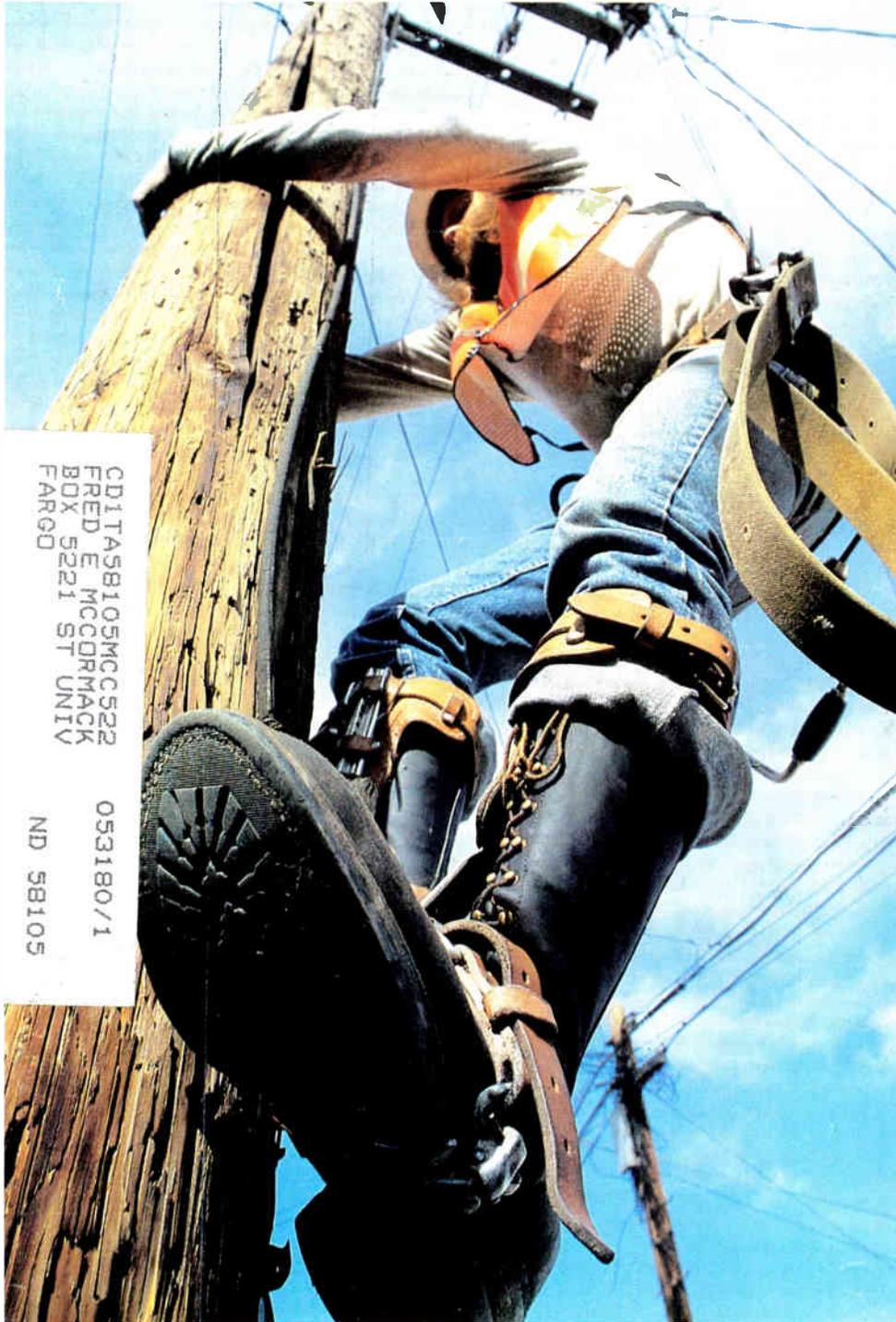


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Communications Engineering Digest/The Magazine of Broadband Technology



