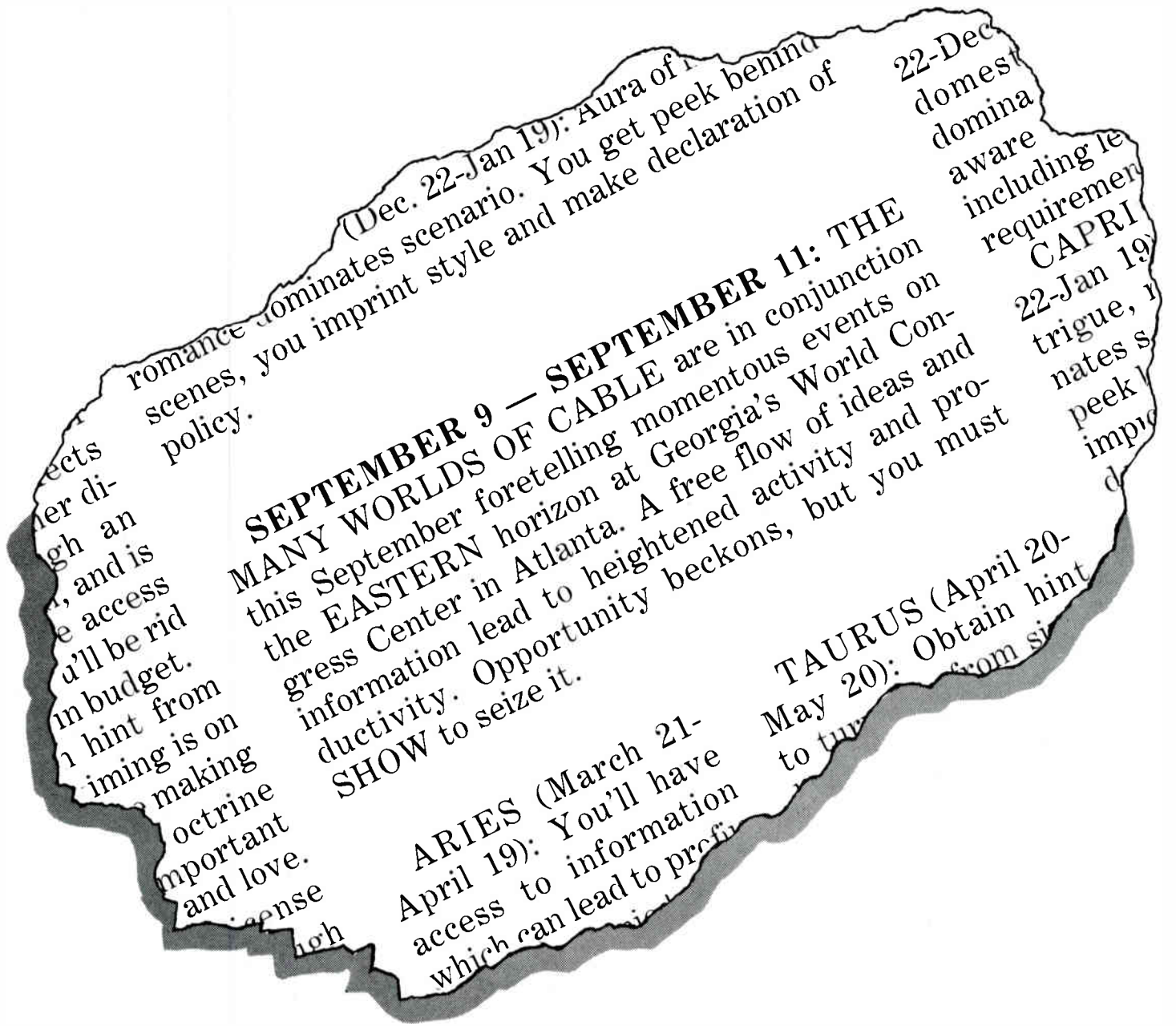
## Looking ahead

**October 26-28:** Atlantic Cable Show, Bally Park Place, Del Webb's Claridge and Brighton Hotels, Atlantic City, New Jersey.

**November 14-16:** NCTA Cable Software Symposium, Los Angeles area.

**November 17-19:** Western Cable Show, Anaheim Convention Center, Anaheim, California.

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## A New Manpower Source For Cable Engineering

Cable television's professional engineering and technician ranks continue to be plagued by an insufficient supply of trained and experienced personnel. The manpower problem exists on all levels of the industry from installers to corporate MSO engineering staff. Until now the major telephone companies, especially AT&T and the Bell System Operating Companies, have been in stiff competition with the CATV industry for a pool of technical people that are in short supply. However, since AT&T has jettisoned the BOC's, a new manpower source may develop for cable engineering in the near future.

At last year's Western CATV Show, NCTA vice president for science and technology, Wendell Bailey, spoke at a technical session devoted to the cable manpower question. Bailey, who comes from a family that has many members employed with the Bell System, spent most of his professional career with AT&T and MCI before coming over to cable television. In his talk, Bailey pointed out that AT&T currently employs about one million people and, at the time of his speech, was expected to expand in the traditional telephone area at a rate of 18 to 20 percent. Bailey also stated that cable currently employs about 40,000 people and over the next five years, he predicted, "we'll have to double the number of employees that we have in the industry today."

Cable television needs a greater number of employees and a higher percentage of well trained and technically sophisticated engineers. In another five years the industry will look less like a means of transmission of video entertainment and more like a complex carrier of socially essential telecommunications in video, voice and data. No one to date has been able to find an answer to the manpower question, and there doesn't appear to be a solution in sight.

But one of the windfalls for cable television that may come out of the AT&T divestiture is the growing dissatisfaction among telephone engineers who feel that Ma Bell has abandoned them. Some of the BOC's, at the time of the divestiture, were, and will continue to be, in financial difficulty. Some have already begun to

lay-off hundreds of technically well trained and experienced persons in an attempt to cut their labor costs.

The telephone engineers and technicians that remain employed with AT&T and the BOC's are experiencing something in their careers that they have never before experienced: job insecurity. The Bell System, traditionally, has been a good place to work, with technically interesting projects, advancement potential, and solid job security. The breakup of the Bell System, for many, means diminished expectations and a cut-off of career paths that many thought would lead to the AT&T corporate level.

Cable television engineering skills are not dissimilar to those required in telephone technical work. CATV can offer the disgruntled telephone technician an exciting and challenging future with security, mobility, technical skill development, and appreciation for his or her sophistication and technical literacy.

The cable television industry, the NCTA, and the SCTE would be wise to encourage a migration of telephone engineers and technicians into CATV. It could upgrade the technical quality of this industry and go some distance toward resolving the future needs we have for bright, motivated and experienced technical people.

*George Sell*

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## NCTA Attacks FCC On AT&T

WASHINGTON, DC—In a petition before the FCC, the NCTA has attacked the Commission's position on the AT&T antitrust settlement, claiming that the settlement "takes the position that AT&T's uncontrolled entry into new markets is a 'positive good,' and therefore proposes nothing to cushion the shock of AT&T's impact on those sectors. . . . despite AT&T's proven record of abuse of monopoly power."

Fearful that the settlement will allow the spun-off Bell Operating Cos. (BOCs) to enter the CATV field, the NCTA has requested that the Commission continue to regulate AT&T entry into local markets, continue to prohibit telco-cable cross-ownership and maintain existing regulations for BOC pole attachments. Such action, says the petition, will void "any interpretation that the BOC's may furnish any telecommunications service, switched or unswitched, two-wire or broadband, within the confines of exchange boundaries. Any such involvement would undercut the FCC's efforts to stimulate new entry into local services."

## Television Equipment Specification Service

WHITE PLAINS, NEW YORK—Knowledge Industry Publications Inc. has organized and is offering a computer data bank of the television product industry. Known as the Television Equipment Specification Service (TESS), the single, comprehensive looseleaf service is sold by subscription and contains standardized technical descriptions of the specifications of more than 2,500 audio and video products used in television production and post-production.

"TESS will eliminate the chore of collecting, sorting and storing mounds of spec sheets and brochures from the various manufacturers for the user who wants to stay informed on existing hardware," said Eliot Minsker, Knowledge Industry Publications president.

Intended for use by professional TV engineers and managers, TESS is stored as a computerized database for information updating and could be offered as an online information service in the near future. Currently 400 manufacturers have supplied TESS with their specifications and Knowledge Publications intends to include several hundred more manufacturers by the end of 1983.

Product specifications are divided into

82 main product categories which are further broken down into 428 alphabetically arranged sub-categories. A table of contents lists manufacturers by products, and, as a cross reference, includes an alphabetical page index of all products included. Knowledge Publications will update TESS with periodic supplements to the table of contents, index and manufacturer directory.

## Las Vegas Build

IRVINE, CALIFORNIA—Times Mirror Inc. has selected Rocky Mountain Cable to construct the aerial build for its Las Vegas cable franchise. They join Burnsworth Cable Associates and Clover Cable of Ohio, two companies that have joined forces to build the underground portion of the system.

Construction of both portions has already begun, though Bob Griffin of Times Mirror said that a construction completion date has not been decided.

"Economic and schedule problems may become obstacles," he said.

The system, which will cover Las Vegas and the surrounding county (over 1,000 square miles), will be a 400 MHz, 52 channel, addressable system with two-way interactive capability.

## Oak Consolidates Sat Operations

CALIFORNIA—Hoping to become a greater force in the growing industry of satellite communications, Oak Industries has formed a subsidiary, Oak Satellite Corporation, to develop and consolidate Oak's satellite activities.

Oak Satellite will incorporate two earlier Oak operations: Satellite Systems and VideoNet.

The consolidation will bring Satellite System's Orion encoding/decoding system for satellite carried programming and VideoNets advancements in videoconference services and programming, under the control of Oak Satellite. Oak claims that the new Satellite Corporation will allow it to venture into the DBS field.

## Kanematsu-Gosho To Market SPRUCER

NEW YORK, NEW YORK—Kanematsu-Gosho (USA), a Kanematsu-Gosho Ltd. subsidiary, will market an advanced micro-computerized addressable converter, the "SPRUCER" base band converter, late in 1982.

The SPRUCER is unique in that it has one-way addressability, upgradeable to a two-way system. It also features a three digit LED Channel Display, remote termination ability in the headend, 128 Tags for all-channel pay-per-view service, dual input (A/B cable) automatic selection for up to a maximum of 128 channels, and a 444 MHz, 64 channel phase-locked synthesized conversion for Standard, HRC, and IRC Channel Frequency.

The Matsushita Electric Industry in Japan will manufacture the "SPRUCER" for KG.

## Wold Gets Fourth Transponder On Westar IV

Wold Communications has acquired fulltime use of a fourth transponder on the new Westar IV satellite. Wold has agreed to sublease 5D, a protected transponder, from American Satellite Company (Am-sat) effective on or before July 1. By late summer, when Westar V has become operational, Wold will have fulltime use of four transponders on Westar IV.

In addition, Wold has leased two transponders on Comstar D-3 from AT&T Long Lines. The first, 4H, will become available in July and the second, 5H, will be added to the Wold lineup in September.

Wold Communications, an FCC licensed common carrier, owns or operates 45 satellite earth stations.

## Product Announcements For NCTA Convention

CEC has learned of the following new products and features to be announced at the National Cable Television Association's Annual Convention in Las Vegas, May 2-5, 1982.

**Oak Communications Systems** will be introducing its Minicon II software package utilizing and IBM 5150 computer. The system, essentially, is an application of Oak's Interfaceable Addressing System (IAS) for small system operations and is the second generation of the Minicon software line. The IAS software permits interfacing between the control computer and the customer billing computer.

**TOCOM Inc.** will feature a live demonstration of its interactive videotext converter with addressability, the TOCOM 5510. The demonstration involves on-line interaction with The Source database.

**Gould Inc.**, Instruments Division, will be featuring its OS3350/5 TV monitor oscilloscope at its booth. The unit combines a line-by-line waveform monitor, a video

monitor, and a 40 MHz dual-trace scope.

**CableBus Systems Corporation** is introducing its Micro 1.5 two-way interactive security system designed for 4,000 to 8,000 subscribers. The system, which is controlled by a DEC 11/03 computer, is intended for systems whose needs fall between the Micro I capabilities (up to 17,000 subscribers) and the Micro II (up to 1,000 subscribers).

CableBus and the **Linear Corp.** have joined forces to introduce a wireless residential security system at the convention. According to CableBus officials, the complete home system can be carried in a suitcase by the salesman. Having completed the sale, a main unit is placed on the TV set and the sensors can then be installed in a few minutes. CableBus provides the two-way interactive security system and terminal while Linear provides the home equipment and interface.

**Tektronix** will show its OF150 fiber optic tester at the Las Vegas meeting. A fiber optic time domain reflectometer (FOTDR), the instrument is capable of quantitative, calibrated loss and distance measurements on multi-mode 125  $\mu$ m OD fibers with a core diameter of 50  $\mu$ m. It has a chart recorder for display memory and an LCD readout for repeat measurements. The portable OF150 costs \$17,500.

**Scientific-Atlanta** will be featuring two earth station antennas (ESA), a 4.6-meter and a 5-meter. Both antennas offer prime focus feeds. The company will also feature its entry into the residential security systems market (see **CEC** Product Profile, this issue) and a new 8500 series set-top converter/terminal.

**Vitek** will be introducing its new 14-channel block converter.

**Magnavox** will be featuring its Digital System Sentry status monitoring system and the Magnavox 6400 converter.

**Leaming Industries** will be offering two additions to its family of stereo synthesis units. The FMT-723 unit converts the monaural audio from the satellite receiver demod into a stereo FM signal simulcast (full-time) with the monaural at the TV set. The FMT-733 processes audio signals of local off-air carries. Coupled at the IF sound carrier of the TV processor, the unit synthesizes the signal into FM stereo. Both units offer crystal controlled and digitally synthesized output frequencies. The FM stereo audio transmission requires second cable hook-ups at the drop site for the subscriber's stereo receiver. The FMT-723 is priced at \$875 and the FMT-733 at \$1,075.

**RCA Cablesystems** will be showing its CTM20 digital TV modulator. The rack-mounted headend unit is for all applications in CATV, terrestrial microwave and TVRO signal processing.

**GTE** CATV division will be introducing a new addressable system, upgrading the Series 4040, 58-channel converter. GTE will demonstrate the system with a one

and two-way hook-up. GTE will also be introducing a new amplifier station module that will allow present 12-channel Sylvania amplifiers to increase capacity up to 35 channels. Also at the show, GTE will introduce a sub-VHF bridger switch option for the existing Series 2000 trunk/bridger station, which will allow return video or data transmission on a time-assignment basis, shutting off unused return lines.

**Texscan Corporation** will again join forces with Titsch Publishing Inc. (**CEC** magazine and **CableVision** magazine) to offer an electronic news service to be broadcast throughout the convention center and, for the first time, on the Las Vegas Hilton Hotel TV system. Utilizing the Texscan/MSI FMC-II character generator, the latest news from the convention will be made available to attendees whether they are on the floor of the Convention or in their rooms.

Texscan will display additions to its TRACS addressable converter system. They will introduce a multiplex capability over an A/B dual cable system, parental control, a 20-key data entry console with memory, a 120-channel capacity and many other features.

Texscan's Indianapolis Division will be introducing three new field strength meters: the Installer IB, the Installer IIB and the Digitech. They will also introduce the AL-57 spectrum analyzer, a micro-processor-based instrument.

**AM Cable TV**, which recently acquired E-Com Corporation, will be introducing a stepped-up 450 MHz tap.

**Harris Corporation**, Satellite Communications Division, will be giving center stage to its new 3-meter commercial TVRO system, the Delta Gain Antenna System (see article, p. 73).

## SCTE News



### Call For Papers

Members of the Society of Cable Television Engineers and other interested parties are invited to submit abstracts of technical papers for presentation at the 1982 SCTE Fall Engineering Conference, October 10-12, in St. Petersburg, Florida. The three-day conference will center on Business & Data Communications on CATV Networks.

Major topic categories include: Basics of Data Transmission; Institutional CATV/Broadband Networks; Satellite Networking; and, Business Management Aspects of CATV-Data Communications. Papers are invited on data protocols, standards and formats; relations of speed and bandwidth; multiplexing; performance of in-place urban institutional networks; future networking concepts; common carrier satellite networking; CATV as a business issue; and, competition. Additional

papers of interest on topics related to Business & Data Communications on CATV Networks are invited.

Abstracts must be limited to 300 words, with notation of the approximate number of graphics and/or photographs necessary to support the presentation. Verbal presentations will be limited to 20 minutes with discussion at the end of each major program segment.

Authors must include a complete name and address and daytime telephone number with the abstract. Abstracts are to be mailed to the Society of Cable Television Engineers, 1982 Fall Engineering Conference Chairman, 1900 L Street NW, Washington, D.C. 20036.

## Business Notes



★ **Gulf Coast Cable TV Inc.** has reached the 50,000 subscriber milestone the company reported. The southwest Houston cable company reached this subscriber plateau less than two years after beginning construction. Regarding construction progress, the company reported that the entire system is expected to be completed this year, well ahead of schedule. In the meantime, Gulf Coast continues to install new subscribers at a rate of approximately 1,000 per week. Thirty channels of programming are currently offered and 43 will be available later this year with QUBE two-way cable service.

★ **Manhattan Cable TV Inc.**, a division of **American TV & Communications Corporation**, has announced it will offer a second tier of pay service—Cinemax—to its more than 140,000 subscribers. Customers opting for Cinemax will receive Jerrold STARCOM set-top converter descramblers supplied by the Jerrold Subscriber Systems Division of General Instrument Corporation. The Jerrold converter descramblers were chosen for the enhanced pay-channel security they provide for the new two-tier pay service. A spokesman for the Jerrold Division said the company has shipped approximately 20,000 STARCOM converters out of a total of 48,000 ordered by Manhattan Cable. He added that the Jerrold units will accommodate the 35 active channels now in use in Manhattan Cable.

★ A new publication—the **Electronic Media Edition of Advertising Age**—will be introduced May 3 by publisher Crain Communications. It will mark the company's 18th business publication and the first devoted exclusively to the electronic broadcast field. The new publication will be introduced through a free circulation for 23,000 to 25,000 electronic media executives, including local and network commercial and cable TV officials, syndicated programmers, home video and radio broadcasters. The new Crain weekly has been under consideration for



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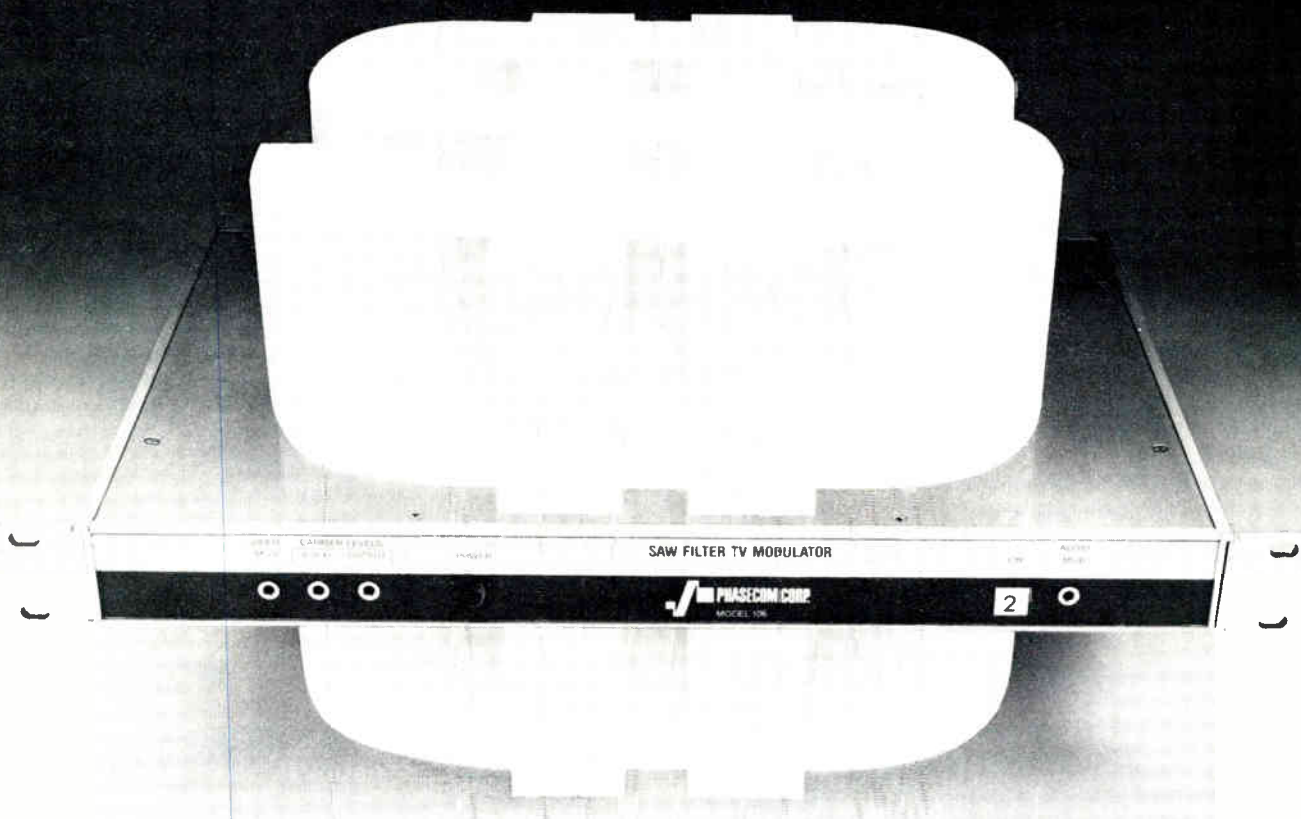
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# Computer-Aided CATV Plant Design

By Almis J. Kuolas, project engineer,  
American Cablesystems Corporation

**A**dvances in microcomputer software and the reduction in the cost of hardware is making computer-aided plant design a practical alternative to programmable calculators even for small and medium-sized systems. The savings in time and the increase in plant optimization can easily outweigh the capital costs of purchasing the necessary hardware and software.

Anyone who has designed a cable system for a new-build or for a major rebuild is well aware of the compromises that must be made to complete the job in a reasonable length of time.

The problem essentially lies in the fact that so many options are available for routing of cables, placement of active components and selection of values for couplers or splitters, that it is impossible to evaluate every possibility. Figure 1 shows a simplified strand map which we can use to demonstrate the enormous number of possibilities for cable routing and design.

Even limiting the options by assuming that the trunk and bridger station to feed this area must be located on a corner pole, we are left with 27 starting locations. Furthermore, there are at least eight locations where we will require some sort of splitter or coupler. The options include 8 dB or 12 dB couplers, 2-way splitters, 3-way equal loss and 3-way unequal loss splitters. High value couplers are excluded only because of the limitations they impose on 2-way design. Their inclusion would expand the possibilities even more.

If we further limit cable size choices to, say, .412 and .500 or .500 and .625 and we only use one size of cable on any contiguous run (i.e., cable size can only

change at actives and splitter/coupler locations), we add at least  $8 \times 2$  possibilities for the design.

Finally, assuming ten seconds for a computer to calculate the design, evaluate it against the previous design based on some defined criteria, and then to change one option and redo the cycle eventually arriving at the optimum design,

it would take  $27 \times 8 \times 2 \times 8 \times 5 \times 10 = 172,800$  seconds, or 48 hours. Even if by improving the software and hardware we could speed it up by a factor of 10, it would still take an unreasonable length of time.

And, what makes one design superior to another? Is it the minimum number of actives? The cost? Is the best carrier-to-noise or composite triple beat figure most

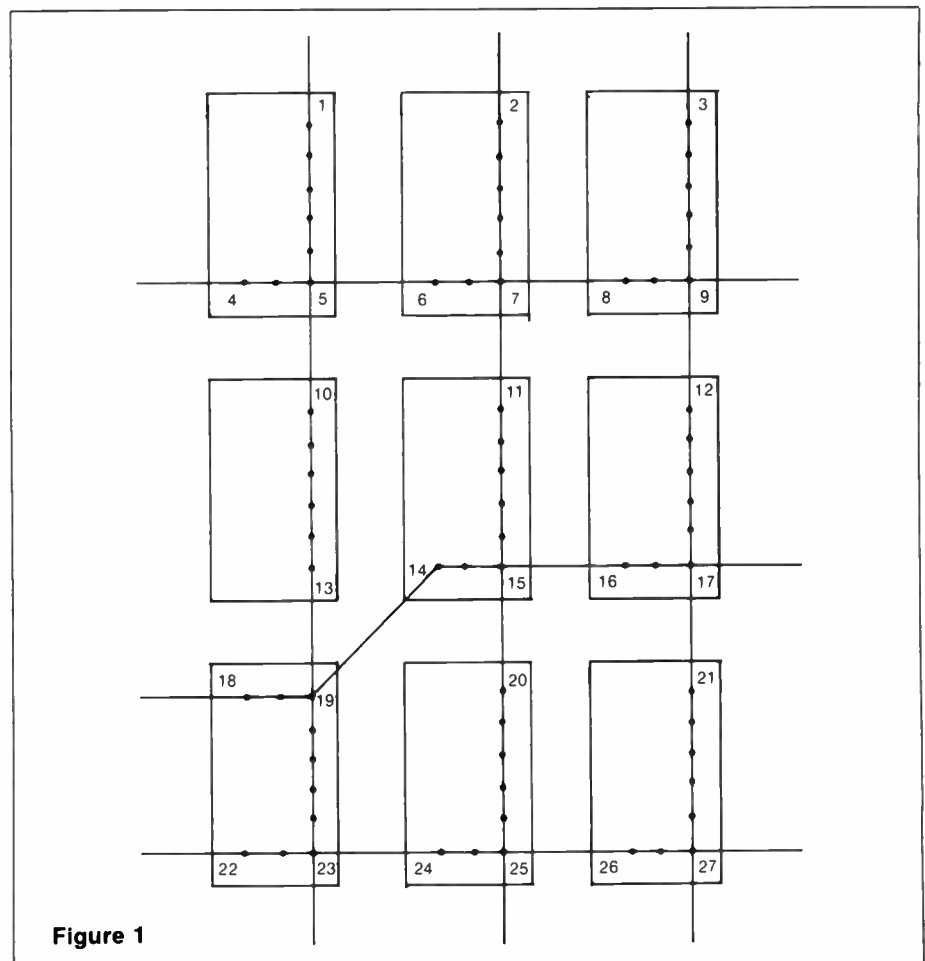


Figure 1

important? Is optimum placement for maintenance purposes the crucial factor?