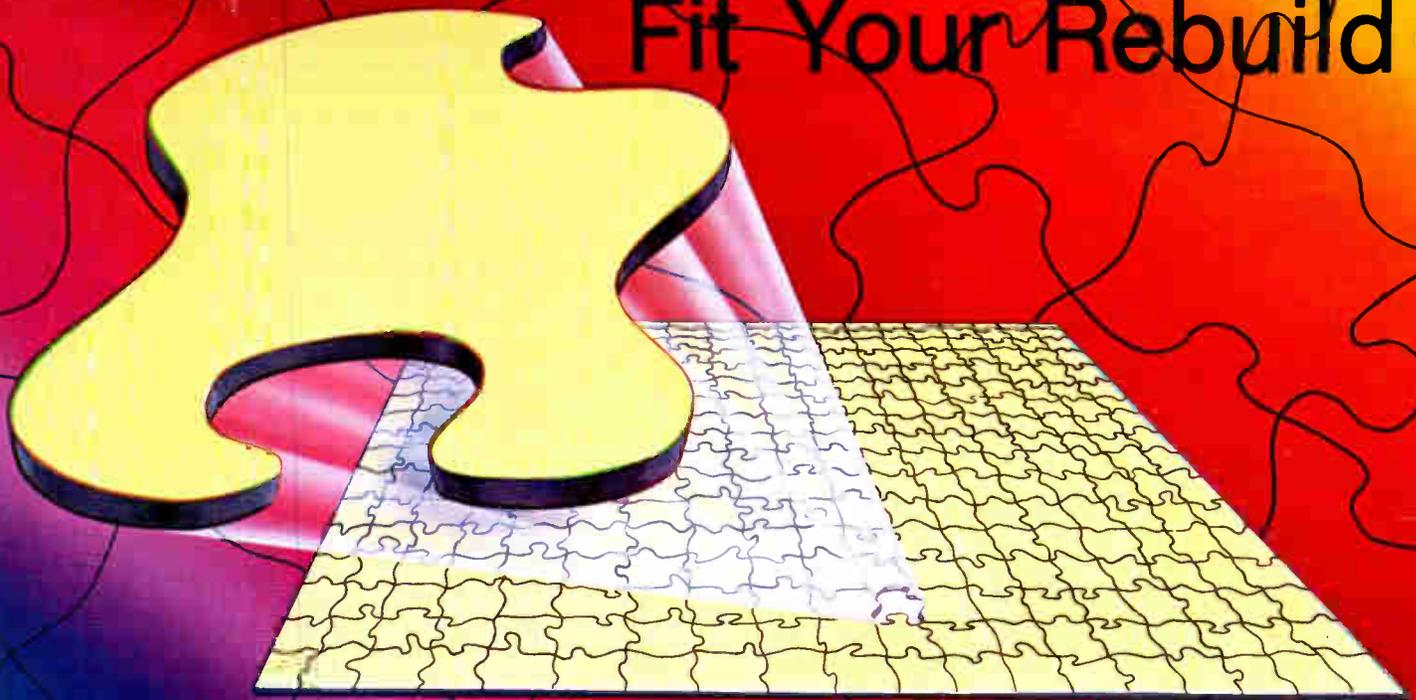
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Photomicrography reveals precise closed cell structure of new T4 ultra-hard cable. (above)

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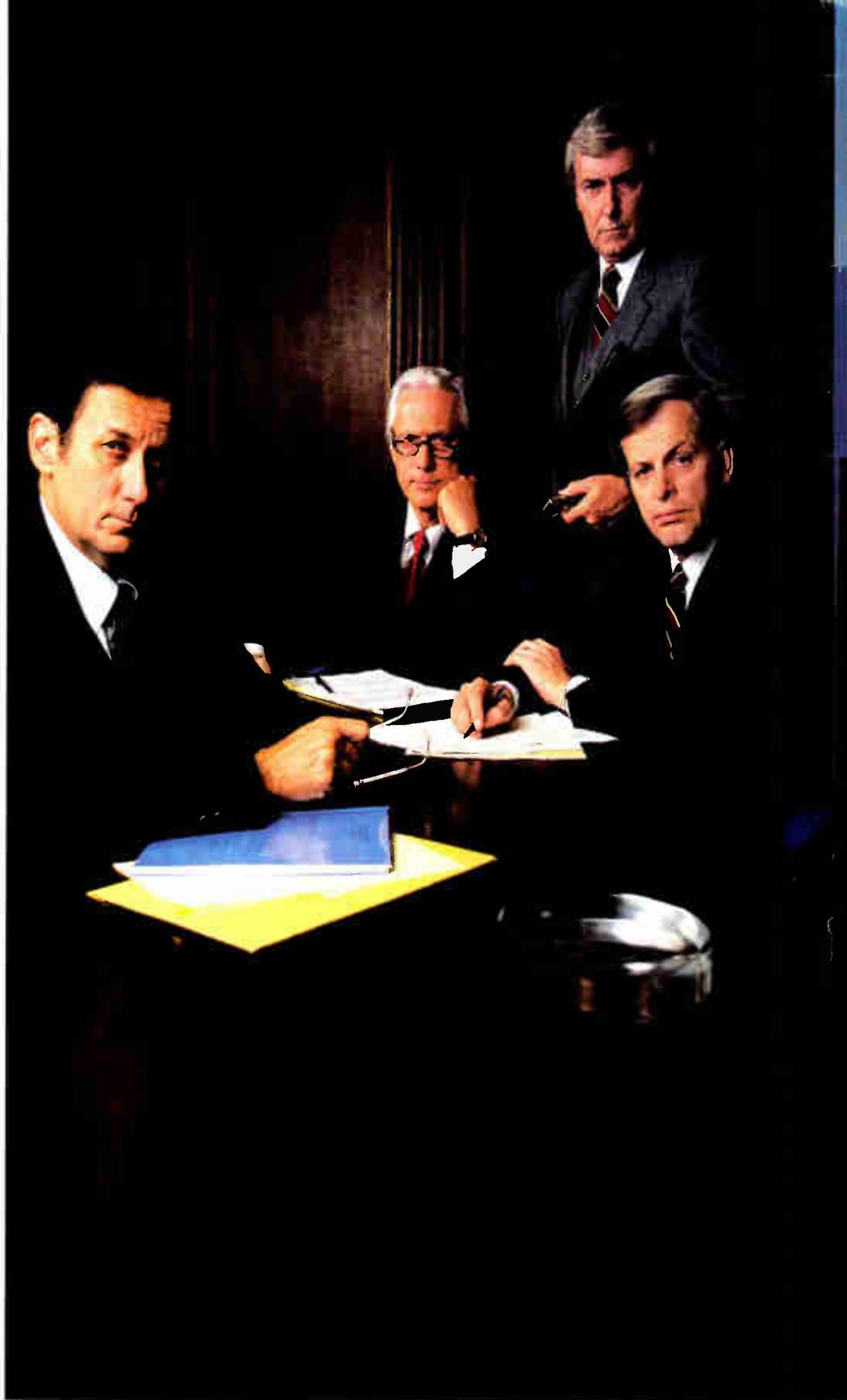
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TECHSCOPE

Scaling new heights **7**

A group of U.S. climbers will record their ascent of Mt. Everest this spring using Panasonic video equipment and a portable earth station to send signals via Intelsat to broadcasters worldwide.

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A private cable operator in Dallas was granted a CARS license despite objections from Warner Amex Cable, the Dallas franchisee.

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Construction: State of the art **18**

Today's construction marketplace has entered a new slow-down that may sustain itself for the next ten years. Despite the slowed growth, our survey of some of the nation's top MSOs shows that today's systems are being built to take full advantage of the technology of the future. Operators with an eye to the future are looking for quality in plant construction and they want the job done right—from the first day of construction.

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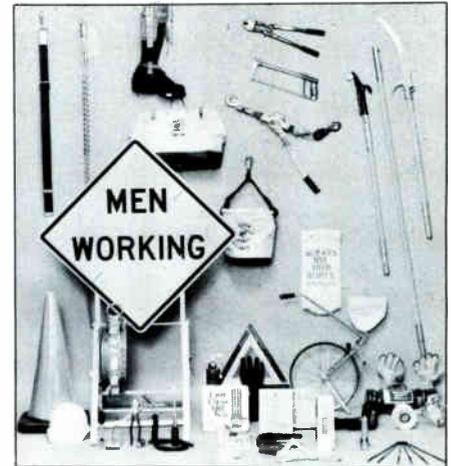
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Billing services **51**

Batch, on-line or in-house, billing services are listed and profiled in our center section this month.