Usually the best is a compromise of one or more of the above virtues, a compromise that requires personal judgment and is dependent on the priorities placed by management and the depth of experience of the designer. Rarely is the first attempt at a design successful in meeting optimization criteria. Also, repeated attempts at improving the first pass are generally time-consuming to the point where a better second or third try is accepted as optimum.

Much has been written about computer-aided design for various other applications. Modern design of aircraft, automobiles, printed circuit boards, integrated circuits and even new generations of computers are the result of utilizing computers to aid the designer in making choices of shapes, sizes, paths, materials or procedures. Few, if any, of these programs are written to complete their tasks without user interaction and

invariably, the programs are user-friendly, so that the combination of man and machine can quickly and accurately arrive at the desired goal.

## Design Program

The cable television design program described here was written originally for in-house use by American Cablesystems and its operating companies. It has since undergone several revisions to make it more universal. It is, to my knowledge, one of the few programs available that does more than just select the appropriate tap value after a footage entry. It is not only user-interactive throughout the data entry and modification routines, it also is able to print out design results and a materials list (see Figure 2).

The design program has been revised with several objectives in mind:

- To allow for simple and quick data entry.
- To allow for data modification without reentering unchanged data.
- To allow for flexibility in using various sizes of cables.

- To make it as foolproof as possible by disallowing obviously incorrect data (such as .936 cable).

- To make it affordable from both a software and hardware view. Specifically the program was written for the Apple II/48K in Applesoft Basic. With some effort it should be translatable to operate on a Radio Shack TRS-80, Commodore PET, or other personal microcomputer.

- To make it user-friendly and minimize the training time to learn the proper operation of the program.

To a very significant extent, these objectives have been met. Memory and speed limitations of the microcomputers limit their ability to handle large design areas simultaneously.

Let's examine the operation of the program. Once the operational parameters (such as output level, tilt, tap loss, cable attenuation) have been programmed, subsequent booting of the program will reflect standard operational conditions.

You will thus be prompted:  
STANDARD OPERATIONAL  
PARAMETERS  
(Y/N)?

A positive response sets all variables to the default values previously initialized. A negative response will prompt you to change the appropriate parameter. Once the change is made, it can become a permanent option for future use or it can be active only on a single use basis.

You will next be prompted to specify the starting point for the design. This may be a trunk station, a full output (-3.5 or -7 dB) bridger port or a line extender. Your starting levels will be initialized based on this choice.

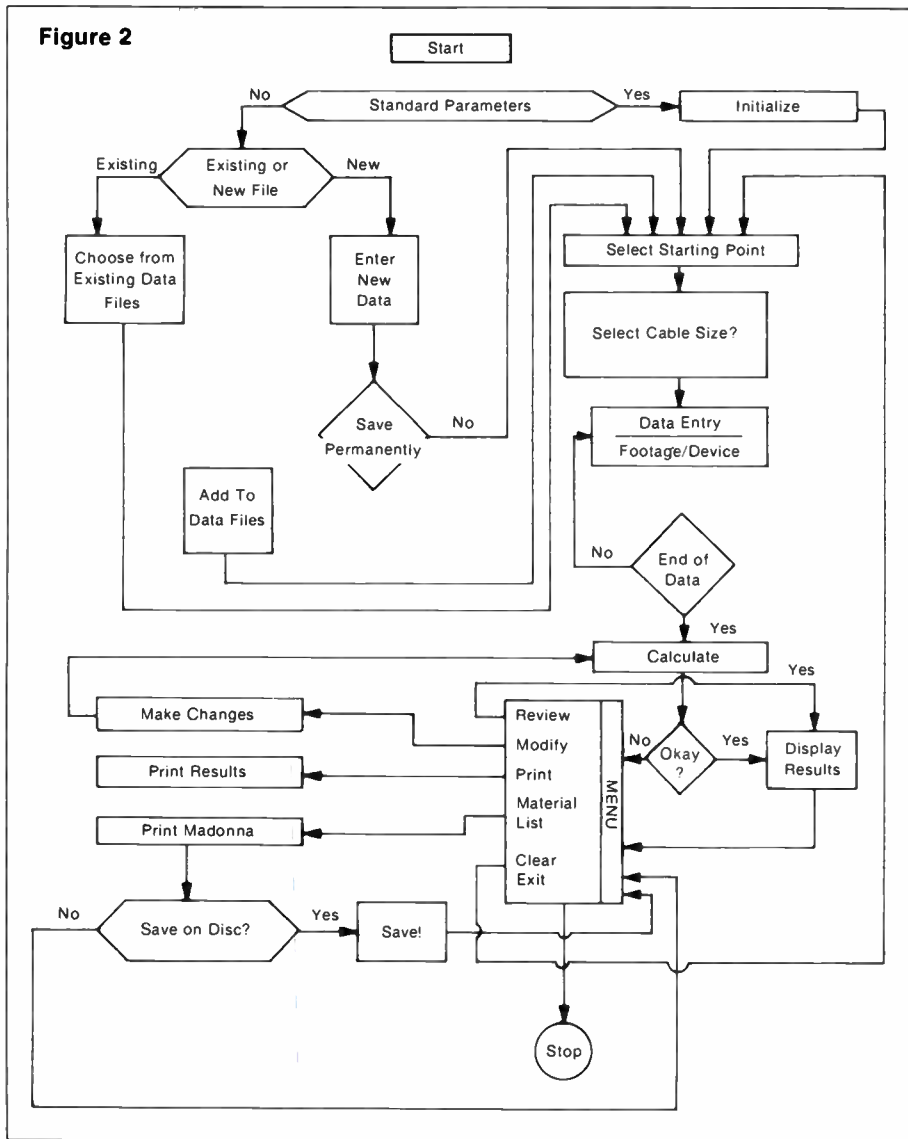
A further prompt will ask you to specify the size of cable and whether or not you will utilize only that one size for the whole line or whether you intend to mix different sizes along the run. If you intend to mix different sizes, you will be asked to enter the cable size for each span. Otherwise, the preselected size will be assumed in all calculations.

Once the operating specifics have been established, the user is prompted to enter the footages and device types for the complete line to be designed. Cable size choice was made previously.

The codes in table 1 (page 24) represent the device choices available:

Upon completion of data entry, a /Ø,Ø/ entry specifies the end of data. At that point the computer performs the necessary calculations and returns a completed design based on the input data.

If the design engineer is satisfied that the design is adequate, he may choose to review the results, print them out and/or save the materials list in a file to be printed out upon completion of a map, phase or complete system. If the completed line





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CODE	DEVICE
2	2-way tap
4	4-way tap
8	8-way tap
S2	2-way splitter
S3	3-way splitter (equal loss)
S31	3-way splitter (leg 1 is hi-loss)
S32	3-way splitter (leg 2 is hi-loss)
S33	3-way splitter (leg 3 is hi-loss)
D8	DC-8 (through loss continues)
D8R	DC-8 (tap loss continues)
D12	DC-12 (through loss continues)
D12R	DC-12 (tap loss continues)
D16	DC-16 (through loss continues)
D16R	DC-16 (tap loss continues)
E	in-line equalizer
L	full-output line extender
L2	reduced output LX (if cascaded)
T	trunk amplifier
Ø	no device (splice). When used in conjunction with Ø, footage indicates termination of line.

These same codes apply in the "MAKE CHANGES TO DATA" mode.

**Table 1**

represents the end of the design effort, a materials list for the single line may be specified.

However, if the design is not satisfactory or does not work, the user can enter into a "MAKE CHANGES TO DATA" routine which allows the designer to change individual entries as long as these changes do not increase the total number of output ports. For example, one may change a 2-way splitter to a directional coupler but not to a 3-way splitter. A commonly implemented change would be to increase cable size from .412 to .500 or from .500 to .625 where the signal is marginally too low but an additional line extender is not warranted to feed the last two taps. Once the desired changes have been completed, the program automatically recomputes all of the losses and gains, redisplayes the new design results and reopens the menu options for printing, making additional changes, cancelling the data or exiting the program.

Additional features of the program include automatic placement of in-line equalizers when reverse tilt exceeds a pre-set amount (say, 2 or 3 dB).

Earlier versions of the program had automatic placement of line extenders wherever signals were too low to place a specified tap. This option was deleted since human judgment can usually optimize the placement of actives better than a formula.

The display routine will allow the user to view all the entered data (i.e., footage, device types and cable size) as well as the computed tap values, and the low channel and high channel input levels into each device. Although the computer will not make any concessions with respect to tap levels, the user may, upon seeing a terminated tap location fail for the sake of 5 dB, decide to place the tap anyway

rather than increase cable sizes, add actives, implement back-feed techniques or totally redesign the area.

Once the designer is satisfied with the results, a hardcopy printout is available as a permanent record. A title is entered for the hardcopy (for example, 150-305 Milton ST or amplifier 1A3) followed by a listing of devices and all tap values. It even lists the number of housing to housing connectors resulting from two or more devices being specified at the same location.

### Program Limitations

Although this program as described is powerful compared to previously available microcomputer software, several elements are notably missing:

1. Automatic routing of cables and automatic selection of optimum coupler values.
2. Graphics capabilities to at least display the results on a screen if not to totally draft the results on a hardcopy map.

Whether or not these will appear on future generations of software for microprocessors, I cannot say. What I do know is that the level of sophistication to add these elements is an order of magnitude more complex than in the present version. Present micros are also limited in memory and particularly speed. Furthermore, printers/plotters capable of high resolution mapmaking are presently beyond the price range of most medium-sized cable operators.

However, memory size and speed are increasing dramatically with the advent of the 16-bit processors, costs are at least staying constant if not decreasing, and printers are constantly being developed with more sophisticated graphics capabilities.

Certainly some of the missing elements could be added. Automatic coupler or splitter selection would be fairly straightforward if the criteria for "optimum" could be defined and the speed increased by a factor of 1,000. This is not totally unreasonable. By compiling the program to machine code, a speed increase up to 10 times is achievable. By software improvements limiting choices and eliminating obviously poor designs before they are even completed, a further order of magnitude may be achievable.

Finally, by utilizing a 16-bit processor (soon to be available at a low cost) instead of the AppII, our 1,000 factor may be achievable. Programs displaying graphics on a device basis are in existence already. The difficulty arises in scaling the display to automatically handle the wide dynamic range of branching and line lengths. Although I have not attempted it, I think that some form of graphics would be possible utilizing a bit pad to specify relative equipment locations and a printer with screen dump graphics capabilities. However, unless the final product replaced the need for a draftsman producing quality mylars, the value of a lesser system is dubious. Existing systems with those capabilities are priced at least ten times higher than this system. Such costs can only be justified by large design and engineering establishments employing numerous designers and draftspersons.

Experience has shown that the utility of the American Cablesystems' Design Program is not so much in total man-hours saved, but rather in the resultant quality of the design. Because changes in the data are relatively easily accomplished, the designer is more likely to try various alternatives and select the best rather than pick the first one that works. The result is a savings in active components for increased reliability, improved electrical performance, simpler maintenance and perhaps most important—cost. After all, a savings of only 2 percent in the cost of actives in a typical 100-mile build will justify the purchase price. Experience has shown that a 10 percent reduction in actives is usually possible.

*Almis J. Kuolas joined American Cablesystems Corporation in 1981 as project engineer, having previously been manager of engineering services with Premier Communications of Toronto. He received a BSc degree in physics from the University of Toronto in 1974. He is a member of the SCTE and the IEEE.*

*The computer program described in the above article is available from American Cablesystems for \$500. For further information, contact Al Kuolas at (617) 471-9611.*



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# Narrowband

A practical solution to noise and ingress for two-way services

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By Clifford B. Schrock, chairman, CableBus Systems Corporation

**A**s more two-way services are contemplated for CATV systems, the return path continues to be a limiting factor in the economic viability and reliability of the services. This article gives a simplistic analysis of the impact of low data rates for two-way services. A number of current services including security, energy management, filtering and home data transmission are analyzed to determine the *effective* data rates required.

A technique of using narrow bandwidth transmissions in the return path and other enhancement circuitry at the headend as an alternative to the wideband techniques is described, and comparative data is presented along with a summary of two years practical experience using the narrowband techniques for alarm services.

## The Present Dilemma

The present dilemma for cable systems is that they want to offer advanced services, but have no cost/benefit justification to do so. Consequently the commitment to maintain plant is lacking and early experiments are failing either economically or technically.

What is presented is a technique that lets the CATV operator begin two-way services without having to fight all the traditional problems. Further, the system is compatible with envisioned future services systems by merit of its bandwidth efficiency and may well remain as effective once the return path and its associated problems are understood and solved.

The system presented is formulated around one premise—*narrow bandwidth*. The baud rate in simply encoded systems is roughly:

**Baud rate  $\times$  2.1 = Bandwidth**

For instance, 9600 baud will require roughly 25 KHz of bandwidth.

To achieve the minimum data rate, each new service opportunity can be analyzed to get to the true information content requirement for a given system. As an observation, it should be noticed that the information content is significantly lower than the actual baud rates proposed for use by most systems.

## Real World Examples

*Alarm Systems*—The objective is to locate all alarms within

five seconds. A brute force solution is to poll all customers every five seconds for their status. However, two significant factors are overlooked. The majority of status changes in an alarm system *are not* alarms; therefore supervision can occur less often—for instance once per minute or (using UL guidelines for alarm operations), once per 90 seconds.

The second factor is that the dispatcher, followed shortly thereafter by the available response equipment (i.e., fire trucks and police cars), rapidly becomes the limiting factor. Prioritization is required at the dispatch position to deal with the alarms—and this prioritization can be established in the system operation by using an interrupt type protocol. One way to do this would be to scan all the accounts slowly (hence in a narrow bandwidth) to supervise or make sure they are on-line, then interrupt the scan for alarms at short intervals.

*Pay TV Control*—The downstream and return (pay-per-view or customer preference) could, of course, be handled with a rapid, real time data rate. However, in a real-world situation, updates can occur slowly, and the presentation of special events could be preset on the appropriate home terminals, then activated with a single mass command from central.

Channel authorization decisions can be made within the terminal by comparison to an internal up-dateable ROM.

In the return path, theorists envision that overloads could occur in a pay-per-view type event, where, within a period of a few minutes, thousands of terminals could request an event. However, a system of presets that would allow usage for a short period while the system was updated would probably suffice.

*Meter Reading*—Metering systems generally have three requirements—monthly reading, on-line reading (such as when a tenant moves) and demand reading. Demand reading is the most strenuous, although readings per home every 10 to 15 minutes suffices in most instances and can be handled to high capacities with low data rate. Demand reading can enhance 50 to 60 percent the presentation of the most significant digits and could effectively double the polling rates and subscribers served.

*Energy Management*—All proposed systems revolve around customer notification, or system setting, in response to factors such as peak demand or temperature and weather changes. None of the factors requiring control occur instantaneously, nor would a virtually instantaneous (real time) mass command be required. Further, a mass command (such as switching of 10,000

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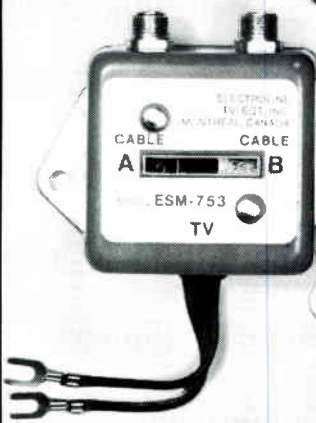
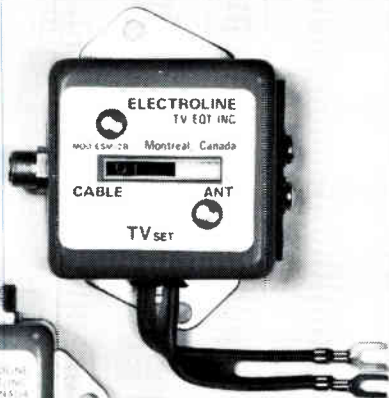
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hot water heaters simultaneously) could, in fact, cause significant problems to a utility. Energy management in general can be thought of as a low data-rate type function.

*Two-way data systems and Customer Preference Polling*— These systems potentially require the highest effective data rates. The downstream requirements are the greatest, with whole pages of data being delivered to each subscriber on the service. Teletext and videotex systems are already addressing the downstream aspects. Yet the following observations must also be factored:

- Given the availability of a data system to each home, at any one time, only a small percentage of the population will try to use the system. For instance, the Bell system has used a factor of 15-17 percent usage for years in planning telephone trunking facilities. While we don't yet know what this will be for our services, we do know it will be less than 100 percent.
- A person asking for data is much slower than the data returned. Typically a person will enter a menu selected digit or a line of data and receive a page of information back. Rarely can a person deliver data to a system in excess of 110 baud; while, in supplying data back to the subscriber, anything less than 2400 baud "feels" slow.

Much work has already been done in data-packeting protocols for networking applications. Systems such as Ethernet, and the Mitre system take advantage of both points mentioned above to allow efficient packets of data to be sent on a system of much lower baud rate than a cursory glance would suggest. The author theorizes that other alternatives or adaptations utilizing low baud rate channels and multiple channels could provide efficient solutions.

The short analysis above was done to bring the reader to a single conclusion: that the actual information content of proposed and envisioned new services on cable is quite low—especially in the return path. Further, if the information content required is low, then the baud rate, and ultimately the bandwidth, is low. This fact can be used to a tremendous advantage by permitting the cable operator to offer advanced service without carrying the overhead in maintenance and associated costs of operating the two-way plant.

### A Practical Narrowband Design

The author has designed a narrowband, high-capacity alarm system for cable TV systems that is being used by many cable operators. A detailed analysis is shown to illustrate how the parameters were selected and to show the margins gained over other system approaches.

The system used in this example is the CableBus® Systems Corporation CableAlarm™ system. The design goal was to provide a high-capacity alarm system capable of serving up to 100 percent of the homes in a cable service area. (Present experience with custom alarms indicates a 5 to 10 percent penetration, however, significant breakthroughs in price, coupled with the increase in crime and decrease in municipal services has the author predicting that we may see franchise areas with a smoke detector in every home by the mid-1980's.)

Typically, the largest block of homes served by a single cable is limited by amplifier spacings to hubs serving 40,000-60,000 homes. Multiple hubs could utilize the same frequencies to serve different customers, and hubs with exceptions to the maximum proposed capacity could be provided with two or more trunk outputs. Therefore, the first premise is that a single trunk area will require a maximum capacity of 40K alarm accounts.

In choosing the bandwidth, it was felt that 25KHz was the lowest practical value. Factors including the availability of IF components, frequency stability of the home terminals and the attendant cost, and the capability of the resultant data rate (9600 baud), were considered. Two simple modulation options were available: narrow deviation FSK or simple keyed carrier AM. Since narrow deviation FSK has little perceptible C/N advantage over AM, and AM was easy to generate with a minimum number



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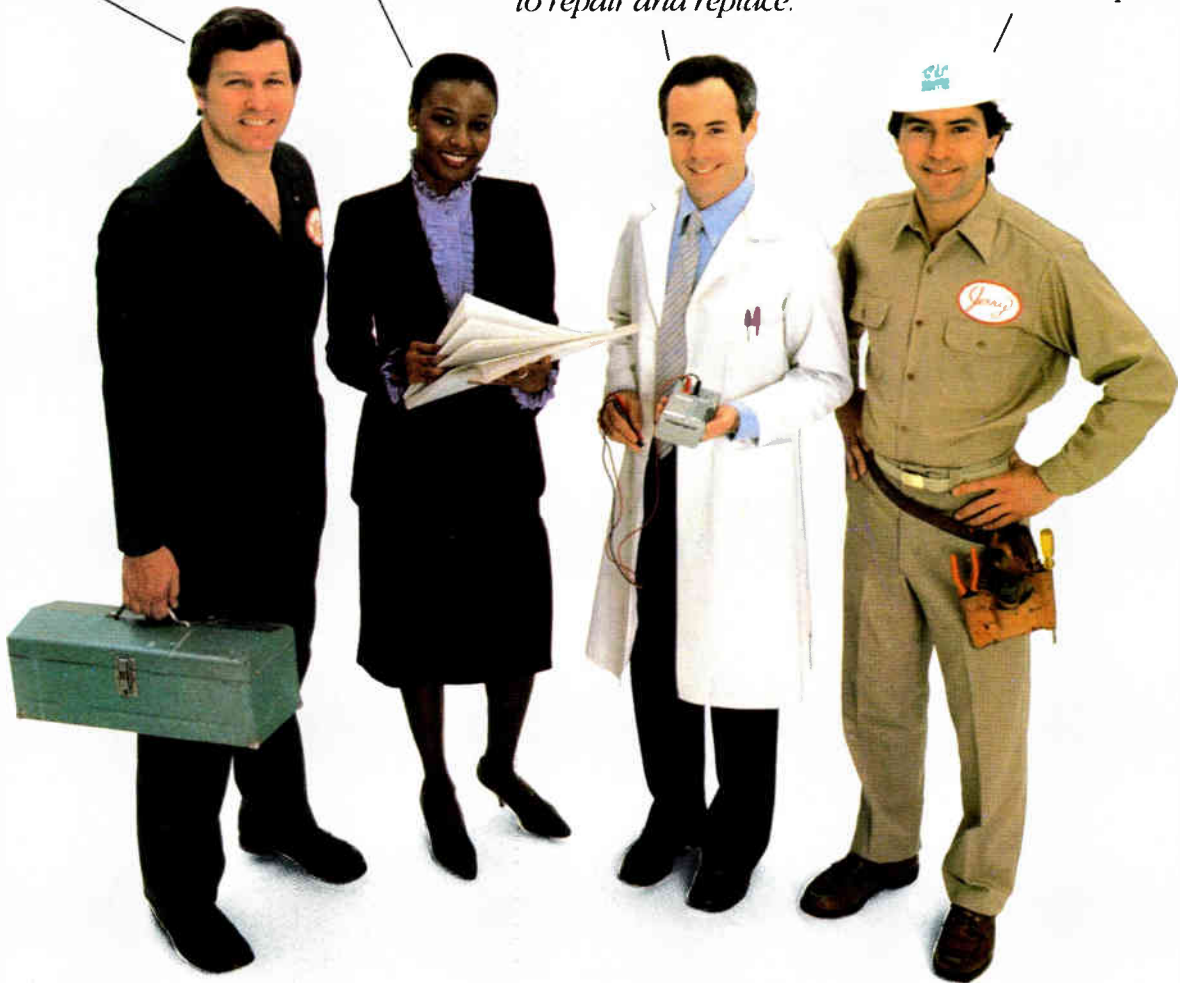
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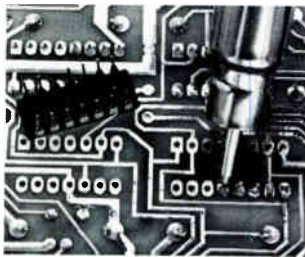
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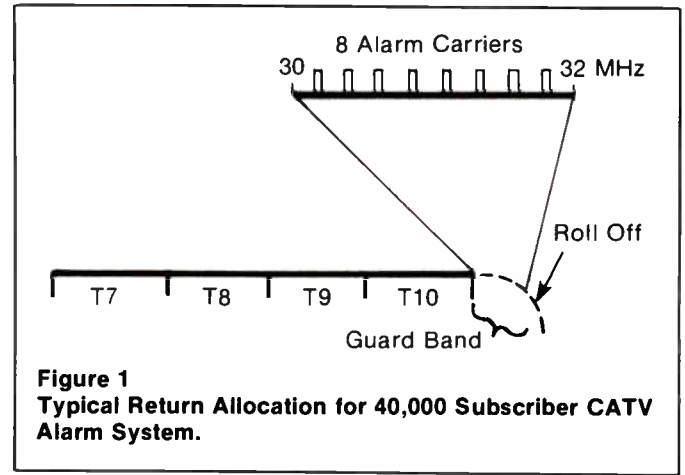


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**Figure 1**  
**Typical Return Allocation for 40,000 Subscriber CATV Alarm System.**

of components, AM was chosen.

Account access times were chosen using UL-611 alarm industry multiplex guidelines to arrive at the following:

- Maximum supervision time to check every account for status would not exceed 90 seconds.
- Maximum time between checks for alarms (interrupts) would not exceed five seconds (10 seconds required by U.L.) for the first alarm.
- Ability to sort and list multiple alarms would exceed 50 per minute (which would, it should be pointed out, overrun virtually any dispatch center in the U.S.).

The limiting factor, therefore, is supervision time (checking to make sure each account is still there). Using an ASCII message format of a header, four address characters and two command/interrogate characters; a maximum of 77 bits per account would be used. Roughly 11,220 accounts could theoretically be covered in 90 seconds at 9600 baud using this technique. Allowing for space between transmission, alarms, and other contingencies, a maximum of 5,000 accounts per 25 KHz bandwidth was adopted. To handle 40,000 accounts, eight subcarriers of 25 KHz each would be required. If these carriers were spaced on 50 KHz intervals, an entire 100 percent penetration security operation could be operated in 400 KHz of return bandwidth, with the forward data occupying a similar bandwidth.

## Quantifying The Advantages

An analysis of the system advantages over some existing schemes is provided. Currently, other manufacturers offer a variety of high baud rate schemes, the narrowest utilizing approximately 280 KHz using an FSK carrier. The CableBus system uses an AM carrier as was described.

The C/N advantage due to bandwidth alone is in the order of a tenfold reduction; approximately 10 dB. A further advantage can be claimed by merit of the simple keyed AM format. A 12 dB C/N is required for reliable performance in a clear (white noise only impaired) noise situation. While it may not be a true advantage in carefully designed equipment, current wideband FSK systems claim to operate only to within an 18 dB C/N.

A third advantage can be obtained by video filtering the data. As shown in the figure, although the bandpass for a given data rate must be  $2.1 \times$  the data rate for simple modulation, there are gaps within the bandpass (Figure 2). A relatively simple comb filter applied at baseband can gain an additional four to five dB of noise reduction.

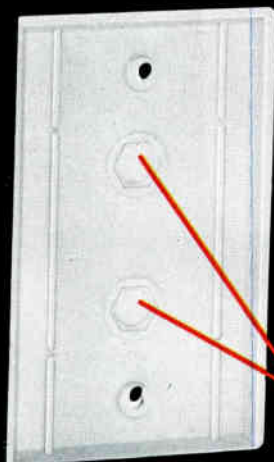
A final filtering technique is the "software filter." Random high level system perturbations will always exist on two-way return plants. Lightning strokes and electrical power switching transients are the most violent, although many other sources can "upset" the system. Effective software protection in the form of multiple checks on status and error-correction can enhance a

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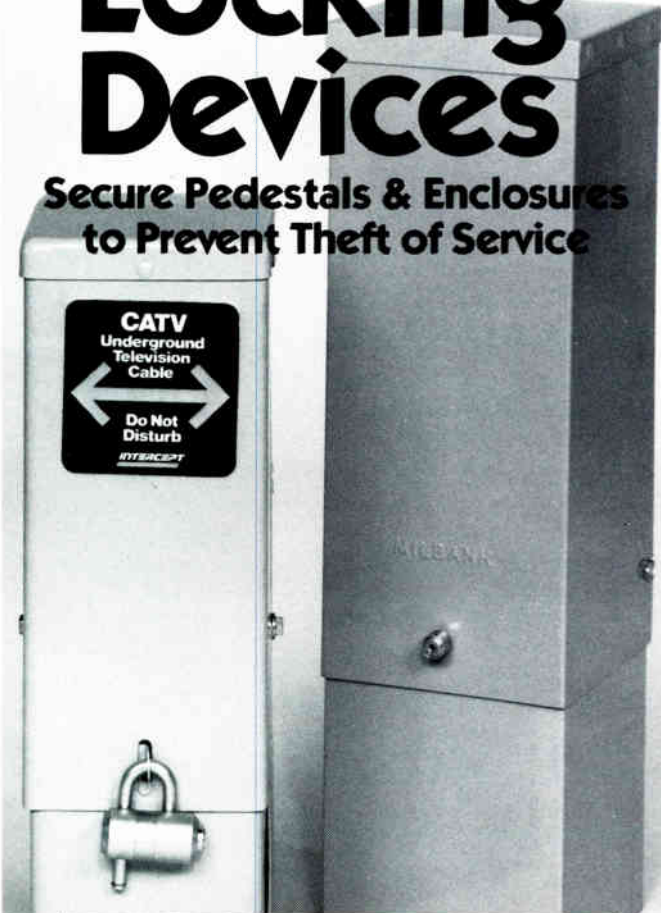
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marginal C/N situation. A summary of possible noise improvements for a 25 KHz alarm system is provided.

Bandwidth reduction to 25KHz	10dB
AM/design improvements	6dB
Video filtering	4-5dB
Software filter	3dB
	23dB

Up to this point we have been talking only about numbers. The real advantages of a narrowband technique are cost benefits to the operator and the numbers must be translated accordingly.

The author feels that the single largest advantage today is gained through a reduction in manpower for trouble calls and maintenance. The two-way plant for a system such as the one described would not be running anywhere close to its maximum potential; therefore, alignment and ingress problems would be substantially reduced.

The terminal and the central computer equipment designs benefit from the data rate reduction. In the home terminal, lower baud rates can be very effectively handled with "bit-crunching" in a single microprocessor, rather than requiring a separate UART or other converter. Further, the home terminal processor can be multi-tasked to handle the other local intelligence required both for a "software filter" and to operate the home alarm system. A single-chip home terminal design means lower cost and/or greater performance.

The central computer can also be simpler and operate using one or more RS-232 ports rather than having to provide a more expensive high-speed port.

Another significant advantage is that the narrow carriers can be placed on the cable in places not normally considered useable by other systems. For instance, most of the CableBus systems so far have operated in the 30 to 32 MHz guardband. (See Figure 1) While most systems do begin to roll off in this area, the C/N advantage offsets losses of up to 10dB in the guardband and the roll off is not a significant factor.

Another related advantage is that the narrow carriers can be placed to avoid known ingress carrier sources. In a marginal or older CATV plant, it is advantageous to chose a quiet slot on the cable, a task that is easy if the bandwidth is narrow. (Figure 3)

A final advantage is that of using a lower return transmitter level from the home. Industry standard is to use +50 up to +60 dBmV for the home terminal return transmitter. The author questions the impact upon factors such as leakage by FCC part 15 and part 76.613. Most home drops are marginally effective with downstream signals in the 0 to +10 dBmV level range. A return signal of +50 dBmV, even of short duration, could be wildly out of specification on a standard RG-59 drop, especially after

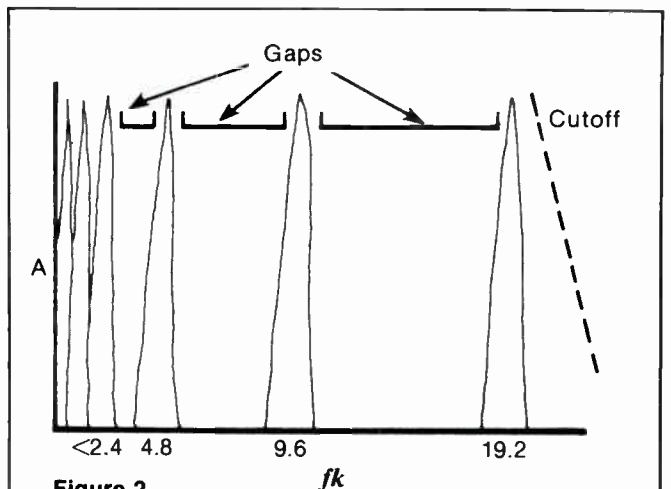


Figure 2  
Fourier Transform Distribution of the Frequency Components in a 9.6 kB Data Transmission.

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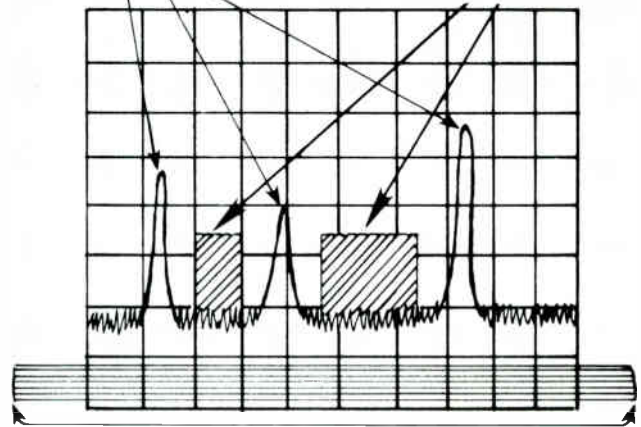
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**Figure 3**  
**Choosing a Quiet Return Frequency**

the foil deteriorates. Without final supporting data, CableBus has limited its maximum output level to +41 dBmV at the home. A typical worst case flat loss of 47 dB will be encountered between the home and the headend on a well designed two-way plant, resulting in a return level at the headend of -6 dBmV. The practical worst case white noise floor (coherent carriers excluded) that we have ever encountered in a two-way plant, across 25 KHz has never been greater than -30 dBmV. An additional minor advantage of lower terminal transmit levels is that less filtering is required on the TV leg to the home.

## Conclusions

By utilizing narrowband techniques, new services can be accommodated on CATV plants, and need not become a tremendous maintenance and repair burden to the operator.

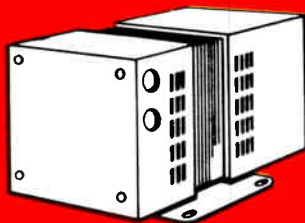
Narrowbanding is a method of combating and/or dodging noise and ingress problems. Significant advantages can be gained over wideband systems.

Narrowbanding also efficiently utilizes the CATV spectrum. To most operators today, bandwidth is not a problem. However, within a few years, after a few new service successes, the author feels that bandwidth will be at a premium. It is analogous to the pre-1973 gasoline situation. Nobody believed in conservation of gas until they ran out!

Experience gained using the CableBus Alarm System over the past two years has proven that less is required of the return path to operate successfully on two-way and marginal plants.

Narrowbanding has significant advantages whether applied as a single carrier or as hundreds of narrow carriers. Someday there may be so many services and revenue sources using two-way that they will be able to easily justify the manpower and equipment necessary to support a very tight high-quality return plant and allow wideband return schemes. Until then, the alternative presented may be the answer.

*Cliff Schrock left his position as CATV program manager at Tektronix, Inc., in 1978 to form CableBus Systems Corporation where he currently holds the position of chairman. He holds a BSEE from the University of California, Long Beach, and is a member of the SCTA, SCTE, and CATA.*



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In addition to fiber optics and satellite antenna design, sessions will be devoted to system reliability, studio technology, data transmission technologies, satellite spacing, videotex, satellite technology and microwave system design, data transmission systems, new developments in addressable hardware, interfacing CATV with subscribers' sets, control of noise and distortion in distribution systems and future technologies.

Technical sessions will take place in the East Meeting Room complex of the Technical Corridor in the convention center. The 40 to 50 technical papers to be presented in the sessions will be available in one softcover volume for sale at the convention.

## New Developments In Addressable Hardware

Monday, May 3, 1982—2:30 to 4:00 p.m.

This panel will present the latest products in addressable hardware and techniques. Including developments in small system and multi-unit applications and integration of teletext.

Mr. David Large, moderator  
Gill Cable TV

Mr. Charles Eissler  
Oak Communications, Inc.  
**Addressable Control for the Small System**

Mr. M. Farouque Mesiya  
Times Fiber Communications  
**Minihub Addressable Distribution System for High-Rise Applications**

Mr. Robert R. Brown, Jr.  
**Inter Bridger Trunking for Information Services**

Dr. Charles Alvord  
Communications Technology Management, Inc.  
**Creating Standards for Interconnect Systems**

Mr. Christopher Weaver  
Media Technology Associates, Ltd.  
**Developments in Man/Machine Interface: The Cable Connection**

## Why Aren't Fiber Optics Being Used In Cable TV?

time and date to be announced

This panel will focus on activities around the world that are providing fiber optics directly to the home or business and then will discuss reasons why the U.S. CATV industry is not moving to use this technology.

Dr. Paul Polishuk, moderator  
Information Gatekeepers, Inc.

Mr. Harry Kallina  
Cable Communications of Iowa, Inc.  
**Electrical Safety Codes**

Mr. John Skrobko  
Scientific-Atlanta  
**Improving CATV System Reliability with Automatic Status Monitoring and Bridger Switching**

Neil Rapoport  
RCA Cablevision Systems  
**Improvements in Headend System Reliability**

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Mohamad Masri  
RCA Cablevision Systems  
**Amplifier Status Monitor and Control System**

John Dahlquist  
Jerold Distribution Systems Division  
**Techniques for Improving Continuity of Service in a CATV Distribution System**

## Applications Of Fiber Optics In CATV

Tuesday, May 4, 1982—8:00 to 9:30 a.m.

This session will review the present state of applications of fiber optics to CATV in the U.S. and abroad. Recent developments in fibers, cables, and connectors will be described as well as actual operating experience.

Dr. Paul Polishuk  
Information Gatekeepers, Inc.  
**Present Status of Fiber Optics Technology and Its Impact on the CATV Industry**

James Herman  
Times-Fiber Communications, Inc.  
**Mini-Hub Concept**

Dr. Douglas Pinnow  
Times-Fiber Communications, Inc.  
**Cable and Connectors**

two more speakers to be announced

## Interfacing CATV With New Consumer Electronics Products

Tuesday, May 4, 1982—2:30 to 4:00 p.m.

This panel deals with the many issues and problems involved in interfacing the modern cable system with home video equipment created by new technologies.

Mr. Joseph Van Loan, moderator  
Viacom Cablevision

Mr. Jerry Bahr  
Cox Cable Communications, Inc.  
**Cable-Ready Sets—An Operator's Viewpoint**

I. Switzer  
Cablecasting Limited  
**Present Set-Top Converters & Related Subscriber Terminals**

## Satellite Spacing

Wednesday, May 5, 1982—10:00 to 11:30 a.m.

Mr. Norman Weinhouse, moderator  
Hughes Microwave

Panelists to be announced.



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Your profits from multiple tiering, pay-per-view, and interactive services will be substantially increased by TFC's Mini-Hub™ System. Total remote authorization and verification maximize your revenues from all services.

No more signal theft or accidental "freebies." You bill everything you deliver. No more excess royalty payments. And your collections will improve, too, with instant remote disconnect/reconnect of all services.

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# System Calculations

The TRS-80 pocket computer is a true computer, programmed in BASIC

By Pat McDonough, project engineer, United Cable Television Corporation, and Steve Johnson, consulting engineer, Ron Cotten & Associates

One of the most frustrating and time consuming exercises for a cable TV engineer or technician is the repetitive calculation of various system performance characteristics. Most of us have had the dubious pleasure of figuring over and over just what size earth station we need, where to aim it, how, or if, it will work, or trying to decide how many amplifiers can be run in cascade before the signals self destruct. Hand held calculators have almost totally replaced slide rules and now the new generation of programmable calculators and even micro-computers are taking their place in the number crunching business. One of the handiest of these new devices is the TRS-80 pocket computer.\*

The TRS-80 is a true computer. It is programmed in BASIC, which is much easier to use than many of the programmable calculator languages. The computer's internal memory, 1,424 steps, 26 fixed memories and 178 flexible memories, is

\*TRS-80 is a trademark of the Tandy Corporation.



# NCTA '82





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MAKES UPGRADING LESS COSTLY  
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CED 5/82

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on how to upgrade to 26 channels for less.

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Title \_\_\_\_\_

Phone \_\_\_\_\_

Cable system \_\_\_\_\_

Address \_\_\_\_\_

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more than sufficient for most applications. An optional cassette interface and printer are available for additional program storage and hard copy records.

Pocket computer BASIC is a relatively powerful program language, but easy enough for the novice computer user to master quickly. BASIC utilizes simple words for commands and logic statements. To get the computer to run a program the command RUN is used. PRINT tells the unit to print whatever follows the command. INPUT tells the computer that information will be entered. GOSUB commands the program to jump to a sub-routine and to return and so on. These commands can be abbreviated to save memory space, such as I. = Input. Punctuation marks are used to separate different statements on the same program line. While retaining simplicity, BASIC requires a fairly strict protocol when programming. If a mistake is made, one of six error codes is displayed which define the type of error and its location within a given line.

Mathematical functions are generally written just as they normally appear in an equation. It does help to know how the computer prioritizes the math functions so the equation can be entered to get a correct result. Log, trig, inverse trig and logic functions are all available for use as well as exponentials and angle conversions. Addition, subtraction, multiplication and division are signified by +, -, \*, /.

Developing software for CATV application is not difficult and programs can be tailored to meet individual requirements. The small group of users here at United Cable have already written several useful programs and we are constantly adding to and refining our software. Some of the programs we have completed to date include the following:

1. Point to point distance—computes the distance in miles between two pairs of latitude/longitudes and displays the distance and azimuths.
2. Signal level—computes received signal strength, based in part on Program #1.
3. Path loss—computes loss in dBmV over a specified distance at a desired frequency, part of Program #2.
4. dBmV to dBm, dBm to dBmV—does these conversions. Also, part of Program #2.
5. Earth station aiming—calculates and displays the azimuth and elevation for an earth station, given latitude, longitude and satellite longitude.
6. Earth station evaluation—calculates and displays LNA output, carrier/noise and signal/noise ratios. Based on EIRP, antenna gain, antenna temperature, gain and temperature of the LNA and the noise figure of the receiver.
7. Composite triple beat, cascade—

computes total composite triple beat distortion for a given cascade of 3 different amplifiers based on the number and single amp specifications for each type.

8. Cross modulation, cascade—same as Program #7.
9. Carrier/noise, cascade—computes total C/N performance for up to 3 different amplifiers in cascade based on the number, noise figure, gain and output level of each amp.
10. Simple feeder design aid—computes tap input levels, tap value based on amplifier outputs, high and low channel losses and desired output levels.
11. Output levels—calculates the correct output level for a cascade of identical amplifiers for specified distortion parameters.

Most of the programs listed above can be stored in the computer's nonvolatile memory, but a tape backup is highly recommended. As can be seen, the software possibilities are quite varied. But, the real advantage of this computer is that it will literally fit into your pocket and can be extremely useful at remote headend or earth station sites, on an airplane and so on.

Program applications are limited only by the needs and imagination of the user. Radio Shack offers some programs which

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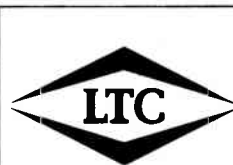
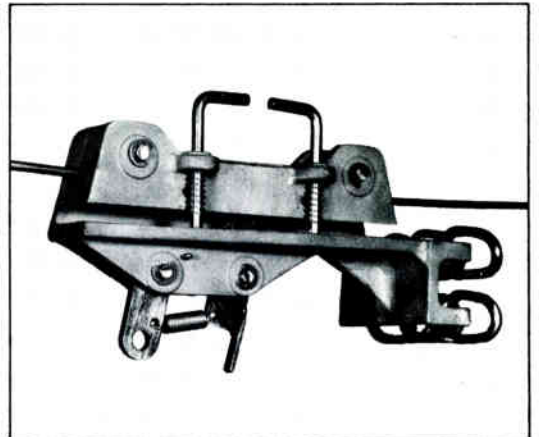
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may be used. Their engineering package includes filter design programs. Other possibilities include microwave path analysis, tower stress and torque analysis, fiber optic and FM coax signal/noise calculations and 2nd and 3rd order beats for a given number of channels. Business related programs for cost analysis, inventory cost estimates, depreciation analysis and loan payment/interest are available.

In order to demonstrate the relative simplicity of the programming process for this computer, programs 5, 6, 7 and 8 will be listed and described below. All of these programs were written for us without a printer, but can easily be modified to utilize this option.

## Two 4-bit Microprocessors Split Functions

The internal design of the TRS-80 pocket computer is much different from other handheld units. The TRS-80 uses two 4-bit microprocessors in a unique serial configuration as opposed to a single 8-bit processor. Both of the 4-bit devices are CMOS IC's with built-in ROM (read only memory). The first microprocessor arranges data and makes decisions. It also reads information that is keyed into the unit or requested from the program memory. It interprets BASIC statements and prioritizes the mathematical operations. This processor then arranges data and sends instructions to the second microprocessor, where the actual functions are processed. Processor two then updates the visual display. The split of functions for each device is listed below:

**Microprocessor 1**—Keyed INPUT routine, acknowledges remaining program, program execute statement interpreter, cassette control interpreter, command statement interpreter, printer control, execution of manual functions, power shut off and clock stop control.  
**Microprocessor 2**—Display routine, input buffer, error display, calculation results, math routine, cassette routine, beeper, character generator, print routine and clock stop.

The memory of the pocket computer is all in four IC's. Three of these are memory chips, each with 512 bytes of programmable memory. Three IC's drive the Liquid Crystal Display and contain 128 bytes of memory each. All together this equals 1920 bytes of memory. Approximately 500 bytes are used for internal functions so the net result is 1424 bytes of user programmable memory.

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- 6 Polarization for each satellite & transponder.

AND  
MUCH,  
MUCH MORE.

**SATELLITE CHANNEL CHART** JAN FEB 1982

**1 WU WESTAR 3 (S1 \*W)**

TR--(02) HUGHES SPORTS NETWORK—sports events feeds (S 0.6 B 0)  
 TR--(05) OCCASIONAL TRANSMISSIONS—sporting events, news & features (S 0.6 B 0)  
 TR--(06) XEW-TV, Mexico City—Mexican leading network (S 0.2)  
 TR--(08) OCCASIONAL TRANSMISSIONS—sporting events, news & features (S 0.6 B 0)  
 TR--(09) CBS CABLE—satellite programming (S 0.6 B 0)  
 TR--(10) CBS CABLE—satellite programming (S 0.6 B 0)  
 TR--(11) CBS CABLE—satellite programming (S 0.6 B 0)  
 TR--(12) ROBERT WOL COMMUNICATIONS—satellite programming (S 0.6 B 0)  
 TR--(13) BELEC-TV—S-V feed from Mexico City (S 0.6 B 0)  
 TR--(14) FMN—Program Network (S 0.6 B 0)  
 TR--(15) SBN (Spanish International Network) (S 0.6 B 0)  
 TR--(16) SPN (Spanish)  
 TR--(17) ABC Networks  
 TR--(18) ABC Networks  
 TR--(19) CNN (Cable News Network)  
 TR--(20) OCCASIONAL TRANSMISSIONS—sporting events, news & features (S 0.6 B 0)  
 TR--(21) EWTN (Eternal Word Television Network)  
 TR--(22) STUDIO CITY  
 TR--(23) ERDS—(S 0.6 B 0)

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**ATT/GTE COMSTAR 4 (P2 \*W)**

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**SATELLITE CHANNEL CHART** JAN FEB 1982

**5 Audio Services on SATCOM 1**

TR--1 SATSATELLITE RADIO NETWORK (S 0.1)  
 TR--2 SATSATELLITE MUSIC NETWORK (S 0.1)  
 TR--3 SATSATELLITE MUSIC NETWORK (S 0.1)  
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**6**

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Vol. 2, No. 1 JAN/FEB 1982 Issued 1-1-82

**RCA SATCOM 3R (P2 \*W)**

TR--1 NICKELODEON  
 TR--2 ARTS  
 TR--3 WGN-TV  
 TR--4 SPOTLIGHT  
 TR--5 THE MOVIE CHANNEL  
 TR--6 WTBS  
 TR--7 ESPN  
 TR--8 CBS  
 TR--9 CSPAN  
 TR--10 USA NETWORK  
 TR--11 BET  
 TR--12 SHOWTIME  
 TR--13 MTV  
 TR--14 SHOWTIME  
 TR--15 HBO  
 TR--16 CNN  
 TR--17 CNN  
 TR--18 SHOWTIME  
 TR--19 AETN  
 TR--20 CNN  
 TR--21 NJT  
 TR--22 GOOD STUFF  
 TR--23 WOR-TV  
 TR--24 RELIANT'S MONITOR SERVICE  
 TR--25 GALAVISION  
 TR--26 OCCASIONAL TRANSMISSIONS  
 TR--27 C-SPAN  
 TR--28 HOME BOX OFFICE CINEMAX  
 TR--29 HTN  
 TR--30 THE PREVIEW CHANNEL  
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 TR--32 MEN/MUSIC  
 TR--33 DAYTIME  
 TR--34 HBO CINEMAX  
 TR--35 HBO

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**Program 5**

**Title** "SPC", E.S. AIMING "V", E.S. EVALUATION

Memory Content	Line #	Statements
A 1 ANT. GAIN	10	"SPC": I, "LAT="; L, "LONG="; M, "SAT LONG="; C
B 2 SAT. LONGITUDE		
C 3	15	C=C-M:Z=180+ATN (TAN C/SIN L):
D 4		R=ACS (COS L*COS C)
E 5	20	E=90-R-(ATN(SIN R/6.6166-COS R))
F 6 RCVR NF	25	P, "EL="; E; "AZ="; Z
G 7		
H 8	30	"V": I, "EIRP="; P, "ANT GAIN="; A, "ANT TEMP="; T, "LNA GAIN="; U, "LNA TEMP="; W: B=74.77
I 9		
J 10		
K 11	35	I,"RCVR NF="; F: F=290* (10^(F/10)-1)
L 12 SITE LATITUDE	40	X=T+W/.98+F(.98*10^(U/10));K=A-10* LOG X: C=P-196+K
M 13 SITE LONGITUDE		
N 14	45	S=P-196+A-U-1.71+30; J= -228.6;
O 15		D=C-J-B-1.5; T=D+37.75
P 16 EIRP	50	P, "LNA OUT="; S; "DBM"; P, "C/N="; D; "S/N="; T
Q 17		
R 18		
S 19		
T 20 ANT. TEMP		
U 21 LNA GAIN		
V 22		
W 23 LNA NF		
X 24		
Y 25		
Z 26		

Operation	Display	Note
1. Shift SPC	LAT=	Begin Program
2. DEG 39.4458 ENT.	LONG=	
3. DEG 104.5922 ENT.	SAT LONG	
4. 135 ENT.	EL=34.61409 AZ=222.729	
5. ENTER	EIRP=	
6. 34 ENT.	ANT GAIN=	
7. 44.5 ENT.	ANT TEMP=	
8. 25 ENT.	LNA GAIN=	
9. 60 ENT.	LNA TEMP=	
10. 120 ENT.	RCVR NF=	
11. 15 ENT.	LNA OUT= -29.21 DBM	
12. ENTER	C/N=13.1433 S/N=50.893	

In Line 10 above, "SPC" is the space key and is the program "title". The I, means input follows, for example, "LAT=" is displayed and when this data is entered it is stored in register L. Then "LONG=" is displayed and this data is stored in register M. Then "LONG=" is displayed and this data is stored in register M. The actual computations are done in 15,20, 35,40 and 45. Lines 25 and 50 print the answers.

Once this program has been entered into the computer and debugged, it can be run.

Note that ENT. means the ENTER KEY. Also note that the latitude and longitude are entered as DEG DDD.MMSS (Degree, Minutes, Seconds). The DEG puts the computer in the correct angular mode (two others are available).

The next program is number seven in the list noted earlier. Program number eight can also be performed with this program.

This program uses a subroutine to calculate both answers. This is possible since the formula is the same and the same memory registers are used.

This program calculates total composite triple beat or cross-modulation for a cascade of three different amplifiers. This can be particularly useful in equipment evaluations and franchising efforts. The program can be modified using



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The Model 6650 Receiver is the ideal choice if you're planning a new earth station utilizing the latest "block downconversion" technology.

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As a result, the 6650 Receiver can be smaller, simpler, and less costly. Many cable operators can save thousands. And there's no sacrifice in reliability or signal integrity.

In fact, you even get significantly

improved performance characteristics with multiple subcarriers.

## Simplifies installation

The Model 6650 is about half the size of conventional receivers. So it uses much less valuable rack space at your headend. And with satellite signals downconverted to IF at the LNC, your antenna can be located up to four times farther away from your headend with the same size cable.

Or, if the antenna can be conveniently placed near your present installation, you can save money by using a smaller size coaxial cable.

## Ku-band capability

Put the 6650 together with our new Model 361 Low Noise Converter and one of our 1.8- or 2.8-meter antennas, and you've got complete Ku-band capability.