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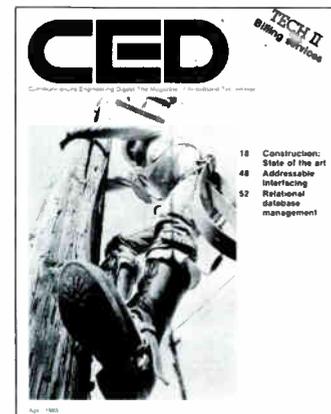
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About the cover

Denver's franchise, a joint venture of Daniels and Associates and ATC, is going up despite a general slow-down in construction nationwide. Photo by John Sunderland, courtesy of ATC.

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U.S. expedition will record Everest climb

When an expedition of U.S. climbers scales Mt. Everest this spring, they will use a Panasonic Industrial Co. Recam camera/recorder and support system to transmit live and taped pictures back to the U.S. The expedition will include four climbers who are also experienced television cameramen. As the climbers approach the peak, the Recam will transmit signals to the base camp, which will be equipped with Panasonic AU-300 source decks, an AU-A70 editing controller, an AS-6100 switcher and another AU-300 for mastering. From there, a portable earth station will send the signals via Intelsat to broadcasters in the U.S. This is not the first time a video system has been to Mt. Everest. In 1982, a Canadian expedition intended to record the climb and then run the cassettes to a nearby uplink for worldwide viewing. The effort was aborted, following the deaths of three Sherpa guides and a cameraman.

Dish plan hands

The National Cable Television Association recently asked the FCC to deny a request by AT&T for a rules waiver so that it can provide certain receive-only earth stations in conjunction with its satellite offerings. AT&T's request, NCTA said, will "erode the limited protections" of the FCC's Computer II rules, which require AT&T to provide unregulated services through a separate subsidiary. NCTA said AT&T's filing "is nothing more than the latest attempt to chip away at (Computer II)."

Video relief

The FCC is likely to begin authorizing applications for video services using point-to-point microwave frequencies sometime this spring, according to an FCC source. In 1981, the FCC allocated private operational fixed microwave service frequencies in the 2.5 GHz band and above the 13 GHz band for video services. The FCC's Private Radio Bureau unexpectedly was deluged with approximately 1,300 applications for the service. One of the applicants, Spectradyne, an over-air movie business catering to the hotel industry, has asked a federal appeals court to force the FCC to begin authorizing applications. Another applicant, M/A-COM, has been browbeating the Private Radio Bureau to get rolling on the applications. Jeff Krause, M/A-COM's vice president for corporate affairs, said the company has invested around \$250,000 to develop a point-to-point video entertainment service.

Bell cable

Bell operating companies' interest in constructing cable systems and leasing them to cable companies has now extended to the nation's capitol. Chesapeake & Potomac Telephone Co. has told the D.C. Cable Design Commission, which is drafting an RFP, that it is exploring the possibility of building the Washington, D.C. system. C&P sent a letter to the design commission saying that it is examining ways to offer a system using fiber supertrunks and coaxial feeds and drops. District Cablevision, the only cable company that has expressed serious interest in the Washington franchise, is holding discussions with C&P. Media General, the franchise in nearby Fairfax County, Va., also is talking with C&P to see what the phone company could do for them. A growing list of

Bell companies have taken an interest in cable construction. Michigan Bell recently signed a contract to help construct part of the Detroit cable system and Pennsylvania Bell has expressed an interest in doing the same thing in Philadelphia.

Unidentified object may be Satcom III

Evidence gathered by the National Air Force Defense Command and MIT's Millstone Hill radar center suggests that Satcom III, lost four days after its launch on Dec. 6, 1979, may have been found. Last fall, the Air Force began to catalog an unidentified object in orbit. The Millstone Hill radar later "verified the orbit that the Air Force observed," a Lincoln Labs official said. The evidence that the object is Satcom III, the official said, "is just based on orbital information. If we could get some communications with it, that would strengthen it." John Williamson, director of public affairs at RCA, said that "indications suggest, based on the information that has been given to us," that the object is the long-lost satellite. RCA, MIT and the Air Force all were uncertain about the possibilities of a computer-enhanced image of the object being tracked. At the time Satcom III disappeared, analysts said that incomplete or poor AKM burn was the most probable cause. Insurance totaling about \$77 million was paid.

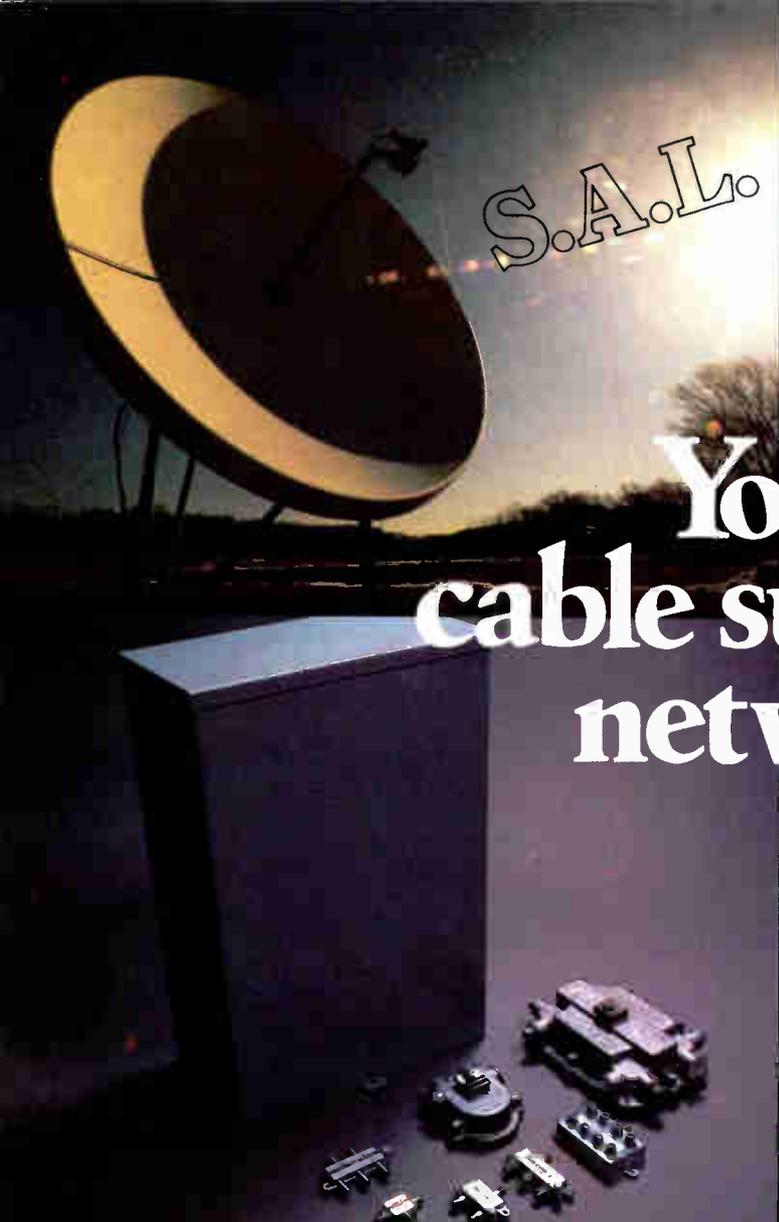
Search narrows for FCC chief scientist

Officials in the personnel department of the Federal Communications Commission are saying now that their search for a new chief scientist may be coming to an end. The word is that the application process should be completed by the end of March, and an appointee may be selected by the end of April, depending on the type of appointment sought. At the present time, the Commission is apparently considering a "non-career" type appointment, which means that the selection process can be streamlined. Approximately 25 hopefuls have submitted their applications for the senior executive service position, the salary for which will range from \$56,945 to \$67,200.