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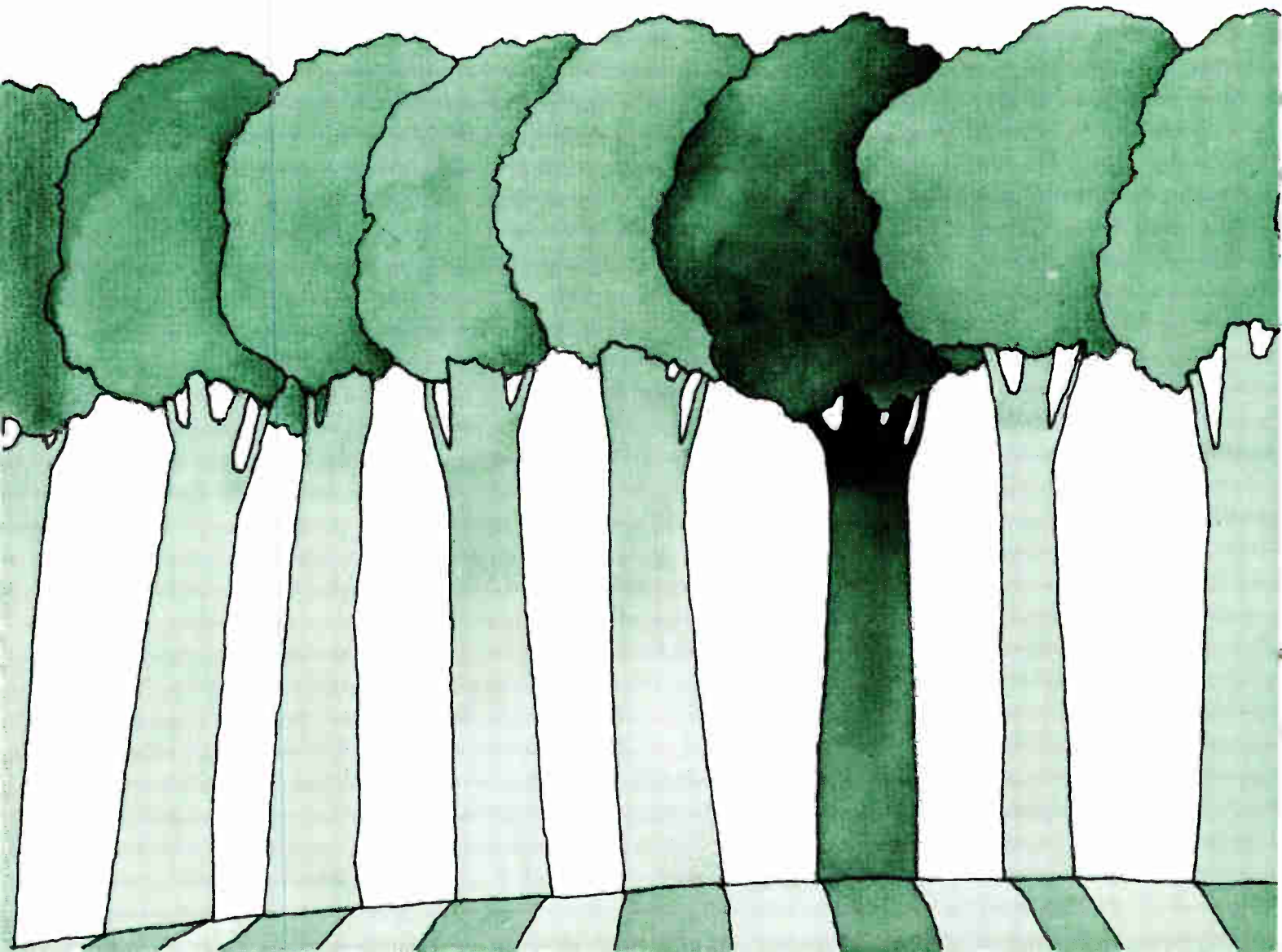
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**If all addressable  
systems look alike,  
you haven't looked  
hard enough.**



When it comes to selecting an addressable system, it's like a forest. But once you know what to look for, it's easy to get out of the woods.

### **First, look at the hardware.**

The heart of addressable hardware is the computer. So you can't afford anything less than the best. That's why Oak addressable systems use an IBM Series 1 computer. It's famous for its reliability and nationwide sales and service backup.

In subscriber terminals, look beyond pretty cases and into performance. Look for things like a "favorite channel" memory for fast, easy tuning, parental control and durable membrane keyboard entry.

Finally, make sure everything's covered by a full year's warranty. That way you won't get caught out on a limb.

### **Look at software performance.**

See if it offers modular programs for you to pick and choose the kind of input and output you need. You want a system that takes into account versatile record access, allows entry to common menus with a single keystroke and interfaces with your billing system for highly efficient and accurate operation.

Make sure you and your software speak the same language. Your addressable system should have a simplified design with plain English menus, so your own people can be trained to use it quickly.

### **Finally, find the right suppliers.**

Talk to someone who's thoroughly experienced in designing and building everything from 35 to 56 channel converters/decoders, and one- and two-way addressable systems. That way you'll get exactly what you need.

See us at the NCTA Show at Booth #1250.

Only Oak Communications Systems (formerly Oak Communications CATV Division) has everything you're looking for in an addressable system. Backed by over 15 years in the cable TV business, Oak invented and introduced state-of-the-art addressability and has a proven track record of having the most addressable systems in operation in the U.S. today.

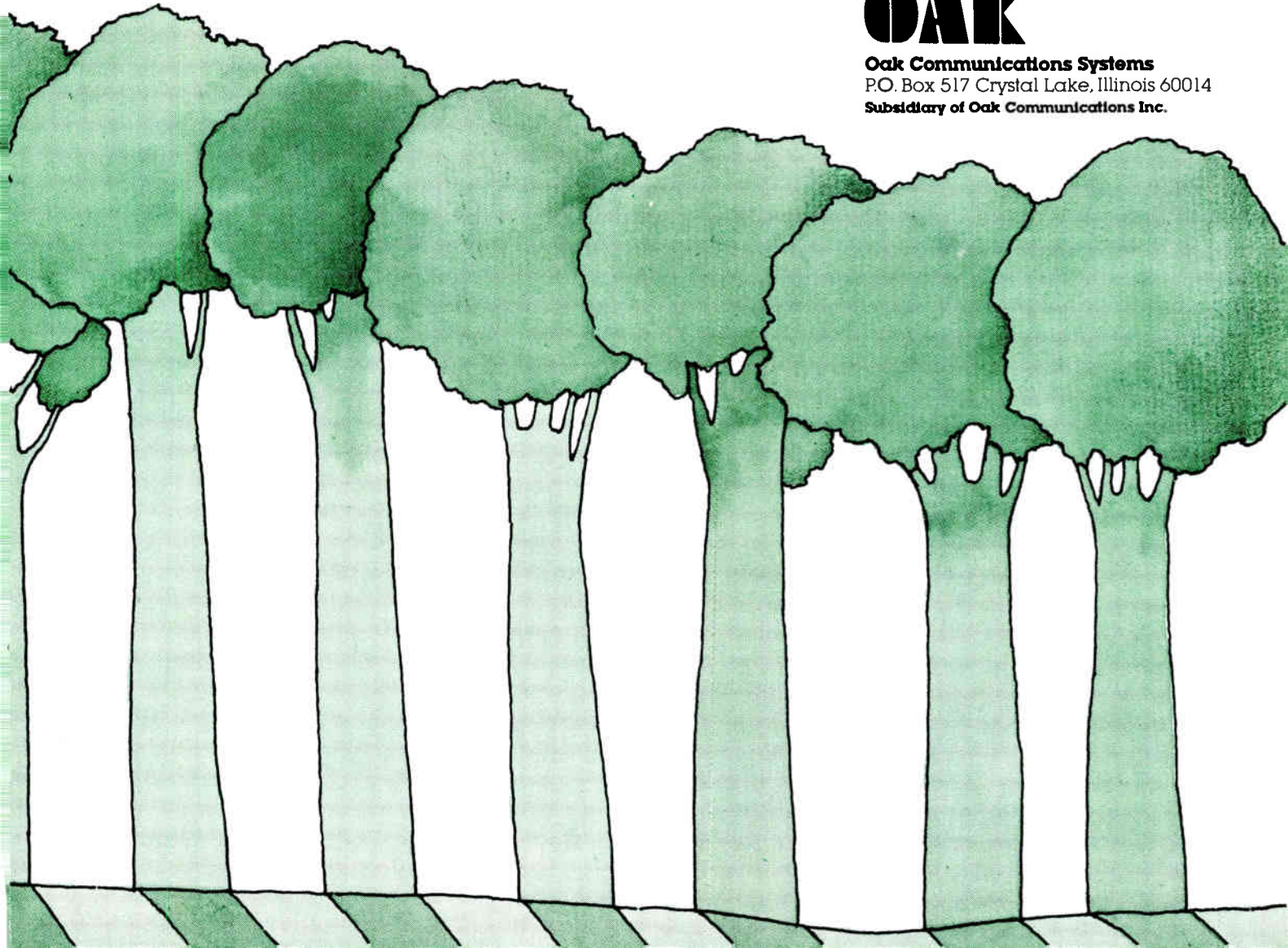
### **Now, here's how to get started.**

For more information on Oak addressable systems, dial our toll-free phone number: 800/323-6556 (in Illinois 800/942-6345). Remember, when you buy an addressable system from Oak, you never have to worry about being lost in the woods.

### **Oak: The first choice in addressability.**

# **OAK**

**Oak Communications Systems**  
P.O. Box 517 Crystal Lake, Illinois 60014  
Subsidiary of Oak Communications Inc.





**Program 7**

**Title** "Z" COMPOSITE TRIPLE BEAT, CASCADE, "X" X-MOD

Memory Content	Line #	Statements
A 1	60	"Z": I. "CTB1="; G. "N1="; H. "CTB2=";
B 2		I. "N2="; J. "CTB3="; K. "N3="; L;
C 3		GOSUB 300: P. "CTB=", T
D 4		
E 5		
F 6	80	"X": I. "XM1="; G. "N1="; H. "XM2=";
G 7		I. "N2="; J. "XM3="; K. "N3="; L;
H 8		GOSUB 300: P. "X-MOD=", T
I 9		CTB/X-MOD, 1ST AMP
J 10		CASCADE 1ST AMP
K 11		CTB/X-MOD 2ND AMP
L 12		CASCADE 2ND AMP
M 13		CTB/X-MOD 3RD AMP
N 14		CASCADE, 3RD AMP
O 15	300	M=(G+20*LOG H)/20, N=(1+20*
P 16		LOG H)/20, Q=(K+20*LOG L)/20
Q 17	305	T=(LOG (10^M+10^N+10^Q))* -20
R 18	310	RETURN
S 19		
T 20		
U 21		
V 22		
W 23		
X 24		
Y 25		
Z 26		

FOR/NEXT statements and a slightly different sub-routine to obtain intermediate answers as well as the total cascade figure.

These programs represent a small part of the myriad possibilities available to a serious user. Now, the second generation of pocket computers is on the way and the new machines look even better. This second generation will offer plug-in expandable memories, interfacing to other terminals and modems and a four-color printer/plotter for hard copies. These units will talk to other devices and can control two cassettes at once.

The authors would be happy to share information and experience with any interested parties and would gladly accept any programs or ideas from other TRS-80 users.

Operation	Display	Note
1 Shift Z	CTB 1-	Trunk CTB Figure
2 -87 ENT	N1-	Trunk Cascade
3 12 ENT	CTB 2	Bndgr CTB
4 -61 ENT	N2-	Bndgr Cascade
5 1 ENT	CTB 3-	L E CTB Figure
6 -67 ENT	N3-	L E Cascade
7 2 ENT	CTB=52 68785039	
8 Shift X	XM 1=	
9 -87 ENT	N1-	
10 22 ENT	XM2=	
11 -65 ENT	N2-	
12 1 ENT	XM3=	
13 -67 ENT	N3-	
14 2 ENT	X-MOD=52 2579	

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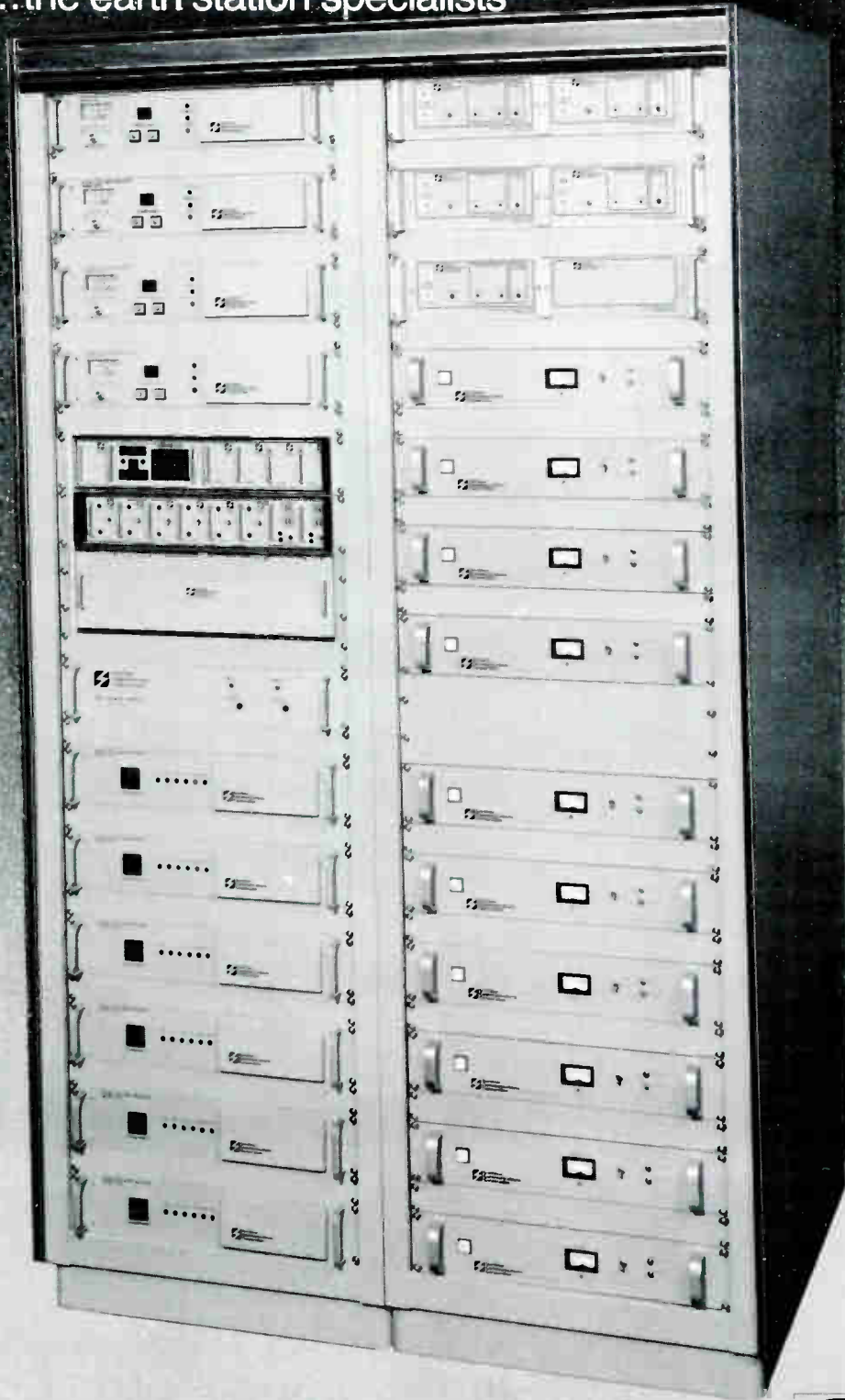
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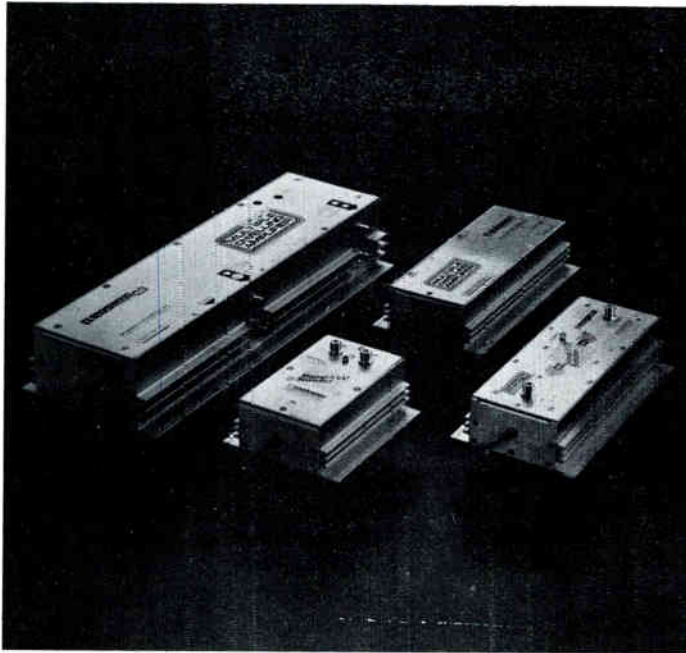
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<b>Super Multiple Dwelling Amplifier</b>			
SMDA-300	20 to 40 dB	50-300 MHz	+49/44 dBmV
SMDA-440	20 to 40 dB	50-440 MHz	+47/42 dBmV
Reverse Amplifier	10 to 30 dB	5-32 MHz	+50 dBmV
<b>Multiple Dwelling Amplifier</b>			
MDA-300-30-T	30 dB	50-300 MHz	+49/44 dBmV
MDA-440-30-T	30 dB	50-440 MHz	+47/42 dBmV
<b>Signal Stretcher™ - Two-Way</b>			
SS-300-15-T-2W	15 dB (flat)	50-300 MHz	+45/40 dBmV
SS-440-14-T-2W	14 dB (sloped)	50-440 MHz	+41/36 dBmV
Reverse Amplifier	0 dB	5-32 MHz	N/A
<b>Signal Stretcher™ - One-Way</b>			
SS-300-15-T	15 dB (flat)	50-300 MHz	+45/40 dBmV
SS-440-14-T	14 dB (sloped)	50-440 MHz	+41/36 dBmV

\*Output specified at -60 dB CTB @ 54-channel loading for 440 MHz units and 35-channel loading for 300 MHz units.

We now offer you a complete line of one- and two-way apartment and house-drop amplifiers to fill all your requirements for home, apartment, condominium, hotel and motel distribution systems.

**Super Multiple Dwelling Amplifier (SMDA):** New! Topping off our product line, the SMDA is super-flexible to meet your changing apartment distribution needs. Easily convertible to two-way operation, it features a variety of gains up to 40 dB at 300, 440 MHz bandwidths.

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Because of their high output capability, Signal Stretchers™ may also be used to feed small apartment buildings of ten to fifteen units.

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# Sophisticated Addressability

Computer control in the 108-channel, 400 MHz, fully addressable cable system

---

By David L. Archer, manager of new systems engineering and Douglas J. Semon, staff engineer, Viacom Communications

**O**n January 27 of this year, in its South Suburban system outside Milwaukee, Wisconsin, Viacom Communications activated the nation's first dual-cable, 108-channel, 400 MHz computer controlled addressable system. On March 18, in its Milwaukee North Shore system, Viacom turned on a second such system. Both of these systems use the new Zenith Z-TAC ST-1000 addressable converters. On March 29, Viacom activated a third computer-controlled, addressable system using the same technology in Pittsburg, California.

Arden Tyler, the general manager of Viacom's South Suburban system and an engineer with more than ten years of cable experience, was confronted with the responsibility of building the first of these sophisticated systems. "The cable industry had been talking about these 400 MHz, high capacity systems for some time, but no one had actually built one," Tyler said. "When we started, the specifications and designs were still on the drawing boards." Viacom's overall system design for the Milwaukee suburbs includes three headends serving 12



*Information stored in the Perkin-Elmer computer is passed along to the Intel computers located at Viacom's three headends in the Milwaukee area. This information includes the "address" (identification number) of each Zenith converter and the subscriber's authorized level of service.*



"To provide stability in frequency output for our new cable television series 6700 set-top terminals, we felt we needed SAW resonators," explained Mr. Kelly. "But there were a couple of problems. We not only needed the resonators in high volume, but we needed them in a hurry.

"So, we spoke with RF Monolithics. They said they could solve the problem. That's one of the points we liked best about them, right away. They've got a unique problem-solving attitude.

"They began to work closely with our engineers to make

sure that our requirements and costs were coordinated. They even went beyond the device and helped with circuit application assistance, too. Yet, they continued to make sure that everything was cost beneficial to both of us.

"We gave RFM some tough problems. But they met every challenge we gave them. They produced the amounts of high-quality resonators we needed and on schedule.

"RFM did what they said they could do. They helped solve a difficult problem for us. That's why we plan to continue with them."

To find out more about our second generation resonators and low-loss filters in the UHF/VHF range, write RF Monolithics, 4441 Sigma Road, Dallas, TX 75234. Or phone (214) 233-2903.



**RF Monolithics, Inc.**

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**"When we needed high volumes of SAW resonators fast, only one company could deliver. RF Monolithics."**

—Jack Kelly, Executive Vice-President  
Scientific-Atlanta



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To meet the sharp increase in demand for CATV amplifiers, some equipment manufacturers were forced to modify their specifications to accommodate substitute hybrid amplifiers because we couldn't manufacture our originals fast enough.

Substitute hybrids have caused problems for system operators. Their low dynamic range requires critical fine tuning. Substitutes have lower MTBF, experience frequent breakdowns, and increase service call hassles and subscriber complaints. But there's no longer any reason for you to accept equipment with lower performing substitutes.



New CA 5000 Series "super chip."

TRW has recently increased production capability eight-fold to meet the needs of the entire CATV industry. And in addition to the tremendous increase in hybrid production, we've also made tremendous increases in performance.

**The new CA 5000 Series "super chip" hybrids have up to 3 dB lower distortion, and up to 2 dB better noise figure than the nearest substitute.**

The difference is so dramatic, we'll be happy to test our hybrids against any substitutes—you name the place and the time. You'll immediately understand why you should specify and demand TRW CA 5000 Series hybrids when you buy amplifiers. The equipment won't cost you any more. But you'll get a lot more performance.

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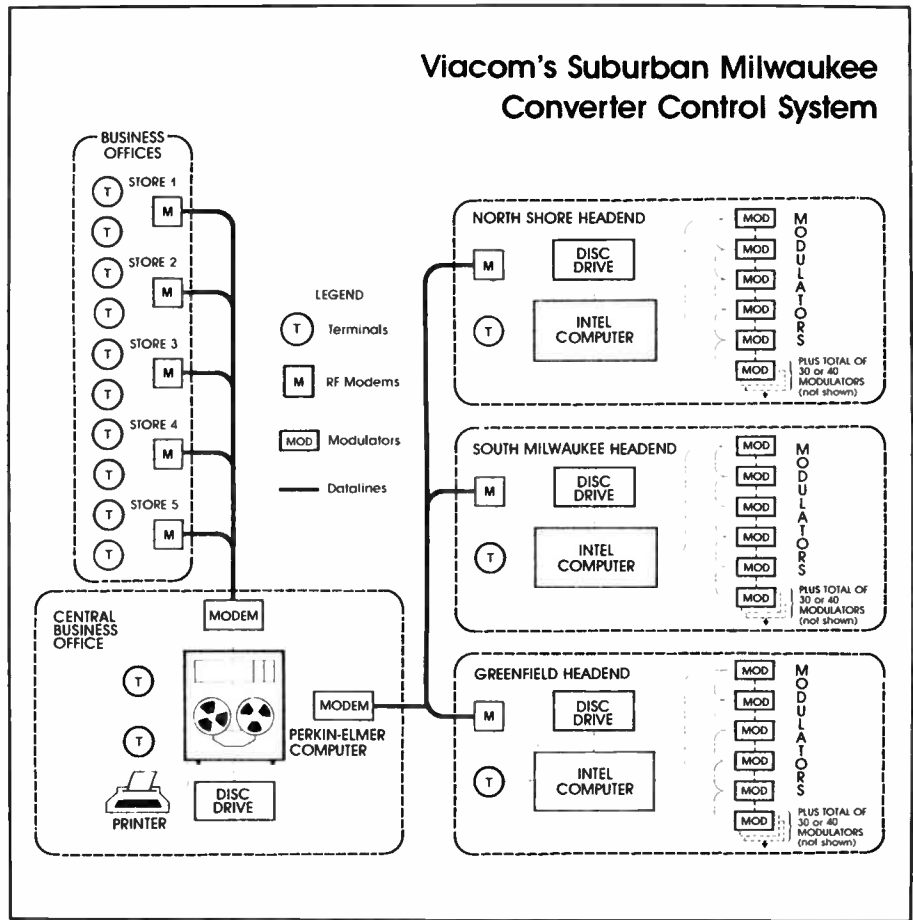


different franchise areas. These head-ends will ultimately be interconnected by CARS band microwave links.

There were many factors involved in Viacom's decision to use addressable converters. The most important were reduced operating expenses and the ability to use these addressable converters as a marketing tool.

Addressable converters allow subscribers to upgrade or downgrade their service without the need for a visit by an installer. With the cost of an installation presently running about \$25, this is a major factor. The addressable converters also reduce the amount of hardware needed to offer different pay services and tiers. Since the same addressable converter can be used for any combination of these services, it is no longer necessary to maintain a large inventory of assorted traps and descramblers. Prior to the introduction of addressable converters, it was necessary to either stock a separate converter for each combination of pay services, or to provide traps for each individual service. In either case, it was extremely complicated and expensive to offer more than a few services. In the case of a non-pay disconnect, the converter can be completely deactivated by "remote control."

Addressability is also a powerful marketing tool. Because of the simplicity of the hardware, operators can offer as



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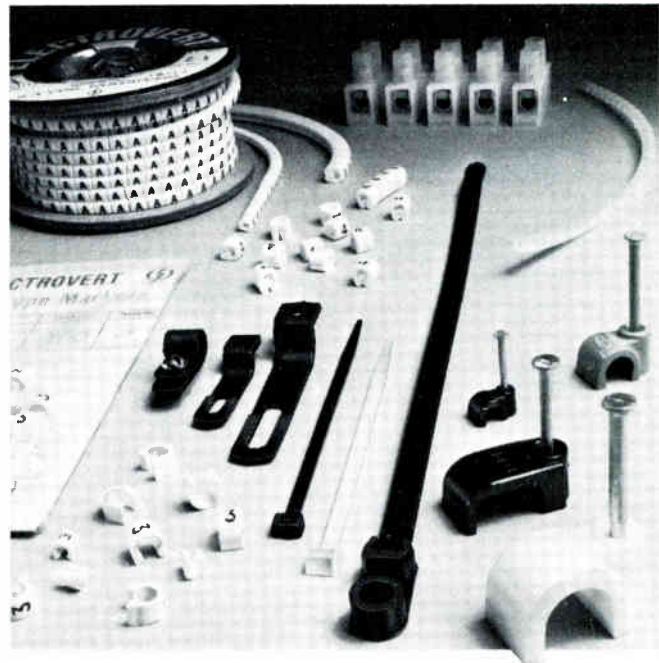
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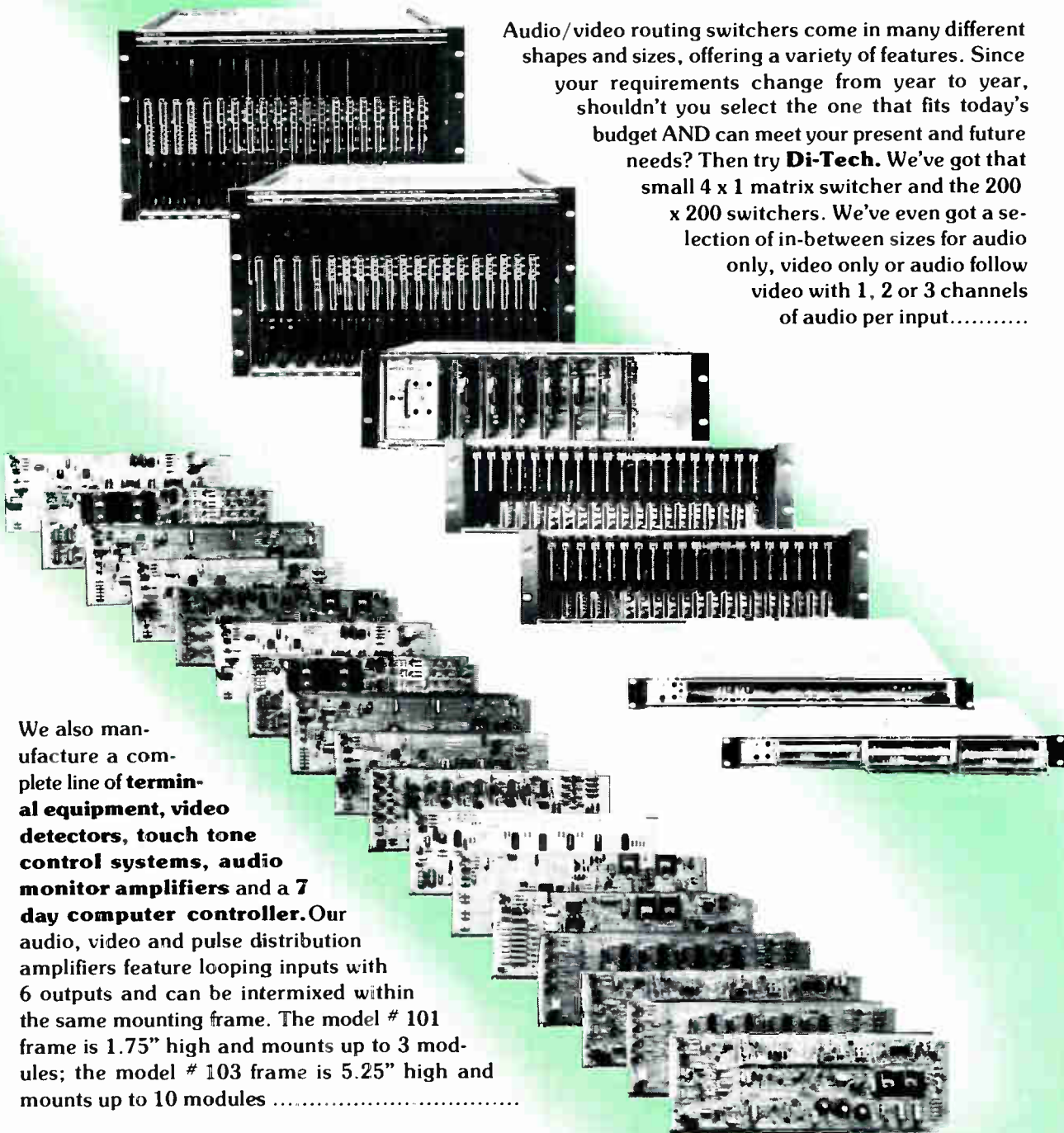


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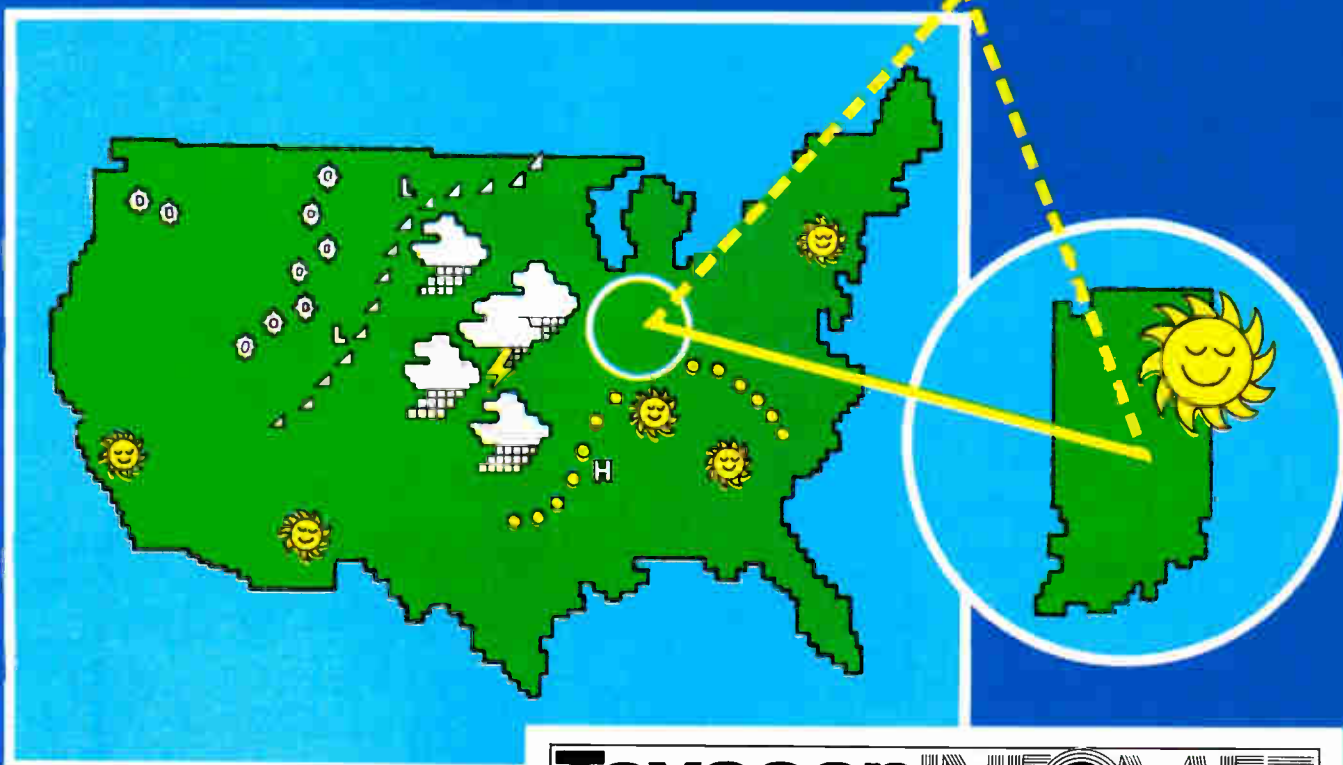
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many individual pay services or tiers as they desire. Impulse buying becomes a reality when subscribers can add services with just a phone call. Special events can be handled easily by authorizing those subscribers for a special "pay-per-view tier." As orders are taken for an event, authorization for that subscriber is entered into the computer. Shortly before the event begins, the channel's scrambler is turned on. This is also done by the computer via remote control. At the conclusion of the event, the channel is unscrambled and the subscribers are de-authorized. Presently, this must be done manually. However, in the future it will be possible for the scrambling and de-authorizations to be done automatically.

The use of addressable converters makes theft of service very difficult. Since all pay services as well as all upper-tier programming are scrambled, attempts to use cable-ready sets or converters from other manufacturers are impossible. De-authorizing stolen converters prevents their use elsewhere in the system, and different market codes (contained in hardware inside the converters) prevent their use in other systems. Addressable converters will not prevent theft of basic service; therefore operators must still conduct random audits to protect against illegal connection.

David Kinley, Viacom senior vice-president and head of the company's new market development department, explained the choice of the Zenith converters: "We believed that Zenith had two major advantages over other manufacturers of addressable converters. First, they had a superior scrambling technology which had been field proven in several STV operations. Second, they were oriented to high volume production of home electronics components with consumer appeal."

The Zenith Z-TAC (Zenith-Tiered Addressable Converter) system uses the vertical blanking interval (VBI) of the scrambled video signals to transmit authorization information to the converters. This information is placed in the VBI using an encoder which consists of two units: a Zenith controller and a modified Grass Valley processing amplifier. Scrambling is done at baseband video.

Two different types of information are involved: First, each scrambled channel is assigned a "tag" level. The same tag level may be assigned to one or more channels. A tier is created by assigning the same tag to a number of channels. The host computer can change the tag on a channel via remote control from the office upon a manual keyboard entry. Second, each scrambled channel carries identical decoder authorization information. This allows authorizations

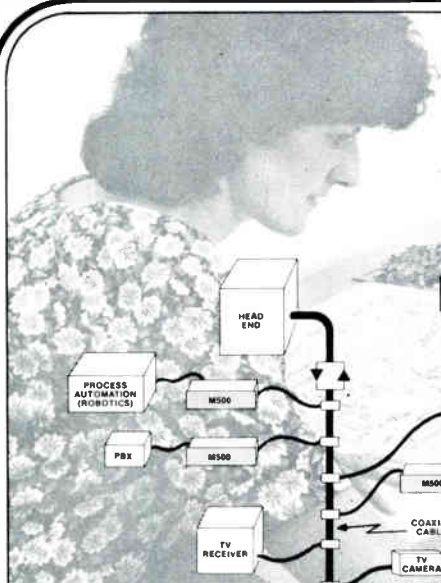
to take place when the converter is tuned to any scrambled channel.

Current authorization information, stored in a minicomputer at each hub site, is constantly transmitted in sequential order. This ensures that a converter which may have been unplugged will quickly be re-authorized. Individual authorizations can also be transmitted. These would occur when a converter is first installed, when a defective converter is changed out, or when service is upgraded or downgraded.

When an installer or service technician connects the new converter, he places a call to an appropriate customer service representative at the business

office, who enters the information into the subscriber record in the main computer. This process causes the new information to be sent immediately to the minicomputer at the hub site, which in turn immediately sends the change down the cable to the subscriber's converter. This ensures that the change will occur at once rather than waiting for the normal addressing cycle.

After deciding on the use of the new Zenith addressable converters, Viacom's engineering staff met with representatives of Zenith and Cybertech to establish the system architecture. Cybertech, a Kansas City firm which specializes in cable computer systems, was chosen by



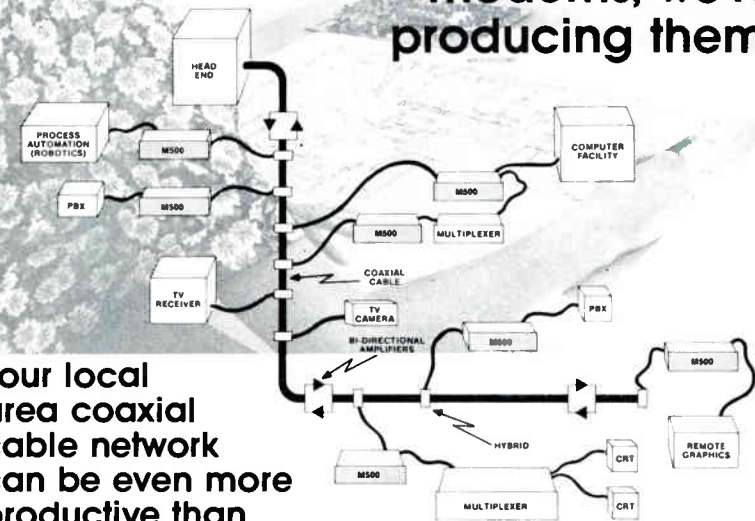
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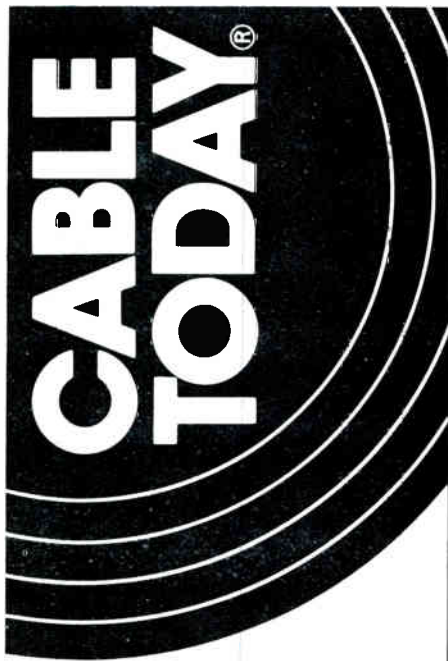


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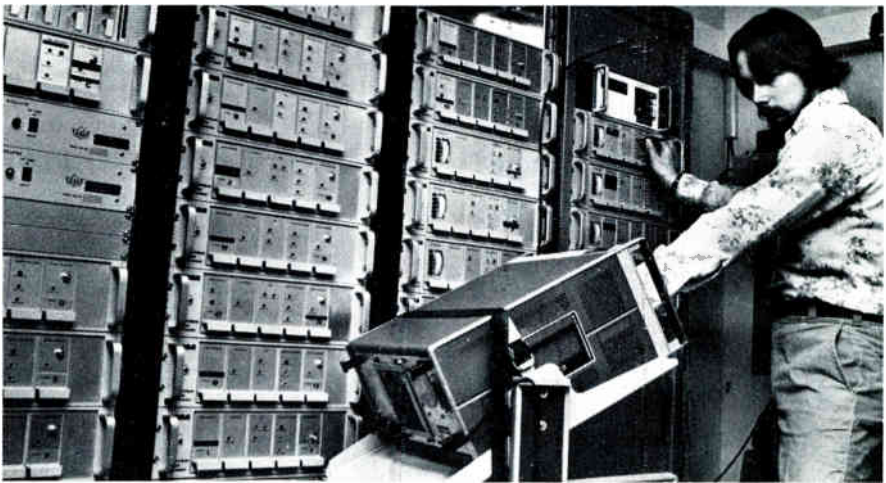
Type	Facility
HRC	United Cable TV Corp. Cupertino, CA
IRC	American Cable Systems, Inc. Arlington, MA
Standard	Camden Communications Carson, CA

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# RCA SAW Nixes Interference



The UACC headend is situated atop Paterson General Hospital. All RCA HSP-1 signal processors and CTM-10 modulators are located here.

Since 1975, RCA Cablevision Systems has worked with UA-Columbia Cablevision to link 52 communities in northern New Jersey into one cable interconnect. The system is centered around the Paterson, New Jersey headend which is also the UACC headquarters in New Jersey. Early on, co-channel and adjacent channel interference was encountered mainly due to the systems proximity to New York, Philadelphia, Boston and several local educational stations.

UACC was determined to provide subscribers with a full scope of programming that was not normally available off the air. Numerous strategies were implemented to reduce the interference. A vital part of the strategy were RCA installed onboard Surface Acoustic Wave filters. The built-in additional protection provided by the RCA SAW filters greatly improved reception and subsequent

transmission of off-the-air channels.

The UACC system which was constructed by RCA Cablevision Systems Turnkey Operations now carries ten New York UHF and VHF stations, four New Jersey UHF stations, one UHF from Boston and one UHF from Philadelphia. The subscribers watch with interference-free reception.

The total UACC and RCA project is a monumental achievement consisting of 2,317 miles of cable passing a quarter of a million homes. RCA was chosen by UACC for numerous vital reasons: manpower requirements, system expertise, equipment reliability, and equipment versatility. Finalizes Peter Psirogianes, Director of Engineering, "The majority of the equipment out there is RCA equipment. They make quality equipment."

## Passives at the Right Price And at the Right Time

Whether your immediate need is for line/trunk passives or subscriber taps, RCA Cablevision Systems has both available for off-the-shelf delivery. For the quality and price conscious cable operator, RCA will rush-ship 2-way, 4-way and 8-way taps . . . 4, 8, 12, and 16 dB directional couplers . . . 2-way and 3-way splitters . . . and power inserters. And all RCA passive components are full frequency range, from 5 MHz to 400 MHz.

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# On Time and On the Spot with RCA

"We turned to RCA when our other supplier proved to be all promises and no results," flatly stated Cordell "Cordy" J. Overgaard, President of Community Cablevision.

RCA Cablevision Systems was a vital factor to the on-time turn-on commitment by Community Cablevision in Harvard, Illinois. After experiencing numerous delays due to a previous vendor's failure to deliver, Community Cablevision asked RCA to meet the 60-day build and deliver schedule. RCA Cablevision Systems accepted the challenge...and met the goals.

"We were operational and on time," says Overgaard enthusiastically.



At Community Cablevision, all systems are go as confirmed by a systems check carried out by Don Licht (left) and Don Arndt, Jr.

The Community Cablevision system was custom headend that was pre-assembled at the RCA facility in North Hollywood, California. A reported easy matter to set-up, the headend is comprised of RCA Heterodyne Signal Processors (HSP1) and Color Television Modulators (CTM10).

The RCA involvement in the Community Cablevision System is another example of RCA's dedication to providing customers the products and services they need when they need them.

## New RCA 400 MHz Converter 58-Channel Digital Control



RCA Cablevision Systems has introduced the new push-button KS series of remote-tuning, set-top converters. The KS series 58-channel (400 MHz) converters utilize the latest digital technology, featuring a microprocessor design that incorporates frequency-synthesized tuning and AFC for automatic, precise channel tuning.

The converters are field-switchable for standard, HRC and IRC channel assignments, eliminating the need to stock three different configurations. The field-programmable, all-channel, in-band decoder option accepts up to 16 levels of pay programming for optimal flexibility in tiering of services. RCA's unique new design provides simple, highly secure authorization of desired channels. The units have been designed to add a future addressability option that will provide control of subscriber service from a central office. An elec-

tronic A/B switch option expands the converter capability to 116 channels for application in dual cable systems. The memory of the RCA KS converter is capable of storing 15 channels which can be randomly selected from either the A cable, B cable, or both.

The new KS series converter joins the RCA family of subscriber devices. The M series of set-top converters now includes a 58-channel model. This series is distinguished by its compact, elegant design. The M series converters are available for 300 MHz applications.

The RCA SCMC converters are available in cord remote or one-piece set-top versions. This product is cost-effective and provides reliable, simple operation.

For operators desiring to add premium channels to existing systems with converters, or who have 12-channel systems, RCA has its Encoder/Decoder system.

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Zenith to supply the software package for the host computer.

After evaluating various computers, the Perkin-Elmer 3120 computer was selected to act as the host computer, and the Intel iSBC86/12 system was selected as the minicomputer to be used in each of the three headends: one in the North Shore system and two in the South Suburban system.

The Perkin-Elmer, a 32-bit computer, contains all subscriber records, including name, address, telephone number, converter address, converter serial number, location within the home, and authorized service levels. With its one megabyte of main memory and 96 megabytes of hard

Equipment	Quantity	Price	Total
Perkin-Elmer	1	\$140,000	\$140,000
Intel	3	26,000	78,000
Encoders	120	7,000	840,000
			-----
<b>Figure 1</b>			\$1,058,000

disc memory, 16 of which are removable for backup of subscriber data, the Perkin-Elmer is capable of storing all necessary subscriber information for both North Shore and South Suburban systems. A computer of this size is capable of handling the billing system as well, with the addition of appropriate printers, which

is a future consideration for Viacom.

This computer is in turn connected to the Intel computers which are located in each of the three headends. The Intel computers receive only decoder address and service level information which is to be circulated to the converters. As mentioned earlier, the authorization information is transmitted to the converters over the vertical intervals of the scrambled channels.

In smaller cable systems, the Intel can act as a stand-alone controller. In this implementation, no Perkin-Elmer would be required. All subscriber information could be kept on microfiche or paper records, and any changes in service level could be entered directly into the Intel.

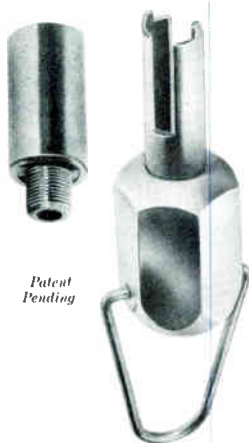
Each of the suburban Milwaukee business offices is equipped with CRT terminals. They are presently connected to the Perkin-Elmer computer via phone lines. However, after the microwave links are completed, data subcarriers will be used. When a call is received at the business office, the subscriber information is entered into the main computer. Subscriber records are cross-referenced by name, address and phone number to allow easy access. Printers are also provided so that hard copies of subscriber records, as well as the various reports and summaries the system generates, may be made.

Inventory control is simplified when using addressable converters. Upon receiving a new shipment of converters from the manufacturer, each serial number must be manually entered into the main computer. After that, the computer tracks the location of each converter as it is moved among inventory, converter repair, or an installer's vehicle. After the converter is installed, information on the location of the box in the home is also fed into the converter. This tight inventory control tends to eliminate "lost" converters, and insures that stolen boxes are not authorized.

As parents become more concerned about their children's viewing habits, parental lockout devices become increasingly more popular. An addressable system will allow programs to be assigned to tiers according to the Motion Picture Association of America ratings. For example, all G and PG rated Showtime films could be assigned one tag, while R rated Showtime films could be assigned a different tag. Those subscribers who do not wish to receive R rated films would be authorized for the first tag, while those

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# A Low Cost Satellite TVRO System

The Delta Gain Earth Station System, a new development from Harris Corporation, offers high efficiency in a 3-meter antenna

By Howard Brady, communications analyst, Harris Corporation Satellite Communications Division

**T**he need to receive signals from several satellites has led cable systems to take another look at satellite TVRO systems and their cost. A new antenna and video receiver that makes reception of quality television possible at lower costs than previous systems has been developed. This article describes the new Harris antenna and receiver.

Generally speaking, the most expensive component of an earth station is the antenna. A few years ago this cost was even more significant. A number of cable systems, even in the high-signal heartland of the U.S., installed nine-meter or larger antennas, investing fifty thousand dollars or so. As electronics have improved, the size and cost of antennas has dropped significantly. Compared to the other costs of a cable system, the satellite TVRO components are usually a fairly low expense, as long as signals are received from only one satellite.

However, the growing need for television reception from multiple satellites has led some cable systems to reconsider the significance of earth station costs. One possible approach is to purchase antennas designed for simultaneous reception of signals from more than one satellite. Some cable systems have also considered small antennas—four meters or less in diameter—for add-on use. Generally speaking, conventional small antennas have had three major limitations that have led experts to discourage their use:

- Poor signal quality

- Sensitivity to interference from terrestrial microwave
- Potential interference from adjacent satellites

These limitations are a direct outgrowth of the design of conventional small antennas.

## Prime-Focus Antennas

Most small antennas use prime focus feed systems, similar to that shown in Figure 1. The objective of the feed is to

capture the satellite signal reflected from the parabolic surface of the antenna dish toward the focus. Unfortunately, antennas exist in a world of noise. Microwave energy is generated by the ground and sky, due to thermal motion of molecules, and this electrical noise level is significant compared to the weak satellite signal. For example, installing a satellite antenna on a hot black roof or near the sun-warmed side of a building will noticeably degrade

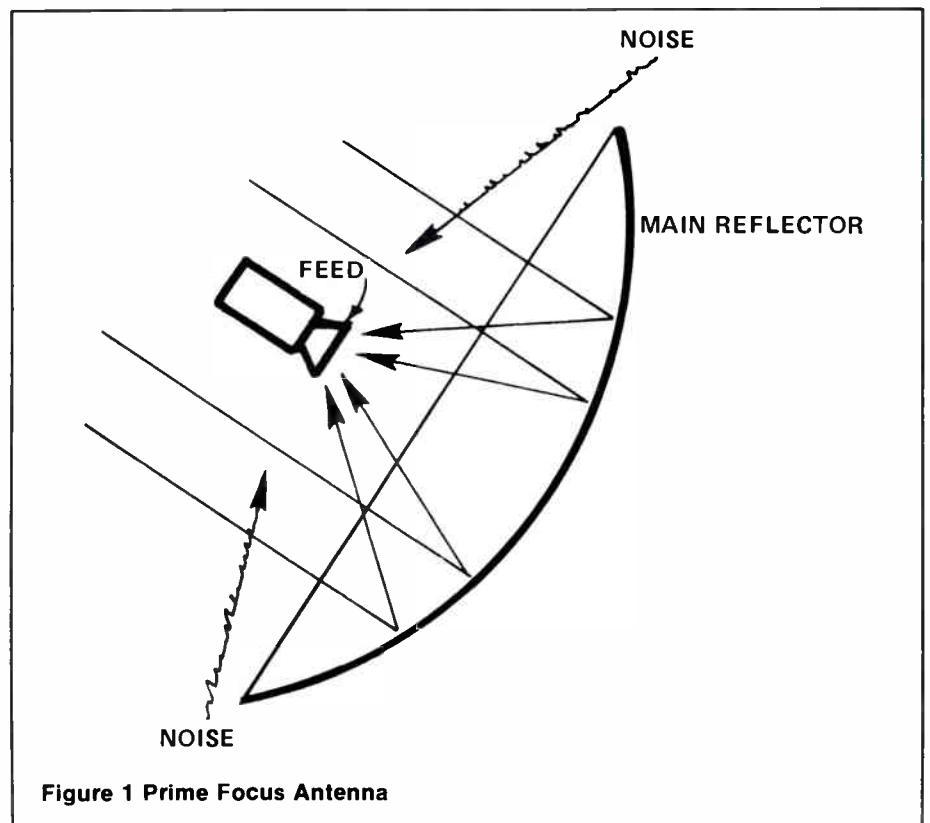
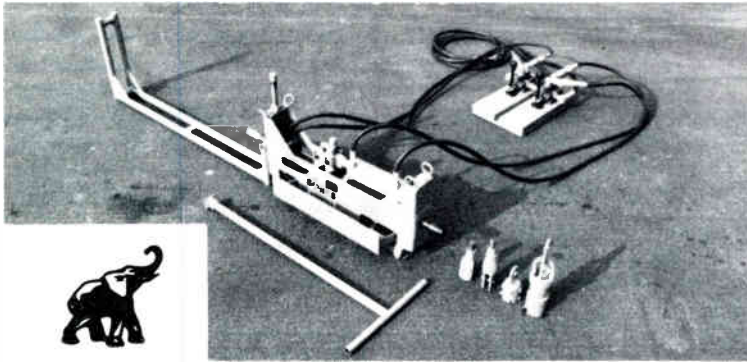


Figure 1 Prime Focus Antenna



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increase antenna sensitivity to noise. Unwanted signals from terrestrial microwave or other sources are diffracted and can end up in the feed, further degrading performance.