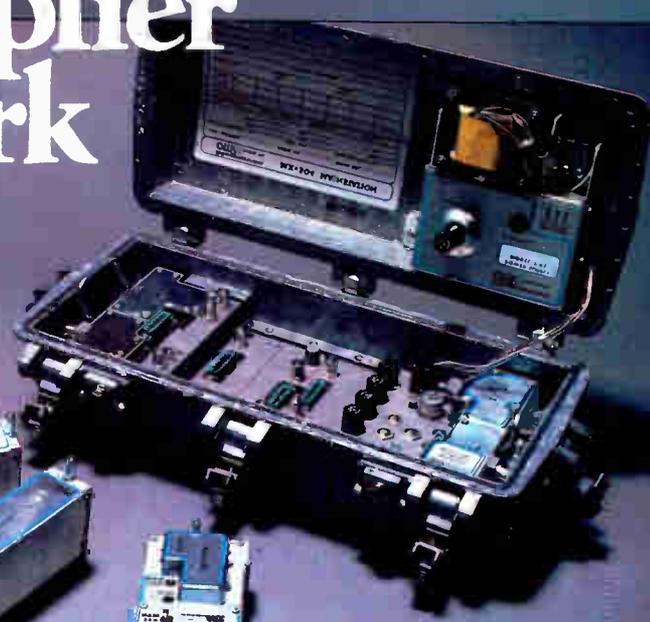
Teleport to be built near Chicago

MILWAUKEE, Wis.—Midwestern Relay Co., a division of the Journal Co. of Milwaukee, publisher of the 'Milwaukee Journal,' is to build a teleport 10 miles north of Chicago in Skokie, Ill. Equipped with three 10-meter antennas to start, the facility is expected to relieve frequency congestion on the path from Chicago to earth stations at Lake Geneva, Wis. Twelve broadband channels will be available between Teleport-Chicago and the Loop. Midwestern operates a television facility in the Merchandise Mart that serves Western Union and RCA satellite systems. Construction is set for completion by mid-1983.



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April

4-8: The **Community Antenna TV Association** will conduct an advanced technical training seminar at the Uplander Motor Inn in Upland, Calif. Contact the CATA Engineering Office, (305) 562-7847.

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

7-8: A conference on Implementing Institutional Cable Networks sponsored by **Phillips Publishing** will be held at the Meridien Hotel in Boston. Contact (301) 986-0666.

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

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

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

17-19: The annual convention of the **Virginia Cable Television Association** will be held at The Homestead in Hot Springs. Contact Dick Carlton or Lorraine Whitmore, (804) 358-7060.

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

19-21: A **Blonder-Tongue** "MATV/CATV/TVRO" technical seminar will be held in Seattle in conjunction with Pacnor Marketing. Contact Chuck Fitzer, (415) 449-0547.

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

May

2-6: The **Community Antenna TV Association** will conduct an advanced technical training seminar at the Best Western Coachman in Cranford, N.J. Contact the CATA Engineering Office, (305) 562-7847.

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

5-7: The **University of Wisconsin Extension** will conduct a seminar on "Municipal Administration of Cable Television" at the Wisconsin Center in Madison. Contact Barry Orton, (608) 262-2394.

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

6-8: The **Mountain States Region of the National Federation of Local Cable Programmers** will hold its spring conference at the University of Arizona in Tucson. Contact Sam Behrend, (602) 626-7343.

9-11: Magnavox CATV Systems will conduct a field training seminar with the Mobile Training Center in Kansas City, Kan. Contact Laurie Venditti, (800) 448-5171; in New York, (800) 328-9157.

10-12: ABC TeleTraining Inc. will hold a workshop on "CATV Management, Engineering and Operating Principles" in Chicago. Contact ABC TeleTraining, (312) 879-9000.

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

10-12: The spring meeting of the **West Virginia Community Television Association** will be held at Canaan Valley State Park. Contact Raymond Chapman, (304) 846-2551.

11: The spring conference of the **New England Cable Television Association** will be held at the Sheraton Tara in Nashua, N.H. Contact Gary Cain, (603) 224-3373.

16-19: The 26th annual convention of the **Canadian Cable Television Association** will be held at the Calgary Convention Centre in Calgary, Alberta. Contact the CCTA, (613) 232-2631.

17-19: ABC TeleTraining Inc. will hold a workshop on the topic of "Introduction to Microwave Radio System Engineering" in San Francisco. Contact ABC TeleTraining Inc., (312) 879-9000.

21: A seminar on "Production Lighting Techniques" organized by the **Hollywood Section of the Society of Motion Picture and Television Engineers** will be held at Universal Studios in Universal City, Calif. Contact Jack Spring, (213) 464-6131; or Howard La Zare, (213) 462-3161.

22-25: Knowledge Industry Publications will sponsor a conference on the "International Program Marketplace" at the New York Hilton. Contact B. Katz, (800) 431-1880; in New York, (914) 328-9157.

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

June

5-7: The annual convention of **The Microwave Communications Association** "MCA '83: Opportunities in New Technologies," will be held at the Marriott Hotel in Washington. Contact Chris Selin, (914) 576-6622.