### Cassegrain Antennas

Larger antennas can increase efficiency and reduce noise pickup by adopting Cassegrain design (Figure 2). The extra control provided by the subreflector allows the system to accept signals from near the edge of the main reflector, yet reject noise signals from past the edge, as shown in the figure.

If we attempt to use Cassegrain design with small antennas, we run into a problem (Figure 3). For control of their signal pattern, feed horns must be relatively large, and the horn will block signals from a large central area of the antenna, thereby reducing instead of increasing efficiency. Below antenna diameters of about 4.5 meters, Cassegrain feeds are not effective.

### The Delta Gain Design

These design problems have been solved dramatically in a new 3-meter satellite antenna developed by Harris Corporation. By using a special antenna shape and an adaptation of the Cassegrain design, the Harris "Delta Gain" Antenna provides measured efficiency of 78 percent, and noise temperatures, at higher elevation angles, of less than 25° Kelvin.

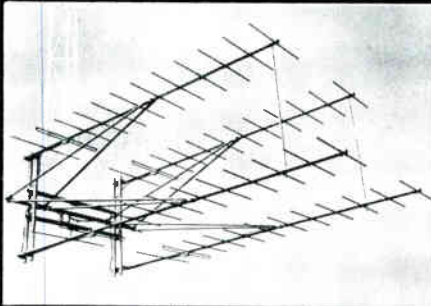
The feed system uses special "near-field" signal control techniques developed recently at Harris Satellite Communications Division, and Harris has applied for a patent on the design. The improved gain and reduced noise are the result of the feed system's ability to collect signals from virtually the entire surface of the antenna, yet discriminate against noise from beyond the dish edge.

The feed and subreflector are integrated and mounted on a support pod in the center of the antenna. This eliminates blockage and diffraction from feed supports. This design provides another advantage of the Delta Gain Antenna: protected LNA mounting. The feed design and a special "Y"-shaped orthomode transition allows both low noise amplifiers to be mounted inside the central feed support pod, sheltered from sun and rain.

A major concern of those investigating smaller antennas has been the antenna's sensitivity to interference from adjacent satellites. The antenna pattern of the Delta Gain antenna has good rejection of interfering signals, even down to two degree satellite spacing.

The combination of improved efficiency and reduced noise temperature gives the Delta Gain antenna over three decibels additional signal-to-noise ratio compared to conventional three-meter antennas

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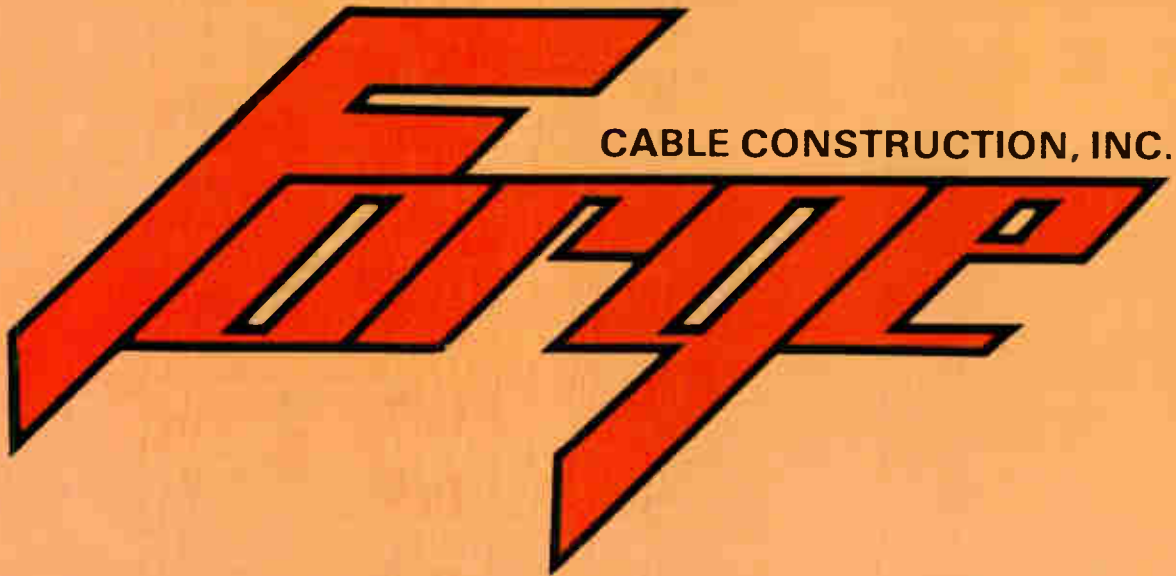
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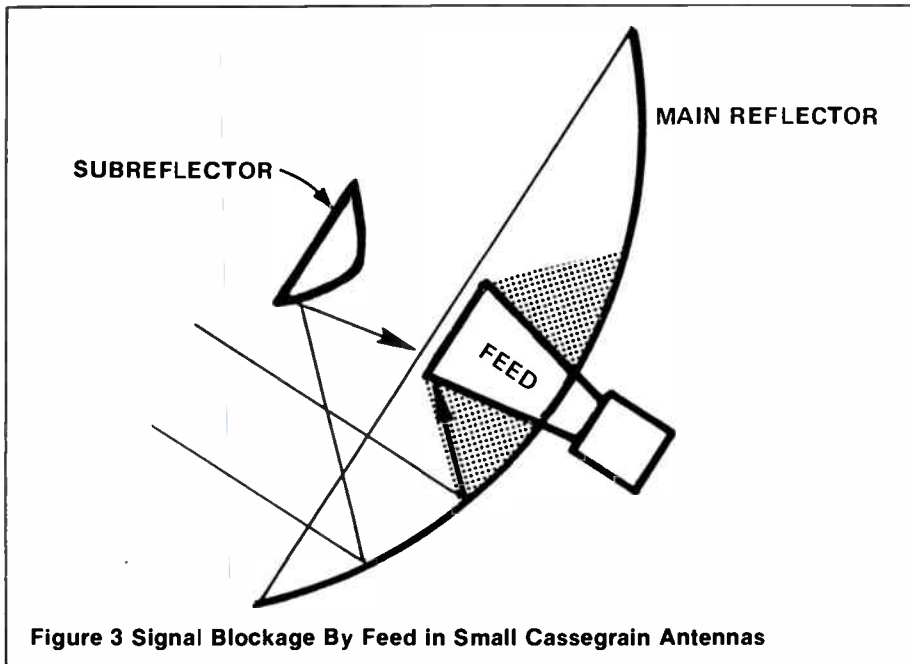
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So make sure you get more than just promises. Go with TOCOM, the recognized leader in cable security. Call Sid Prothro, our National Sales Manager at (214) 438-7691.

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*The leader in interactive cable technology.*



(Figure 4). This performance level is acceptable for full cable quality in much of the United States, especially when the antenna is used with improved lower temperature low noise amplifiers available from Harris and other manufacturers. At least five Delta Gain antennas can be installed at lower cost than a single spherical or toroidal antenna of comparable quality.

Mechanically, the antenna is an eight-petal all-aluminum design, with specially reinforced back-up structure for rigidity. To ensure high surface accuracy, a special metal forming technique is used to shape the reflector panels. The mount is a simple, rigid azimuth/elevation steel structure that bolts to a small concrete pad or to a load-frame for rooftop installation.

### A New Video Receiver

As another step in development of reduced-cost satellite system components, Harris has designed a new video receiver. The new Harris model 6528 receiver converts signals to an intermediate frequency of 520 megahertz. Tuned IF circuits are fabricated directly on the printed-circuit board, using microstrip techniques. RF stage filters and other RF components also use microstrip techniques to lower parts count and cost. The receiver uses an anti-parallel diode mixer which allows use of a stable local oscillator electrically tuned from 1590 to 1840 MHz.

By selecting this frequency plan and filtering and shielding the receiver properly, we have eliminated two major problems of other single conversion receivers: poor image rejection and interference between adjacent receivers. Like all Harris video receivers, Model 6528 provides extended threshold for reduction or elimination of

impulse noise under marginal conditions. The receiver is fully agile, through continuous tuning of the entire 3.7 to 4.2 GHz satellite band.

### Low-Noise Conversion

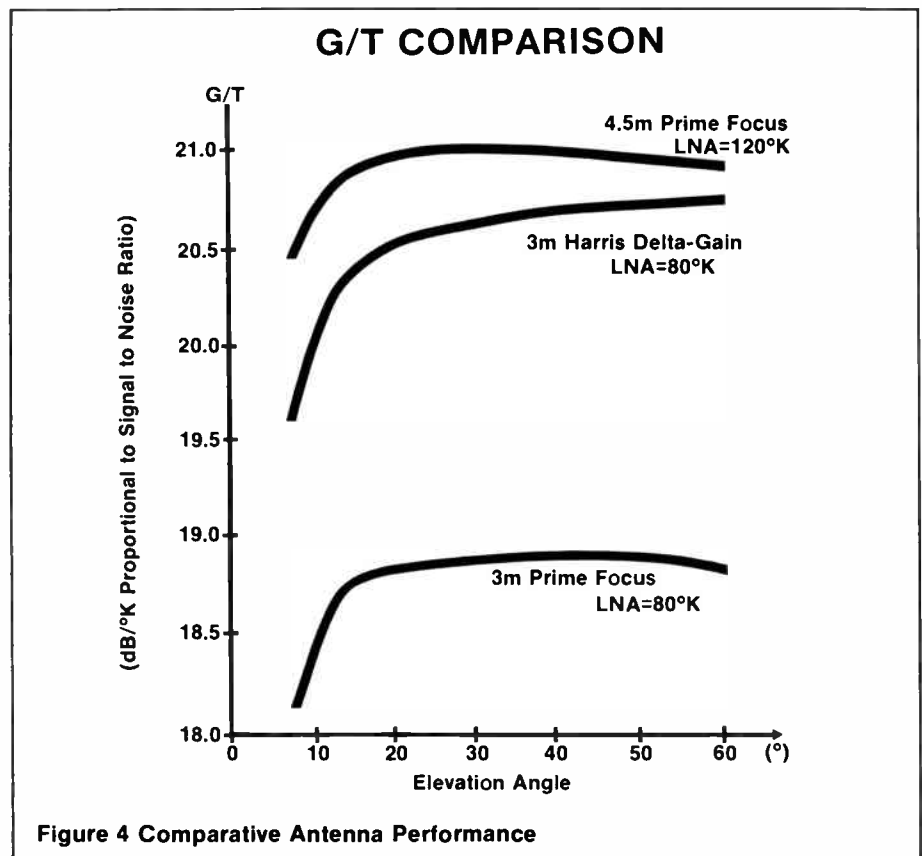
During the initial phase of this receiver development, we considered an approach used by other manufacturers: the "Low Noise Converter." LNCs perform the first signal frequency downconversion at the

antenna, in the same unit that provides low noise preamplification. This approach has some apparent advantages, at least on first look:

- Conventional low noise amplifiers usually provide 50 dB of gain, to overcome C-band entrance cable losses. Down-conversion at the antenna can eliminate some stages of C-band amplification.
- Bringing C-band microwave signals into the station from the antenna requires expensive foam or air-dielectric cable. At lower frequencies, less expensive cable can be used.
- As compared to conventional dual-conversion receivers, the complexity of each station-end receiver is reduced.

After some investigation, we rejected this approach in favor of an advanced single conversion receiver which can be used with conventional low noise amplifiers. We made this choice for the following reasons:

- At the frequencies used for the first IF (typically 750 MHz to 1400 MHz on transponder 24) low-cost coaxial cable is too lossy, and more expensive cable is still required between the antenna and station. For most installations, the savings in cable cost is therefore insignificant.
- The primary cost of a low noise amplifier is in the waveguide coupling, circulator, first two RF stages and mechanical housing. These costs are not affected by converting to an LNC configuration, so front-end costs are not significantly reduced.
- Low noise amplifiers are relatively





## MICRODYNE'S VERSATILE 1100 CSR IS NOW TAKING APPLAUSE.



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One for the money. Lots for the show. Microdyne's talent show is the 1100 CSR, a small versatile satellite receiving system. Our CSR is a breakthrough in satellite system science. Its technologically advanced construction includes increased reliability and simplicity of design to provide the cost-efficient reception you demand.

The CSR combines the advantages of both fixed frequency and remotely tunable units and surpasses industry standards in threshold performance. It automatically configures its channel readout for compatibility with 12 and 24 transponder satellites. Input polarity switching is provided at no additional cost. Microdyne's progressive technology has enabled us to manufacture a receiving system with all features necessary for increased performance in one 1 3/4" compact unit.

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simple and robust, and fail infrequently. Good reliability can be obtained without redundancy. Low noise converters are much more failure-prone because of their higher parts count and complexity, and reliability requires redundancy. Using two LNCs in redundant configuration requires a redundancy switch. The redundancy switch adds complexity, loss, and additional failure problems. The combination of redundant LNCs plus the switch add excessive cost to the system.

- By placing the converter at the antenna, the most sensitive part of the receiving system is exposed to environmental extremes, further increasing chances of failure.

- In an LNC system, the station-end electronics selects a single signal from the 500 megahertz-wide band and demodulates it. For all practical purposes, this unit is a complete receiver, with its own mixer, local oscillator, additional IF and demodulator stages. So this unit has as many parts and will cost virtually as much to build as a complete single-conversion receiver, since the circuitry is very similar.

- Finally, LNC systems are not compatible with receivers in existing installations. The entire system must be converted to LNC operation. Since there is no standardization of intermediate frequencies, an LNC system is "locked in" to one manu-

facturer of satellite receivers.

## Summary

The new Harris Delta Gain Antenna and 6528 Receiver provide two important new tools for the cable industry to use in providing additional satellite coverage. The design of the antenna is a breakthrough in improving the performance of small satellite antennas. By using innovative circuits and careful design, the receiver achieves professional-standard performance. Costs of both the receiver and the antenna are comparable equipment; together they provide outstanding savings with quality performance.

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24 transponder satellites. Input polarity switching is provided at no additional cost. Microdyne's progressive technology has enabled them to manufacture a receiving system with all features necessary for increased performance in one 1 3/4" compact unit.

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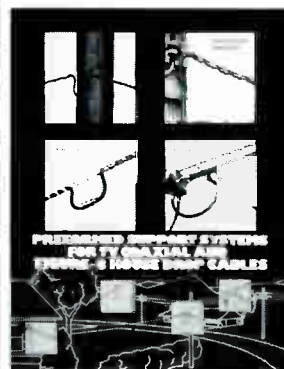
GDE-1104L	Galvanized Guy-Grip Dead-End for 1/4" Galvanized Steel Strand
GLS-2104	Galvanized Strand Splice for 1/4" Galvanized Steel Strand
GFDE-2121	Galvanized False Dead-End for 1/4" Galvanized Steel Strand

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The Agile 24M is a 24-channel, stand-alone master receiver with sufficient gain to drive as many Agile 24S

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The Agile 24 receiver system carries Standard's full technical support. System installation and alignment is facilitated by enlarged schematic diagrams and an illustrated technical manual. Standard's field engineers offer operator training as well as on-site repairs. Where factory service may be required, 48-hour turn-

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System	Headend	Cable Interface	Subscriber Location	Multiservice Upgrades
<b>CableBus Systems Corporation, Beaverton, Oregon</b>				
CableAlarm MICRO-1	Digital 11/23 computer w/VT-100 CRT, LA-120 printer, 2 ea RL-01 hard discs, alarm software package.	MOD-1 headend master modem (rack mounted)	UADT/SE-5 terminal, LKC-50C alarm controller w/interface, six button remote keypad, various push button station assemblies, siren, voice driver, Sentrol sensors, smoke detector, floor trap (also wireless receivers, sensor/transmitters, smoke detectors, motion detectors).	Energy management, meter reading, pay-per-view, opinion polling, utility load shedding.
<b>E-Com Corporation, Sterling, New Jersey and Communications Equity Corporation, Markham, Ontario</b>				
TRU-500	Data General MP100 computer w/Lear Siegler ADM31 CRT, Centronics 704 printer, Data General 10MP cartridge disc.	ACU area controller unit (strand mounted) TCM TV control module (four tap, strand mounted).	CSM customer service module w/8 inputs and 8 outputs, key pad unit (w/remote control option), VDI videotex/data interface option, various push button station assemblies, siren, sensors, smoke detectors, door/window switches.	Energy management, meter reading, pay-per-view, opinion polling, videotex, personal computer connect, feeder switch control.
<b>Jerrold Division of General Instrument, Corporation, Hatboro, Pennsylvania</b>				
Cable Security	Digital 11/23 computer w/VT-100 CRT, LA-120 printer, RL-02 cartridge discs, alarm software package.	Digital 11/03 computer, RF modem.	Home security modem, subscriber control console, optional digital dialer (telco interface), siren, beeper, 8 alarm sensors.	Can form part of Jerrold Communicom two-way interactive system (consult manufacturer).
<b>Pioneer Communications, Columbus, Ohio</b>				
VIP Security	Digital 11/24 computer w/CRT, printer, hard disc and floppy disc back-up, alarm software package.	DCU data control unit, BCU bi-directional communications unit and modem (5,000 subs per unit and modem).	Main alarm panel and data modem, remote key pad, digital dialer (telco interface), siren, 6 sensors, strobe light.	Forms part of Pioneer VIP two-way interactive system (consult manufacturer).
<b>Scientific-Atlanta Inc., Atlanta, Georgia</b>				
Series 2400	HP-1000 w/2412 CRT, 2413 printer, hard disc drive and single floppy disc back-up, power line conditioner.	Alarm Scanner (rack mounted), modem for scanner (if remote from computer), power line conditioner.	Subscriber Transponder and alarm panel, master control unit, optional digital dialer (telco interface), siren, 4 alarm sensors, hand held transmitter, (also optional wireless system and sensors).	Energy management, utility load shedding, meter reading.
<b>Tele-Engineering Corporation, Framingham, Massachusetts</b>				
Tele-Dat II	Zenith Z-8 computer w/CRT, floppy disc drives, printer, real time clock, alarm software package.	TD-8910 computer buffer (scanner, addressing), TD-8915 mod/demod.	TD-8931 modem, optional hand held key pad, TD-8934 alarm panel.	Two-way data transmission w/ASCII printer and CRT, energy management, status monitoring.
<b>TOCOM, Inc., Dallas, Texas</b>				
TOCOM III-B	HP 1000 computer w/three CRTs, hard disc drive, line printer, real time clock, hard-copy logger, tape subsystem, modem rack, power supply and modem.	Zilog Z-80 processor w/display (rack mounted), 2 floppy disc drives, hard-copy logger, RF subsystem	TOCOM 3000 home alarm terminal, RF modem, arming control station, key pad, optional digital dialer (redundant telco interface), siren, rechargeable battery, plug-in transformer, intrusion/fire control panel.	Energy management, metering, data, pay-per-view, opinion polling.



Control Computer	Home Modem	Special Features	Major Unit Costs	Availability
17,500 subscribers (expandable), 128K memory, 20 Mbit hard disc storage format ASCII.	Input freqs. (73.5 MHz, others available), input level (-10 to +20 dBmV), output freqs. (31.4 MHz, others available), output level (+10 to +30 dBmV), data rate (9600 bps max.).	Turn-key installation, documentation, update service, training, 13 month maintenance contract, one year repair or replace warranty, dedicated telco line modems available, optional home terminals and sensor arrays, optional status monitoring.	MICRO-1 headend, software, turn-on (\$59,500) MOD-1 master modem (\$1,400) UADT/SE-5 terminal (\$215) LKC-50C controller (\$195)	90 to 120 days ARO
6,000 subscribers (expandable), 65K memory, 4 port option, 10Mbit cartridge disc storage.	Input freqs. (user selectable), input level (-20 to +10 dBmV), output freqs. (user selectable), output level (+25 to +45 dBmV), data rate (NA), format asynchronous proprietary.	Training and field support, marketing support, technical support.	TRU-500 headend (\$58,000) ACU (\$1,000) TCM (\$160) CSM (\$75)	Fall '82
16,000 subscribers (expandable), 128K memory, 10.4 Mbytes dual disc drive storage.	Input freqs. (107.3 MHz), input level (-15 dBmV), output freqs. (T9 in 100 KHz increments w/400 KHz spacing), output level (+30 to +50 dBmV), format ASCII.	2 channels return, frequency agility, turn-on, field support, training support.	Headend computer, disc drive, one printer, one CRT, software. (\$46,200). Control computer, RF modem, digital polling boards (\$10,000) Home security modem (\$70) Console (\$20).	October 1982
20,000 subscribers (expandable), 512kB memory, 30 Mbyte disc capacity.	Input freqs. (121.35 MHz, others available), input level (-7 to +30 dBmV), output freqs. (24 MHz), output level (58 dBmV), data rate (256K BPS), format ASCII.	Status monitoring and system and terminal diagnostics, back-up battery power supply, training manuals and seminars.	Headend computer (\$95,000) DCU (\$3,000) BCU (\$3,000) Home Terminal (\$280)	August 1982
16,384 subscribers (expandable), one MB random access memory, 16 Mbyte disc storage.	Input freqs. (107.5 MHz, others available), input level (-30 to +15 dBmV), output freqs. (19.3 and 19.4 MHz, others available), output level (+40 to +54 dBmV), data rate (3600 baud), format ASCII.	2 channels return, optional power supply back-up for computer, scanner, home modem, optional configurations available. CRT, printer, disc drives (\$46,250).	Headend computer, CRT, printer, disc drives (\$46,250); Alarm Scanner (\$6,500) Subscriber Transponder (\$118)	120 days ARO
65,500 subscribers (expandable), 65K memory, 100K disc storage, format ASCII.	Input freqs. (108 MHz, others available), input level (-10 to +20 dBmV), output freqs. (24 MHz, others available), output level (+20 to +55 dBmV), data rate (1 Mbit).	Optional interface to billing computer, customized initial system architecture, planning support, turn-key installation and turn-on.	Headend and cable interface (\$15,000-\$33,000) Modem (\$265)	12 weeks ARO
128,000 subscribers (expandable), 2 Mbytes memory, 20 Mbytes per disc drives.	Input freqs. (158.55 MHz, others available), input level (-15 to +20 dBmV), output freqs. (18.2 MHz, others available), output level (+35 to +52 dBmV), data rate (28 kB), format ASCII, or asynchronous proprietary.	Computer maintenance contract (1 yr.), turn-key installation, training, marketing support, manuals.	Headend computer (\$155,000) Z-80 processor (\$32,000) 3000 terminal (\$295.)	120 days

# PED 6000 PED 8000 PED 10000 METAL CABLE CLOSURES



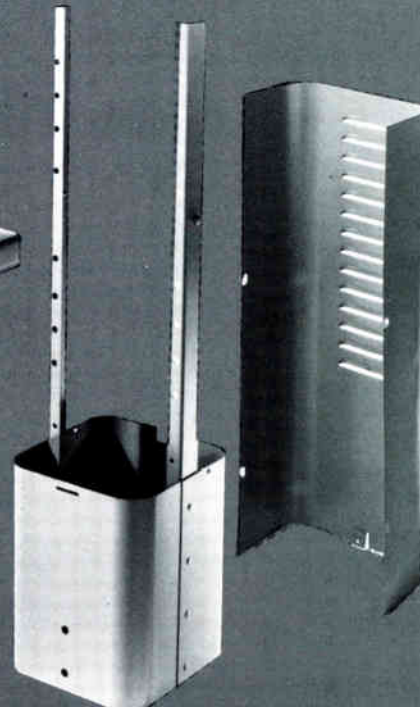
PED 6000



PED 8000



PED 10000



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PED 6000	5¾" wide, 5¾" deep, 20" high
PED 8000	8½" wide, 8½" deep, 26" high
PED 10000	10½" wide, 10½" deep, 38" high

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- Cylinder lock assembly with dust cover

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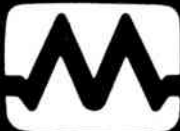
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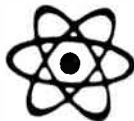
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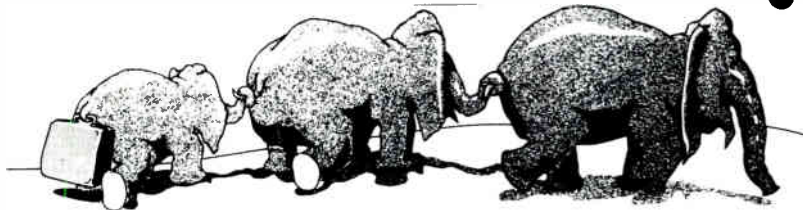
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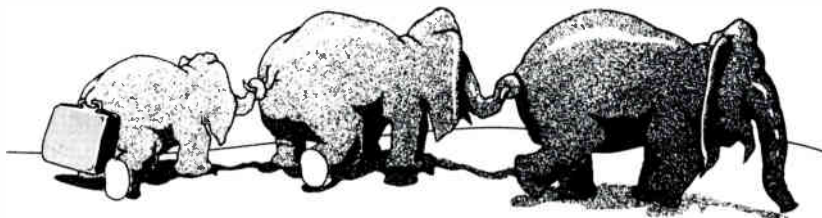


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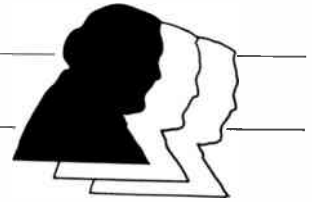
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*Edward Kopakowski*

★ **Edward T. Kopakowski**, has joined **Pioneer Communications of America, Inc.**, as regional sales representative for the midwest area.

Kopakowski comes to Pioneer from the Jerrold Division of General Instrument where he was most recently eastern region account executive for sales of all CATV products. His previous experience also includes two years as product planner and analyst for Jerrold's CATV marketing division.



*David Morgan*

★ **David Morgan** has recently joined **North Supply Company** as CATV's field sales representative for the states of Colorado, New Mexico, Oklahoma, Texas, Arkansas, Louisiana and Mississippi.

Previously with Westamerica Communications Supply Co., Morgan has 12 years experience in the communications industry. This experience has primarily been in the cable television industry.

★ **C. Douglas Rasmussen** has been named product marketing manager for **Hughes Aircraft Company** microwave communications products.

Rasmussen, who has been with Hughes for eight years, is returning to the product line after three years, during which he had marketing responsibility for high-power amplifiers used in commercial satellite earth stations. In his new position, he will have direct responsibility for sales and marketing support activities for Hughes' AML and satellite TVRO equipment.

★ The Board of Directors of the **Society of Cable Television Engineers** has elected the following persons as officers: Thomas J. Polis, (CEMS, Inc.) President; Richard G. Covell (Phasecom Corp.) Western Vice President; James B. Emerson, (Communications Supply) Eastern Vice President; and, James Chiddix, (Oceanic Cablevision) Secretary-Treasurer. In addition, George Fishman (Rogers UA Columbia Cable) has been elected to serve as a member of the SCTE Executive Committee. Fishman was recently elected to the SCTE Board as Region 2 Director.

A total of six new directors were elected to the SCTE Board recently. They include: Emerson (At Large Director); Fishman, (Region 2); Gerald Marnell, Tribune Co. Cable, (Region 4); John S. Warner, Service Electric Cable TV (Region 6); W.A. Devereaux, American Cable-system Corp. (Region 7); and, Anthony Sandaluk, RF Communications (Region 8).

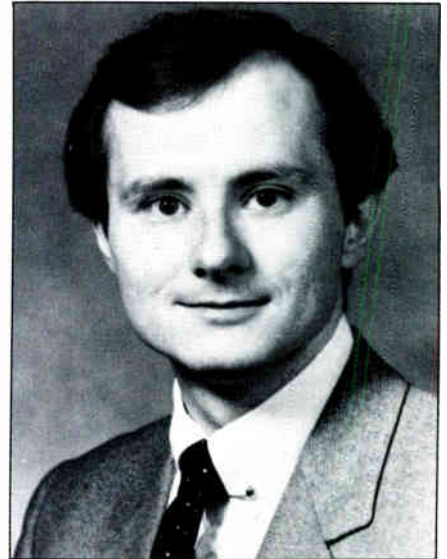
★ **Oak Communications Systems**, a subsidiary of **Oak Communications Inc.**, has announced the appointment of **Robert L. Barrie** as vice president, CATV engineering.

In this position, Barrie will direct all Crystal Lake, Illinois, engineering activities relating to existing cable products and the design and development of new products. He will also serve as liaison with factory engineering, production and field sales in bringing new cable products to market.

Barrie joined Oak in 1980 as director of CATV engineering in Crystal Lake. Previously, he served in an executive capacity for the Air Traffic Control Systems Division of LaPoint Industries, Hartford, Connecticut.

★ **WINCOM Corporation** has announced the promotion of **Harold Maddix** to the position of vice president—microwave components division. In his new position, Maddix will be responsible for overseeing

the applications engineering, and design and manufacture of the division's entire product line. Prior to joining WINCOM Corporation, Maddix served as a microwave design specialist for Omni-Wave Electronics Corporation. He was responsible for the development and sales engineering for a broad line of microwave components.



*John Holobinko*

★ **John Holobinko** has joined **Times Fiber Communications Inc.**, an affiliate of Insilco Corporation, as a sales engineer in the cable television division.

Holobinko will have responsibility for national sales of TFC's fiber transport systems in the CATV marketplace. TFC is the only cable company presently offering fiber optic transport systems on a turnkey basis. Mr. Holobinko will spearhead the sales effort for these systems.

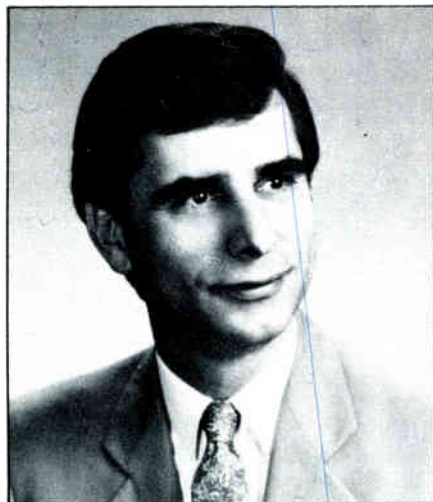
★ **George Green** has been appointed director of manufacturing at **CableBus Systems Corporation**. Green's appointment became effective March 1, 1982, and his duties include the supervision of all manufacturing functions, including line management, scheduling, planning and production engineering. Green has previously worked with Hildebrand NA Inc., where he developed manufacturing operations and procedures, and with the Hyster Company in Irvine, Scotland.

★ **Scientific-Atlanta Inc.** has announced the appointment of **Frederic N. Wilkenloh** as director, market development, of the Phoenix coaxial cable division. Wilkenloh, a twenty-year veteran of the cable



industry, comes to Scientific-Atlanta from M/A-COM Inc., where he was vice president of optical communications. He served previously as vice president, engineering, for Comm/Scope.

Wilkenloh holds five patents dealing with coaxial cable, drop wire and telephone cable. He is a member of the IEEE, the Wire Association, Society of Cable Television Engineers and the Society of Plastics Engineers.



*Carmine D'Elia*

★ **Vitek Electronics Inc.** has announced the promotion of **Carmine D'Elia** to executive vice president.

D'Elia has been with Vitek since 1979. Prior to joining Vitek, he had managed his own engineering and consulting firm. He holds a B.E.E. and an M.S.E.E. degree in electronic engineering.



*Earl Currier*

★ **Microdyne Corporation** has announced the promotion of **Earl Currier** to the position of sales manager. Currier will coordinate the marketing effort for Microdyne's Satellite Television Products Division. He has been with Microdyne for three years and was promoted from his position as sales engineer.

★ **Compucon, Inc.**, announced that **Omar Jennings** has been named manager of the company's satellite planning

business unit. Most recently Jennings was a project manager within the same area. His new duties include overseeing all projects undertaken in the area of satellite planning.

★ **Robert L. Montgomery** has been appointed president, **Warner Amex** of greater Cincinnati. In his new position, Montgomery will have direct responsibility for all operations and construction administration of the Cincinnati systems.

Montgomery comes to Warner Amex from S.D. Systems Inc., Dallas, Texas, where he was vice president of marketing and sales. He was responsible for sales, marketing, advertising, product planning and management and corporate development.

★ **Engelmann Microwave** has announced the appointment of **Vito Caruso** as sales application engineer. Caruso will be responsible for customer liaison, especially in the area of custom designs. Prior to joining Engelmann Microwave, Caruso had various engineering and sales responsibilities at Merrimac Industries.

★ **Dolly H. Ickes** has been named general manager of **Warner Amex Cable Communications**, Altoona, Pennsylvania system, becoming the first woman to be appointed head of a major cable television system.

As General Manager, Ickes will be responsible for Altoona's nearly 35,000 subscriber system, one of the top 80 in the United States.

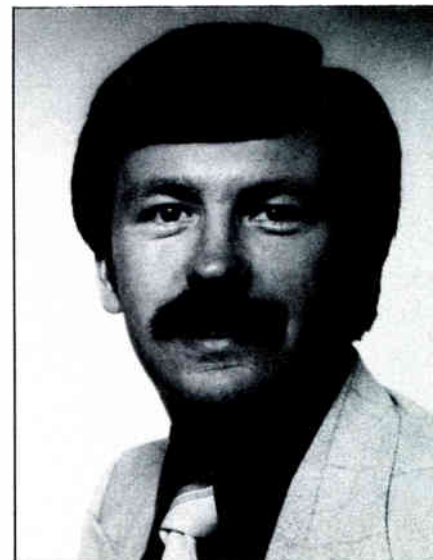
Her promotion comes at a time when only 7.8 percent of all cable system managers are women. Ickes began working at Altoona as a staff member in 1965 and became the business manager in 1972.



*Martin Greenberg*

★ **Martin Greenberg** has been appointed director of turnkey operations for The Jerrold Distribution Systems Division, **General Instrument Corporation**. In his

new position, Greenberg will oversee all turnkey field construction, engineering, project planning, and management. Since he joined Jerrold in 1965, Greenberg has served as manager of project planning, project manager, senior cost estimator and production foreman.



*Robert Kuopus*

★ **Gardiner Communications Corporation** has announced the appointment of Robert T. Kuopus as national sales manager. Kuopus, formerly southwest regional sales executive for Oak Communications, joined Gardiner in 1981. Kuopus will direct all Gardiner sales activities.

★ **Oak Communications Systems**, a subsidiary of Oak Communications Inc., has announced three promotions and the creation of two new positions in its national sales organization.

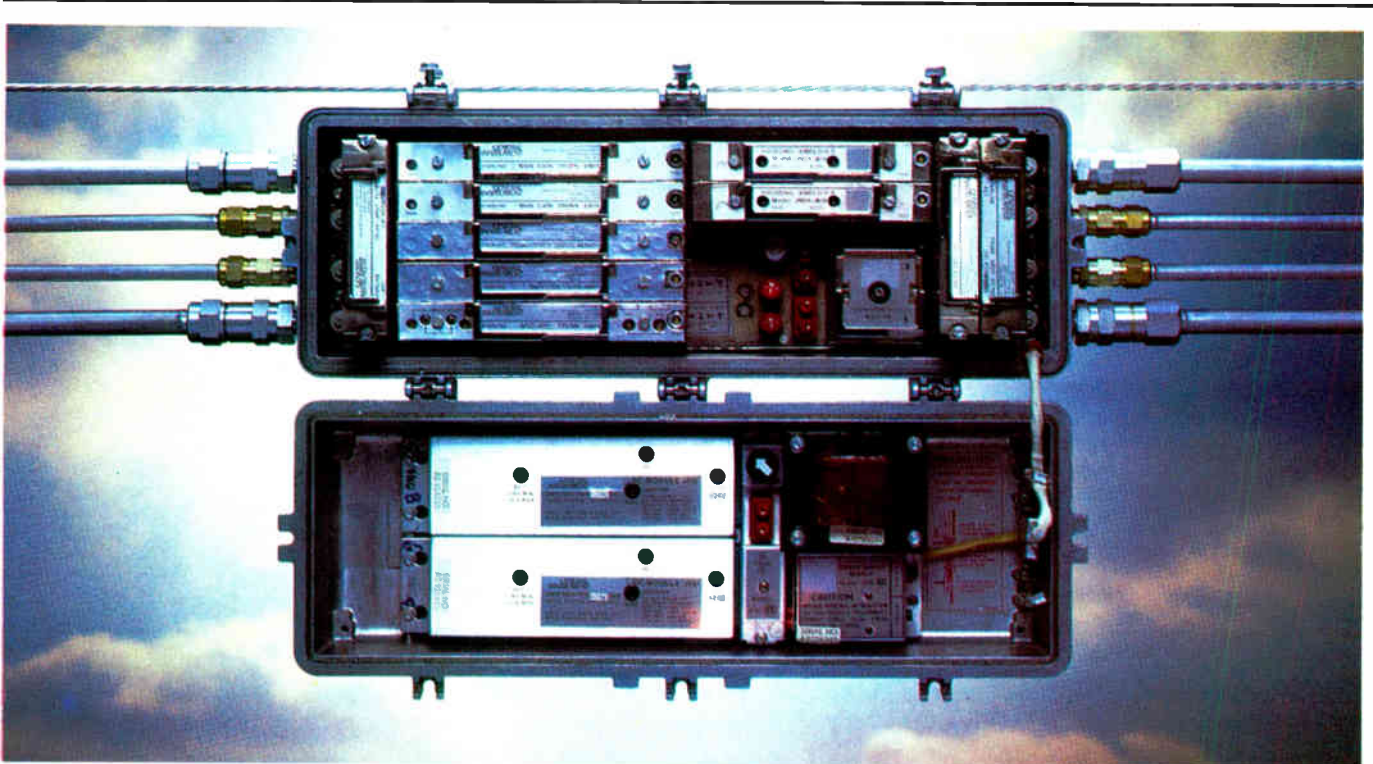
Promoted to the new position of director of western sales is **Thomas Holder**. Holder is responsible for sales activities in the company's western and southwestern territories.

**Louis Roels** has been promoted to the new position of director of eastern sales. This includes the northeast, southeast and midwest territories of the sales organization.

In the midwest sales region, **John Golbeck** has been promoted to district sales manager. Previously he was a sales engineer for the midwest office.

★ **Marian Gammey**, manager of customer service for **Klungness Electronic Supply** of Iron Mountain, Michigan, recently served as chairperson of a two day session held at the Wisconsin Technical Institute's CATV School in Ashland. She was selected on the basis of her 10 years of experience with cable television and because she represents woman's part in this rapidly expanding industry. The school wants to ensure that women are

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aware of the many opportunities available to them in the cable television industry and Marian is an example of achievement.



Steven Fudge

★ **Capscan Cable Company** has named **Steven C. Fudge** as west coast sales manager. He will direct Capscan's sales efforts throughout California, Nevada, Arizona, Utah and Colorado.

A former general manager for Bexar County Cablevision in San Antonio, Texas, Fudge has been employed in the cable television industry for the past eight years, including previous service as General Manager for Belco CATV Construction Company in Houston.

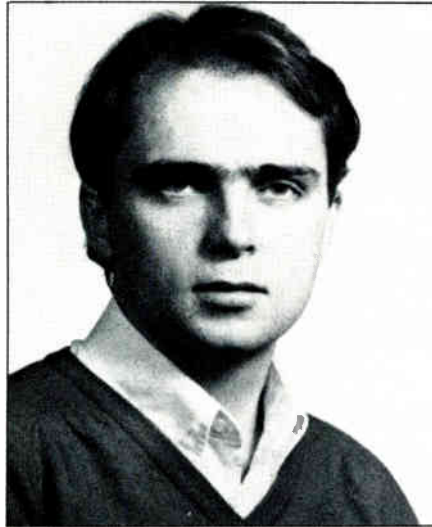
★ **Ferris Peery** has been appointed vice president of **Anixter-Pruzan** and will direct sales of Hamlin Products to the cable TV industry.

Peery has been with Anixter since 1972. In 1975 he became general manager of Anixter's wire and cable distribution center in Seattle, and in 1980 he was named vice president of national accounts in the Northwest region.

**Ray Gensinger** has been appointed vice president, purchasing for **Anixter-Pruzan**.

Gensinger joined Anixter in 1975 as operations manager of its New Jersey facility and later took over the purchasing of all CATV products for the company. Prior to joining Anixter he was purchasing manager for Teleprompter.

Gensinger will be responsible for negotiating blanket purchases with national vendors and co-ordination of district requirements.

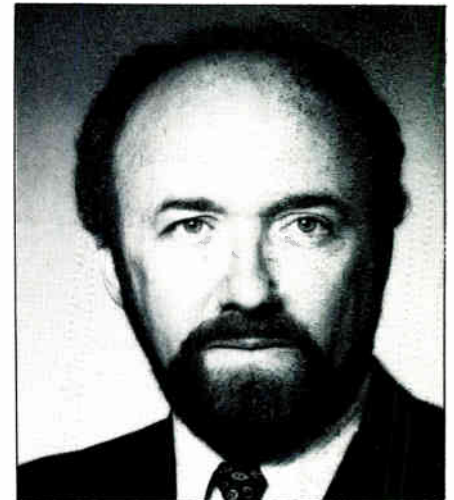


James Heath

★ **James Heath** has been appointed development engineer at Times Fiber Communications Inc., an affiliate of **Insilco Corporation**. Heath will be involved in the design of electronic circuits for new fiber optic systems being developed by TFC.

He comes to TFC from Raytheon-Data Systems-Telecom where he was a development engineer working on high speed digital circuits for fiber optic communication

systems. He has also worked as a development engineer in fiber optics for Phillips Cables Ltd. where he was mainly involved in evaluating the optical properties of the fiber and the design of the cable.



Clifton Gardiner

★ **Clifton H. Gardiner** has announced his resignation as president of **Gardiner Communications Corporation**. Gardiner, a twenty-four year cable veteran, founded the company in 1977 and remained as president when it was acquired by Burnup & Sims in 1979.

Gardiner is president of Gardiner Management Corporation, operator of seven cable systems with some twenty thousand subscribers.

★ **Larry Pfister** is leaving his position as vice president (U.S.) of **Telidon Videotex Systems Inc.**, and is joining **Time Inc.** as vice president of the Video Information Services Division. Pfister is chairman of the Videotex Industry Association, a new trade association of videotex/teletext services and vendors.

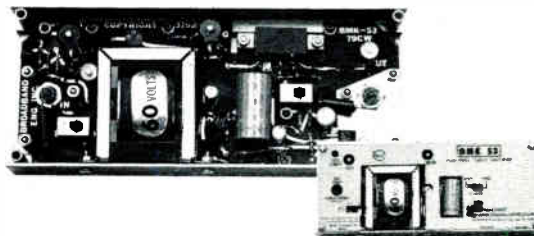
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Rapid delivery on ADM's super-efficient 11-foot polar-mount antenna (includes remote controlled polarization rotation system as well!), plus, packages are available for complete systems including LNA, 24-channel tuneable receiver and cabling. Why wait in a long line when you can get the best, today!



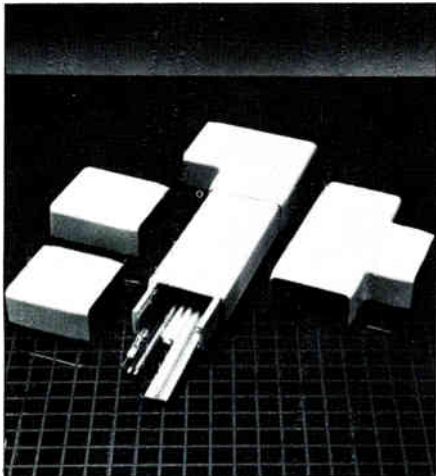
## A SUPER TVRO ANTENNA

**SYSTEM.** High-quality panelized aluminum 11-foot dish and steel polar mount. Dish weighs approximately 200 pounds, mount 265 pounds. Precision designed, easy installation, zinc chromate base primed and heavy-duty white top finish. The rotating feed is standard! Easily shipped and installed. Choice openings for dealers and distributors.

**Antenna  
Development &  
Manufacturing, Inc.**

P.O. Box 1178, Poplar Bluff, MO 63901 (1-314-785-5988)

# Product News



Deduct

## New PVC Duct System For Low Voltage Wiring

Dek inc. has introduced a revolutionary new duct system for low voltage wire. Formed from PVC, it's designed to organize wiring runs from one point to another. Tangled masses of flat or round wire and cable can be neatly enclosed and hidden from view.

Deduct is designed for use in the office, plant, store or home. It allows quick installation of new wiring without running conduit or cutting through walls. The only tool required is a small saw for cutting the duct.

Deduct is available in 6-foot or 8-foot sections with a 1/2-inch x 1-inch wire storage channel. Accessory pieces hold wire in the channel and guide it through L-corners, T-corners, and into special connections. Installation is as simple as cutting sections to size, peeling a liner off of the adhesive backing, and pressing the duct into place.

For more information write or phone Dek, Inc., 3480 Swenson Avenue, St. Charles, Illinois 60174, (312) 377-2575.

## RMS Converters

RMS Electronics Inc. has introduced the Converter-Matic™ series of set-top converters. They are available in both block and regular types with 29 channel configurations. The block converters offer 1, 2, 3 or 7 channel conversion capabilities. Model CA-2DE-IKL, CA-3GI-UKL and CA-7AG-IKL are offered with "parental-key-lock" to control viewing of certain types of programming by children.

The regular converters provide 20, 32, 36, 40 or 60 channel conversion capabilities with output on channels 2, 3 or 4. These converters work on an input

frequency range of 50-324 MHz.

The 20, 32 and 36 channel converters have a frequency stability of less than 1.0 MHz when in operation from five minutes to three hours and isolation of -70dB, in-out.

The Models CA-40, CA-40LED and CA-60LED are crystal controlled through frequency synthesizing circuits (FSC), which eliminates the need for fine tuning. The frequency synthesizing circuits are addressed by a reliable mechanical switch with precious metal contact points. Models CA-40LED and CA-60LED offer a digital read-out which consists of 1/2" LED characters. The Model CA-60LED also comes complete with a jack for optional remote cable control.

The Models CA-40, CA-40LED and CA-60LED converters must be factory aligned for standard or HRC frequencies and are available with output frequencies aligned to channels 2, 3 or 4.

For more information contact RMS Electronics Inc., 50 Antin Place, Bronx, New York 10462, (800) 223-8312 (toll free) or (212) 892-1000 (collect—New York State only).



Schneider zoom lens

## Schneider 14X Zoom Lens

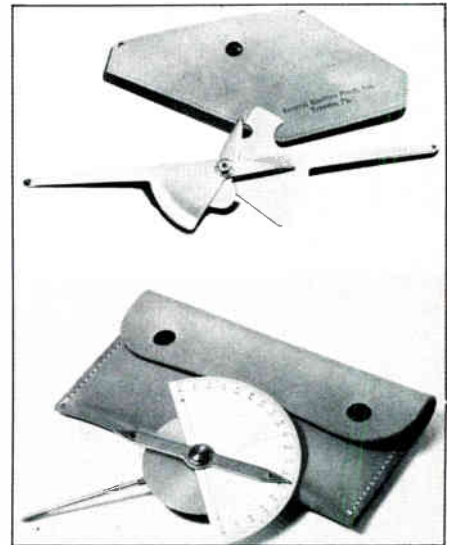
A 14X **Schneider** zoom lens has been introduced by the **Tele-Cine Corporation** to meet the needs of the new 1/2" format ENG/EFP cameras now coming onto the market. These new broadcast cameras, such as the RCA Hawkeye, are compact, lightweight and incorporate a video cassette recorder.

The new lens can power zoom from 6.5 mm to 91 mm. With the 2X range extender, it can zoom from 13 mm to 181 mm. With the 4.4 mm to 6.5 aspheric lens attachment, it can power zoom on wide-angle shots.

The Schneider 14X lens is lightweight, compact, weather-resistant and suited to rough conditions in the field. Sophisticated European optics combined with excellent f/1.4 sensitivity assure clear pictures even at low light levels.

In addition to this 14X ENG/EFP lens for 1/2" cameras, Schneider also offers a 14X lens for the 2/3" cameras now in general use.

For information on the new lenses contact Tele-Cine Corporation, 400 Crossways Park Drive, Woodbury, New York 11797, (516) 496-8500.



GMP pull finders

## GMP Introduces Two Pull Finders For Pole-Line Construction

Two pull finders—one calibrated in feet, the other in degrees—are now available from **General Machine Products Company, Inc.**, for use in pole-line construction.

The C Pull Finder incorporates a guy rod and strand gauge for rapidly determining the pull on corner poles and bisecting the corner angle to locate the guy wire or anchor. The C Pull Finder is a sturdy steel unit consisting of a screw-type prod that supports two pivoted sighting arms. a pointer on one arm that indicates the pull on a scale calibrated in feet inscribed on the other arm, and a guy rod and strand gauge.

In use, the workman simply screws the prod of the C pull finder into the corner pole and sights along the two adjustable arms to the adjacent poles. The unit then automatically indicates the amount of pull on the corner pole and permits easy bisecting of the corner angle for location of the guy rod.

The GMP Protractor Pull Finder, a device similar to the C Pull Finder, is designed for measurement in degrees instead of feet.

For more information on the C Pull Finder and the Protractor Pull Finder,



contact General Machine Products Company, Inc., 3111 Old Lincoln Highway, Trevoise, Pennsylvania 19047. (215) 357-5500.



Scientific-Atlanta series 8500 terminal

### Scientific-Atlanta's New Set-Top Terminal

Scientific-Atlanta's new series 8500 440 MHz set-top terminal offers new features that enable the CATV operator to provide higher quality service in high-channel capacity cable systems.

Advanced soft security prevents subscribers from receiving audio or partial video on unauthorized channels. Whenever an unauthorized channel is requested, the 8500 tunes to a dark screen or to a screen with an advertisement for the CATV operator's pay-per-view events and other services.

In dual cable systems, the new 8500

set-top terminal can tune up to 128 channels with only one drop wire to the home. The control switch is at the point the dual cable enters the house, not in the converter itself. In single cable systems, the 8500 can tune up to 64 channels.

The set-top terminal comes as an addressable unit permitting channel authorization and security functions to be controlled from the headend. This has a substantial cost benefit to the cable operator by eliminating service calls to authorize pay-per-view events.

The 8500 is simple for subscribers to operate and offers many convenience features. Parents can control the programs that their children watch by the use of a 5-digit secret code.

Delivery of the Series 8500 set-top terminal will begin in early fall. For more information contact John C. Messerschmitt, marketing manager, Subscriber Products Division, (404) 925-5561.

### Earth Station Modulator From Phasecom Corporation

The Model 106 SAW Filter TV modulator from **Phasecom Corporation** is a high performance modulator, ideally suited to interface with earth station receivers, which gives full performance at a very low cost.

It provides a high quality vestigial sideband signal and excellent adjacent

channel performance over the 54-300 MHz range. The IF video modulation stage utilizes a SAW to provide stable, maintenance free, band pass characteristics along with flat group delay. Output circuitry includes a sync-tip AGC circuit for constant output levels, and a bandpass filter to ensure low spurious output. Signal integrity is maintained throughout and includes fully enclosed IF and up converter oscillators as well as shielded filter circuitry.

For more information contact Communications Supply Inc., 724 East Union, West Chester, Pennsylvania 19380, or call (800) 345-8266 (U.S.); (800) 662-2428 (Pennsylvania only).



Triangle high pass filter

### Triangle Manufacturing HP50 High Pass Filter

The HP-50 high pass filter from **Triangle Manufacturing** is a low-cost, compact filter that eliminates return noise



# 450 MHz 60 Channels

PLUS . . .

the FS 3D-VS Professional SLM has Built-in Quality Features . .

- $\pm 1.0$  dB Accuracy
- Electronic Auto. Shut-off
- New High-Impact case
- AC/Battery Operation:  
3 types of Battery Options;  
Niacads, Alkaline or  
Carbon Zinc

Available at major CATV Distributors  
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**Sadelco, Inc.** 75 West Forest Avenue, Englewood, New Jersey 07631 201-569-3323  
General representative for Europe: Catec AG Luzern/Switzerland, Habsburgerstr 22. Tel. 041-23-90-56 Telex: TELFI 78168

# DX is Honored to Announce a New Line of Highly Reliable Converters.



Now you can select from three new DX models:

ETC-100, a 7-channel mid band block converter;

ETC-110, a 14-channel mid and super band block converter; and

ETC-200, a high performance 36-channel tunable converter with an input buffer amplifier for clean, crystal clear viewing.