12-15: The annual convention of the **National Cable Television Association** will be held at the Astro Hall in Houston, Texas. Contact the NCTA, (202) 775-3550.

13-14: A "Home Satellite TV" conference and exhibition sponsored by the **University of Wisconsin-Extension** will be held in Madison. Contact Heather Goldfoot, (608) 262-6512 or 262-8953.

Looking ahead

1983

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

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

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

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

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

October 10-11: The Iowa Cable Television Association 1983 Cable Convention, Stouffers Five Seasons Hotel in Cedar Rapids, Iowa.

Nov. 1-3: Atlantic Cable Show, Atlantic City, N.J.

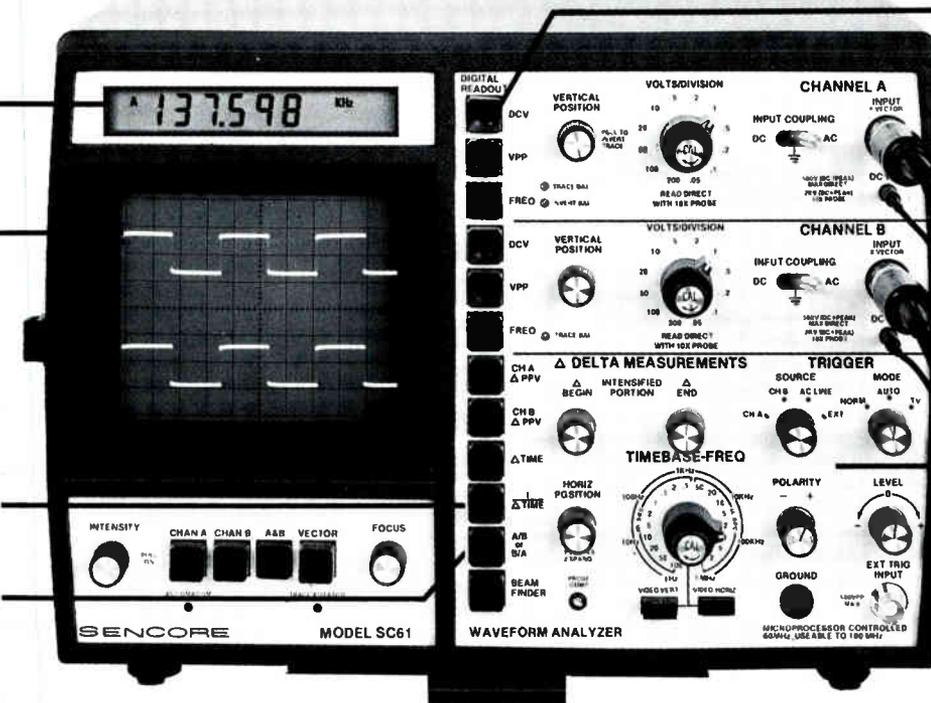
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Cable and data

The era of data communications via broadband coaxial networks is close at hand and cable's ability to move quickly into the market may be predicated on the ability to understand the practical limits of data communications systems and the willingness to battle the telcos despite the existence of their already established network. Engineers at the SCTE's Spring Engineering Conference presented some very sobering thoughts on the ability of cable operators to break into the data arena and make a stand. Many addressed the problem directly, saying that the war with the telcos has already begun in three states, and not only have they initiated competition, but they are trying to keep cable out altogether.

Chief among their concerns was cable's ability to market itself as a data carrier, given its long-term reputation as the premiere delivery service of entertainment programming. Again, there were the reminders that the time for "blue sky" daydreaming is past and that we don't want to look back at this and talk about "the one that got away."

Until cable has a proven track record in the area of data and business transmission, no one will be willing to go 100 percent with cable as a delivery service because businesses will want the opportunity to back out. Geoff Gates of Cox Cable emphasized that, as an industry, cable appears to have an inferiority complex; always apologizing for what it is doing technologically, and this manifests itself, he says, in our eagerness to try new technologies. Gates went on to say that he doesn't believe there is a narrow window for competing with Bell in the data arena. We won't be closed out, he said, because cable already has the plant and the customers and there will be a place in the market, to the extent that we pursue it.

Just to have 10 percent of the telcos' business in data communications would be a marvelous position for any cable operator to be in. The telcos are slow to respond, particularly in the midst of deregulation, but once they decide to respond they can move quickly, utilizing the universal operating parameters they already have in place.