DX converters are specially designed to fill your needs for high quality equipment at competitive prices. And each DX converter has built-in power surge protection for extended converter life. The

clean, crisp styling and small size will be appealing to your customers. And DX's strict attention to quality control in every construction step further assures you a converter that will please, year in, year out.

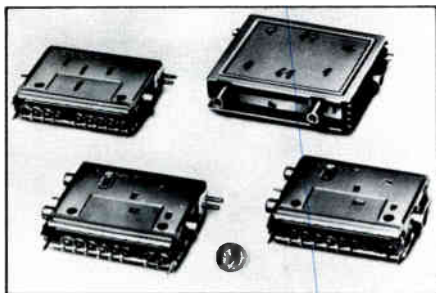
For many years DX has been a widely respected name in the Japanese CATV industry. With the introduction of these new converters, we are committed to becoming a valued partner in the American CATV market. You can count on DX for innovative technology, superior quality, reliable performance, and competitive pricing.



in two-way CATV system applications. The smallest available on the market today, the HP-50 is ideally suited for use in multi-drop installations.

With a pass band of 52-500 MHz, the HP-50 has an insertion loss of 1dB maximum and a return loss of 14dB  $\pm$ 1dB. It has an operating temperature range of -40° to +120°F and is water resistant.

The HP-50 high pass filter is distributed exclusively by Communications Supply Inc., 724 East Union, West Chester, Pennsylvania 19380, or call (800) 345-8266 (U.S.); (800) 662-2428 (Pennsylvania only).



Panasonic 133-channel tuners

### 133-Channel TV Tuners And CATV Converters From Panasonic

Two new models of TV tuners for CATV reception and two models of CATV converters are now available from the

### Electronic Components Division of Panasonic Industrial Company.

The newly developed TV tuners, models ET17X and ET17XP, are very small in size, yet are capable of tuning up to 133 different stations in the VHF/UHF/CATV bands, the largest number of channels made available in equipment of this type.

Simultaneously, the company has also developed two models of advanced CATV converters—an up/down converter, model CT6, and a down converter, model ET17VXP. Each unit has the largest available number of channels, capable of receiving up to 60 stations. The small size of this equipment is due to the use of Panasonic's unique space-saving circuitry and the prolific use of "chip" components which permit the further reduction of equipment size.

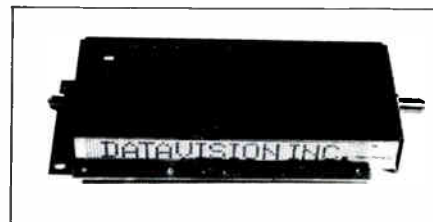
For technical information and pricing call Wally Resnick, (201) 348-5283.

### New TVRO Earth Station Products Brochure Available From Blonder-Tongue

Blonder-Tongue Laboratories, Inc. is offering a new brochure which describes and illustrates their line of TVRO Earth Station products. Five basic systems, each applicable to a specific geographic area, are detailed along with a reference map to assist a potential user in his product selection.

TVRO earth station products available from Blonder-Tongue include: 3, 3.65, 4.6 and 5 meter antennas; low noise converters; 24 channel receivers; earth station modulators and two- and four-way signal splitters. In addition, the company also has available a group of auxiliary earth station products: foundation pier kits, pressurization kits, 0.65 meter extender ring kits and receiver mounting trays. This complete TVRO line provides Blonder-Tongue customers with a professional system having totally compatible components.

For more information contact Blonder-Tongue Laboratories, Inc., One Jake Brown Road, Old Bridge, New Jersey 08857, (201) 679-4000.



Datavision modulator/demodulator

### Datavision CATV PSK/OOK Modulator/Demodulator

Datavision Inc. has introduced its PSK/OOK CATV modulator/demodulator economically designed for two-way data

## Jerrold's Time Proven J-Series Antenna

This Jerrold time proven J-Series Antenna is specifically designed for commercial antenna installations. Its heavy duty construction assures reliability under severe climatic conditions and provides long life and trouble free operation.

### Now Available Cantilever Mount

This new cantilever mounting feature is specifically designed to meet the flexibility demands of today's installations. This feature consists of a high strength mast mount bolted to the rear of the antenna boom. Bracing is provided by a steel horizontal crosspiece U-bolted to the upper portion of the mast, and connected by diagonally opposed tubular braces running down to a steel support bracket which is bolted to the midpoint of the antenna boom. All parts are treated for corrosion resistance.

**Now in stock!**

405 N. Earl Avenue  
Lafayette, Indiana 47904

Call Toll Free 1-800-428-7596  
Indiana 1-800-382-7526





# This electrifying new performer was born for Cable TV.



## Presenting the Gould<sup>™</sup> Watchman.

It stays on the job longer because it's designed to take constant charging.

Just the battery you need for standby power to amplify cable signals during utility outages.

In the past, you've had to rely on conventional batteries to perform that function.

Not anymore.

Now Gould, the leader in battery technology, leads again with the first battery specifically engineered for cable television.

The Gould Watchman.

We constructed it of our new Calcium Plus alloy for:

- a low gassing rate.
- less water loss.
- lower cost over the life of the battery.

We gave it longer life with a specific gravity that permits it to accept constant, low voltage charging.

We incorporated premium envelope separators

to prevent internal shorting and "treeing" from negative to positive grids.

We added extra electrolyte above the plates to minimize service frequency.

Then, we completed the Watchman with offset, studded terminals that fight corrosion and provide for quick connections. Plus, removable gang vents that

make servicing easier.

Add up all those features and you've got a longer lasting, easier to maintain battery.

*A battery that costs less money in the long run.*

A battery born for Cable TV.

Want to know more? Call us at (612) 681-5388 or mail this coupon today.

**YES**, tell me more.  
Please send complete information on the new  
Gould Watchman battery.

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ Zip \_\_\_\_\_

Telephone \_\_\_\_\_

area code number

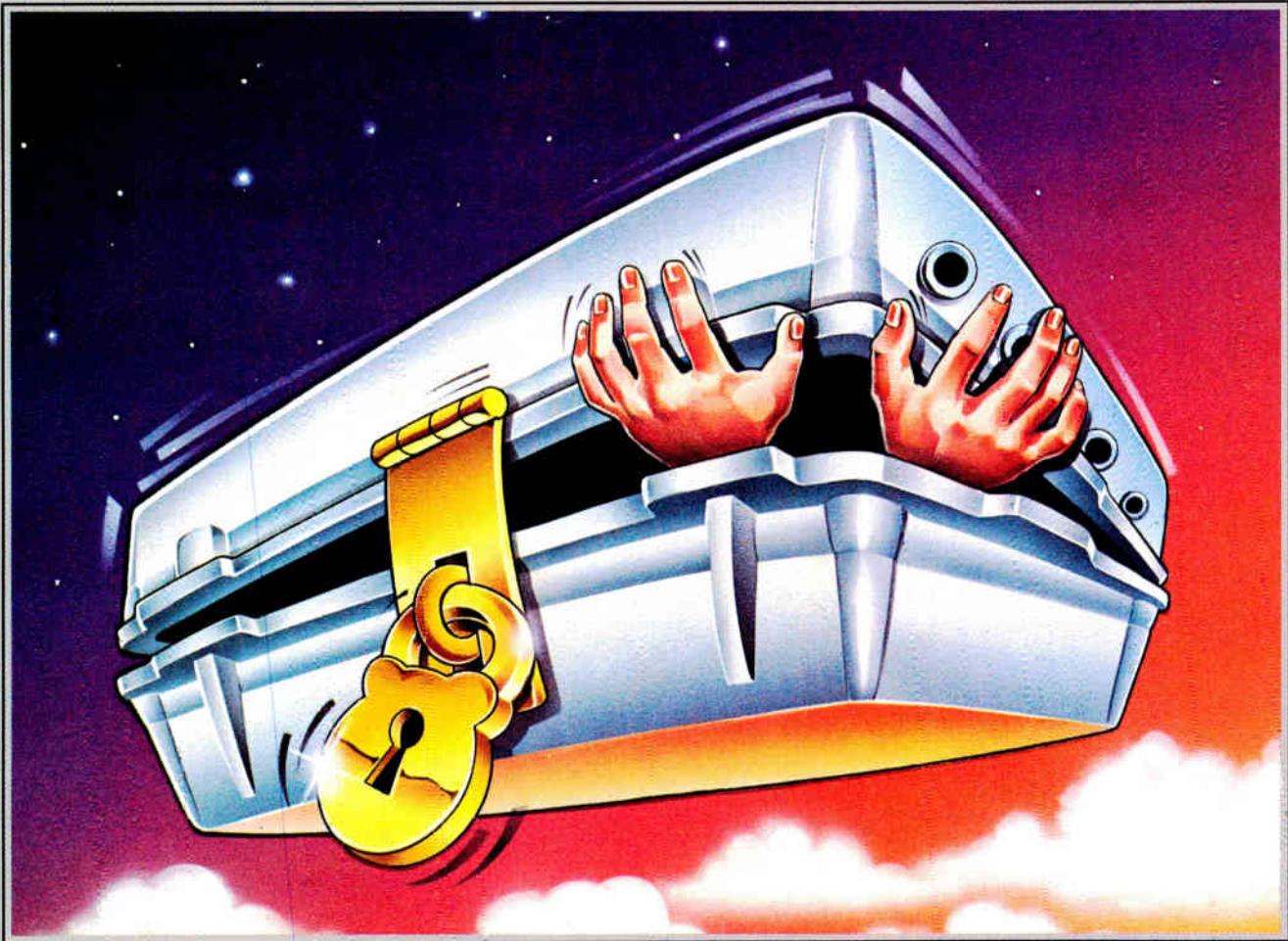
**MAIL TO:** Gould Inc.  
P.O. Box 43140, St. Paul, MN 55164  
Attn: Bob Hasewinkle

CED 5/82

 **GOULD**  
Electronics & Electrical Products

**Committed to  
making batteries  
better than ever.**

# A 450 MHz system that won't lock you in.



When you use Sylvania's 450 MHz transmission products, you won't get locked into a system configuration you can't get out of. Because we've specifically designed these transmission products to make it easy to add or exchange all the options available with our stations.

As a result, you can look forward to easier system upgrades. Simpler system maintenance. And a wider variety of possible system configurations. Everything from conventional trunk/bridger amplification with automatic control, to advanced features like sub-VHF bridger switching and mid-band split.

That's not all; many important modular functions of these stations are interchangeable between the family of trunk, line extender and multi-service amplifier stations. Which lowers the cost of spare parts inventory, and makes maintenance easier.

And thanks to our policy of standardization, we've given you this kind of design flexibility from

the beginning. The first stations we shipped back in 1970 will accept the latest advanced-technology modules now in production. Of course, individual system specifications have to be considered, but the earliest Sylvania system can still incorporate the latest technology.

To complement the standard Sylvania CATV line of transmission products and converters, other GTE Divisions work along with us. So we can bring you the latest solutions for all your communications needs. Whether you're involved with residential security, microwave radio, packet switching, or fiber optics.

If you'd like to know more, call your local Sylvania CATV office. Or call us at 800-351-2345, toll-free. (From Texas, Alaska, and Hawaii, call (915) 594-3555 collect and ask for Customer Service.) But call us soon. Because we're working to unlock your system—now and in the future.

**SYLVANIA** CATV  
Transmission Systems

See us at the NCTA Show at Booth #1254.

**GTE**



transmission. The use of PSK/OOK (phase shift key/on-off key) modulation allows high data transmission rates with a minimal use of valuable signal bandwidth. The Datavision PSK unit operates below CATV video channels at 5-14 MHz upstream and 108-117 MHz downstream.

A unique feature of the Datavision mod/demod design is its high-speed data transmission capability. Datavision PSK units currently online in Grosse Pointe, Michigan, are operating at 19,200 baud, while the unit can operate at up to four times that speed with slight modification.

The compact PSK unit measuring 3" by 6¾" has adjustable signal strength output. Any one of the 89 available channels can be selected by simply changing the crystal.

For more information contact Ann Greenstone, 21103 Gratiot, East Detroit, Michigan 48021, (313) 771-8760.

#### **Cable Pak From M/A-COM COMM/SCOPE**

**M/A-COM COMM/SCOPE** will introduce, at the NCTA, a new, reusable plastic case for use in dropwire installation. The Cable Pak case offers several unique features, including the dual weight distribution handles and a wrap-around system for the handling of pulled-out dropwire.

The Cable Pak will be featured on the

cover of the new Paramedrop Dropwire Catalog from M/A-COM COMM/SCOPE. The new catalog references over 630 configurations of dropwire available to the CATV industry.



*Microcom remote converter*

#### **Remote Converter From Microcom**

**Microcom Systems Ltd.** has introduced a new cable remote CATV converter offering full-feature performance at a very low cost.

The MR1 Remote Converter incorporates a reliable, field-proven 36-channel converter unit, and corded remote control. The rugged, dial-operated channel selector features long-life, and low-wear characteristics. The extremely low unit cost of \$34.95 makes the MR1 ideally suited to mass installations in new

franchise situations, or as a second set converter for existing customers.

The MR1 is manufactured by Microcom Systems Ltd. and distributed exclusively by Communications Supply Inc., 724 East Union, West Chester, Pennsylvania 19380, or call (800) 345-8266 (U.S.); (800) 622-2428 (Pennsylvania only).



*S.T.A.R.S.*

#### **Microcom—S.T.A.R.S. Security System**

S.T.A.R.S. (Scrambling, Tiering and Recovery System), from **Microcom Systems Ltd.** has been designed to

# **LRC** *Introduces*

# **HEAT SHRINK**

## **The Material**

LRC heat shrink is produced from irradiated, cross-linked polyolefin. The cable wall sleeves are flame retarded and provide ultraviolet and corrosion resistance. The material withstands exposure to common chemicals and severe weather conditions. LRC medium wall thickness tubing provides a tough, flexible insulation suitable for aerial and direct burial cable installations.

## **The Advantages**

LRC offers heat shrink for individual connector types cut to insure proper cable overlap. Available in three sizes, LRC's heat shrink accommodates all six cable sizes. When using LRC connectors, only entry and splice lengths are needed. The flexibility of custom size tubing eliminates waste and reduces inventory. With the addition of heat shrink tubing to LRC's established line of connectors you now have the advantage of single supplier convenience.

**LRC** **ELECTRONICS, INC.**  
 901 SOUTH AVE. HORSEHEADS, N.Y. 14845  
 PHONE 607-739-3844

a subsidiary of

**AUGAT**



# VITAL SIGNS

Make **8,640,000**  
Measurements Per Day With  
Texscan's On-Line ATE System



Making more than 100 measurements per second, Vital Signs helps predict problems before they become failures and saves time, manpower and money in correcting system malfunctions.



Vital Signs transponder modules interface with most CATV distribution amplifiers and are internal on the Theta-Com XR2+ and 'T' series. Each module performs up to 8 individual measurements including, signal levels, AC/DC voltages and currents, temperatures, and reverse bridger switching and status.



A computer controlled interrogator monitors each transponder location in turn and alerts the system operator if a fault is found. Isn't it time you had your own Vital Signs system? Vital Signs is available now. Call today for price and delivery.

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#1—1/30/81

## There's a representative near you:

Western—(916) 533-1235  
Mountain—(505) 281-2311  
South Western—(214) 867-1049  
(713) 466-8153

Southeastern—(813) 962-2752  
Northeastern—(201) 821-7422  
Midwestern—(812) 334-2241  
(612) 933-8922

# Texscan

Texscan Corporation  
2446 N. Shadeland Ave.  
Indianapolis, Indiana 46219  
(317) 357 8781

Texscan Theta-Com CATV  
2960 Grand Avenue  
Phoenix, Arizona 85061  
(800) 528 4066

Texscan MSI  
3855 South 500 West, Suite S  
Salt Lake City, Utah 84115  
(801) 262 8475

secure premium service television signals, and features multi-tier horizontal interval scrambling, leaving the vertical interval untouched and available for future services.

The STS2000 scrambler requires only video and IF inputs for complete operation. The programmable STR200 descrambler is compatible with all standard CATV converters and will secure an unlimited number of channels with up to eight levels of tiering combinations. The system utilizes a sophisticated proprietary coding chip to provide a uniquely high level of security.

Optional features include an STC2200 system controller which ensures inter-tier incompatibility in multi-tier operations. The head-end main frame can accommodate eight scramblers, a power supply and one data processor interface for future addressability.

For more information contact Communications Supply Inc., 724 East Union, West Chester, Pennsylvania 19380, or call (800) 345-8266 (U.S.), (800) 662-2428 (Pennsylvania only).



Winegard two- and four-way taps

#### Winegard Introduces Subscriber Taps

Winegard CATV division, has announced the introduction of two-way and four-way subscriber taps to its line of CATV equipment.

The new taps have a bandpass of 4-400 MHz with values ranging from 4dB to 35dB.

Each tap is enclosed in a die-cast aluminal alloy housing with a corrosion resistant chromate finish. They can be aerial or pedestal mounted. Special collars hold the shrink sleeve tight to the housing. The two-way tap can be changed to a four-way without unseizing the cable.

Each tap has low insertion loss, high tap-to-tap isolation and can be used with any system.

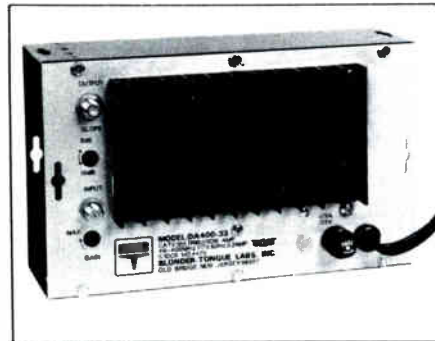
For more information contact W. E. "Bill" Stone, at (800) 523-2529.

#### Scientific-Atlanta Introduces Bonded Multi-Shield Drop Cable

Scientific-Atlanta Inc. has introduced bonded multi-shield drop cable into its standard drop cable product line. It

is designed for urban CATV systems where it is important to prevent RF leakage. Both ingress and egress noise are minimized because the cable is constructed with a bonded laminated foil layer and heavy braid layer, plus a laminated foil tape layer and a second layer of protective braid.

Multi-shield drop cable is available in RG-59 and RG-6 sizes. The RG-59 size is constructed with a 68 percent first braid layer and 49 percent second braid layer. The RG-6 size is constructed with 60 percent and 43 percent braid layers. Multi-shield messengered construction is available, as well as dual construction, PVC or polyethylene jacket and flooded construction.



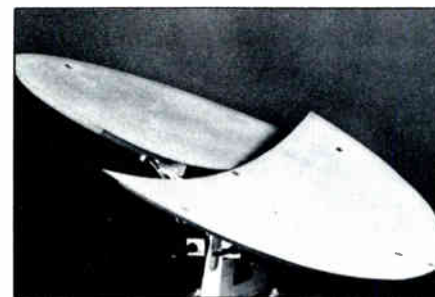
Blonder-Tongue distribution amplifier

#### Blonder-Tongue To Introduce Distribution Amplifier At NCTA Show

Blonder-Tongue Laboratories Inc., will display a new 400 MHz distribution amplifier at the National Cable Television Association (NCTA) Show, May 3, 4 and 5 at the Las Vegas Convention Center.

Model DA 400-33 is a 54-channel broadband CATV distribution amplifier designed with push-pull hybrid IC amplifiers for extra reliability and wide range, continuous gain and slope controls.

Other featured products include three new CATV VHF/FM antennas for low band, high band and FM stations; the Audiomatic, a self-contained automatic sound control system; the Dynamatic CATV Processor, featuring automatic gain control; and the BPF-c Single Channel Bandpass Filter, which rejects signals outside of its bandpass.



System Resources microwave

#### Microwave Antennas And Components Available

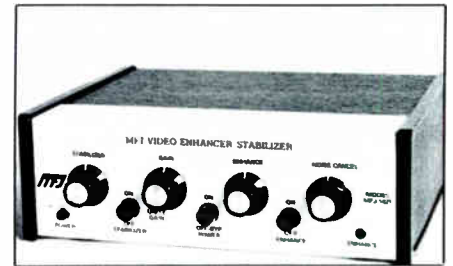
Fiberglass microwave antennas and

components engineered to OEM or end user specifications for commercial and MIL-SPEC applications are available from **Systems Resources Company Inc.**

Systems Resources microwave antennas and components are molded and assembled in any size and configuration from strong, lightweight fiberglass materials, and feature surface accuracies better than .005 RMS, closer than is possible with other materials such as spun aluminum. Foam or honeycomb cores can be incorporated for enhanced strength.

Supplied in prototype to production quantities, Systems Resources microwave antennas and components include horns, scanners, shielding, polarizers, horn covers, array holders, waveguide specialties, reflectors of all types, and radomes of all types.

Systems Resources microwave antennas and components are quoted on request. For more information contact Systems Resources, Inc., 11A Esquire Road, North Billerica, Massachusetts 01862; (617) 272-5772.



MFJ enhancer/stabilizer

#### MFJ Introduces Distribution Amplifier

MFJ has introduced its new Video Enhancer/Stabilizer/Distribution Amplifier that makes fuzzy pictures sharp and clear. Enhance control improves picture clarity, detail and sharpness and increases contrast.

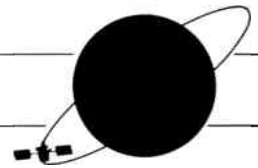
Gain Control boosts weak signals and improves faded picture due to low VTR signals.

A bypass switch compares the enhanced with the unenhanced picture, while stabilize control removes copy-guard, stops picture roll and jitter, and lets you play copyguarded tapes on any TV (requires RF Modulator). A stabilize control bypass switch is provided.

Distribution Amplifier gives three outputs. It can be used as a distribution amplifier with enhancer and stabilizer bypassed. The Power OFF mode connects input to one output. RF Modulator is required with standard TV sets.

The MFJ-1421 Enhancer/Stabilizer/Distribution Amplifier is available from MFJ Enterprises, Inc. for \$139.95 plus \$4.00 for shipping and handling. For more information or to order, call toll-free (800) 647-1800 or mail order to MFJ Enterprises, Inc., 921 Louisville Road, Starkville, Mississippi 39759.

# In Orbit



Signal	Day	Start/Stop	Alert Tones	Satellite/Transponders	Signal	Day	Start/Stop	Alert Tones	Satellite/Transponders
ARTS		9:00 p.m./12:00 a.m.		Satcom III-R, #1	Lifestyle		24 hrs	None	Satcom III-R, #3
ACSN	Weekdays Weekends	6:00 a.m./4:00 p.m. 6:00 a.m./1:00 p.m.	192*/#	Satcom III-R, #16	The Movie Channel		24 hrs	None	Satcom III-R, #5
BET	Fridays	11:00 p.m./2:00 a.m.	018*/#	Satcom III-R, #9	Modern Satellite Network	Weekdays Weekends	noon/5:00 p.m. 8:00 a.m./1:00 p.m.	243*/#	Satcom III-R, #22
Bravo		8:00 p.m./6:00 a.m.		Satcom IV #6	MTV: Music Television		24 hrs.	None	Satcom III-R, #11
CableText		24 hrs.	None	Satcom III-R, #6 Vertical Blanking	National Christian Network		6:00 a.m./8:00 p.m.	073*/#	Satcom IV #7
CBN		24 hrs.	None	Satcom III-R, #8	National Jewish Television		12-4 p.m. Sundays		Satcom III-R, #16
CBS Cable		4:30 p.m./4:30 a.m.	524*/#	Westar III, #6	Nickelodeon		8:00 a.m./9:00 p.m.	311*/# (E,C,M) 519*/# (P)	Satcom III-R, #1
Cinemax		24 hrs.	None	Satcom III-R, #20 (E,C) Satcom III-R, #23 (M,P)	North American Newstime		24 hrs.	None	Satcom III-R, #6
CNN		24 hrs.	None	Satcom III-R, #14	PTL		24 hrs.	None	Satcom III-R, #2
Cable News Network II		24 hrs.	None	Satcom III-R, #15	Preview Channel	Weekdays	10:00 a.m.-1:30 p.m.	207*/#	Satcom III-R, #21
C-SPAN		9 a.m./1 a.m.		Satcom III-R, #19	Reuters	Weekdays	4:00 a.m./7:00 p.m.	None	Satcom III-R, #18
Daytime				Satcom III-R, #22	SIN		24 hrs.	None	Westar IV, #3x
ESPN		24 hrs.	None	Satcom III-R, #7	SPN		24 hrs.	None	Westar IV, #11x
Eros	Mon-Sat	12:00 p.m.-5:00 a.m.		Westar IV, #10D 12 (Fri, Sat.)	Showtime		24 hrs.	None	Satcom III-R, #12 (E,C) Satcom III-R, #10 (M,P)
Escapade		8:00 p.m./6:00 a.m.		Satcom IV, #7	Trinity (KTBN)		24 hrs.	None	Satcom 4, #17
Eternal Word Television Network		7:00 p.m./11:00 p.m.		Westar III, #12	USA Network		24 hrs.	None	Satcom III-R, #9
GalaVision	Weekdays Weekends	8:00 p.m./3:00 a.m. 24 hrs		Westar IV, #12x	Calliope	Sundays	7:30 a.m. to 9:30 a.m.		
HBO		24 hrs.	Program 729*/# Scramble 835*/# Duplication 940*/#	Satcom III-R, #24 (E,C) Satcom III-R, #13 (M,P)	The English Channel	Saturdays and Sundays	12 p.m. to 2 p.m.		
HTN		8:00 p.m./2:00 a.m.	207*/#	Satcom III-R, #21 (P)	WFMT		24 hrs.	None	Satcom III-R, #3 Subcarrier
HTN Plus		4 p.m.-4 a.m.		Satcom III-R, #16	WGN		24 hrs.	None	Satcom III-R, #3
					WOR		24 hrs.	None	Satcom III-R, #17
					WTBS		24 hrs.	None	Satcom III-R, #6

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

Alert tones listed are for sign-on, sign-off.

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



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each

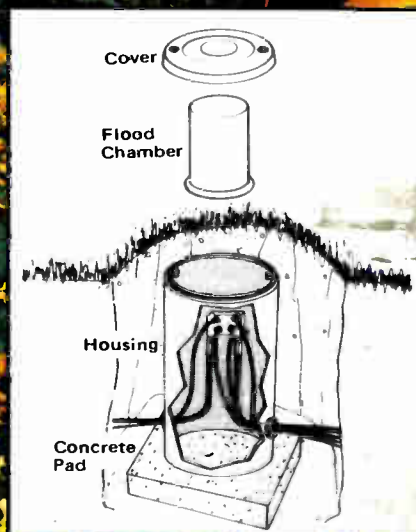
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Height: 18"

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3 ft	73 in
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5 ft	116 in



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