One of the strikes against Bell is that they have a reputation, within the data communications industry, of treating their customers poorly; telling them what they need in lieu of listening to their needs. In cable's favor, on the other hand, is the ability to deliver a number of different services, video teleconferencing and data, as well as enhanced services, at a cost which is significantly lower than that of the Bell network.

If cable is going to mount a significant challenge to the Bell operating companies, cable, as an industry, has to overcome fragmentation between operators and between manufacturers, and cable has to learn data communications from the inside out. Surprisingly, few engineers at the Spring Engineering Conference were members of the IEEE or other professional groups that offer training in the areas of business communications and enhanced services. Currently, there is no depth of manpower for the advent of local, regional or even national delivery of business services via broadband networks, and cable needs all the help it can get in this area.



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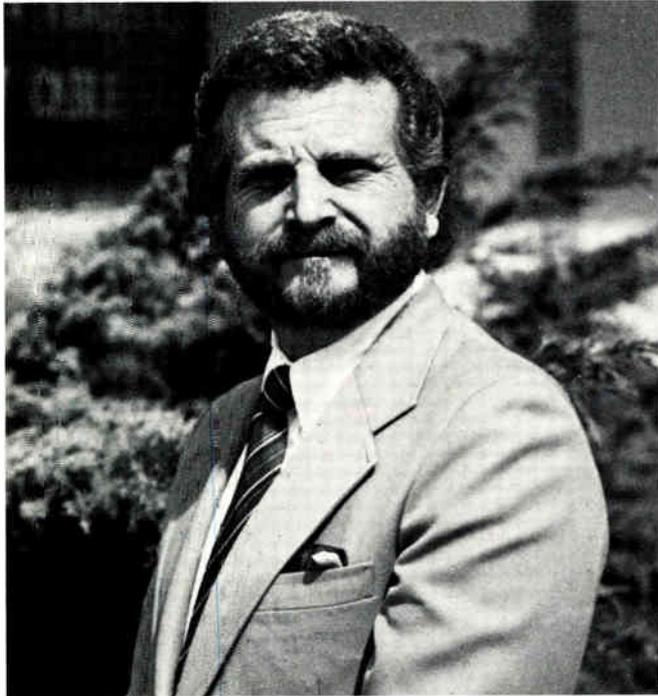
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SMATV operator gets CARS license

WASHINGTON—The Federal Communications Commission has affirmed the grant of a CARS license to an SMATV operator in Dallas.

The FCC Cable Bureau originally had granted the CARS license to the private cable company, Cable Dallas, last spring. Warner Amex Cable, the Dallas franchisee, petitioned the FCC to stay the permit and review the Cable Bureau decision. Many cable industry observers questioned the grant, which marked the first CARS license for an SMATV operation.

By a unanimous vote during a meeting March 3, the seven commissioners denied Warner Amex's application for review. The commission said that Cable Dallas fit within the FCC's definition of a cable television system because the company intends to use the CARS microwave facilities to link two clusters of buildings, neither of which are under common ownership.

Under the FCC rules, the term "cable television system" does not include any facility that serves fewer than 50 people or that only serves subscribers in one or more multiple dwelling units under common ownership or management. Based on that definition, much of the franchised cable industry has not considered SMATV operators to be cable operators. The National Satellite Cable Association, the trade group for private cable operators, has maintained that SMATV is part of the cable television industry.

In order for other television technologies to qualify for CARS, the commission

indicated that coaxial cable must be involved in linking more than one dwelling unit. Observers noted that this likely would result in the crossing of public rights of way, which possibly would subject the company to local franchise regulations.

FCC officials also said the CARS facilities could be used only to link what FCC Cable Branch Chief Steve Ross termed as "clusters" of buildings, which each qualify as a separate cable system. An FCC official said a CARS license would not have been granted if Cable Dallas wished to use CARS to link its one cluster of complexes with a single building.

CARS applications are pending for

SMATV operators in Washington; Dade County, Fla.; Sacramento, Calif.; Austin, Texas; Chicago; and Houston. FCC officials said the Cable Branch would begin reviewing those applications, but that decisions may not come quickly due to the branch's reduced manpower.

In a related matter, the National Cable Television Association filed comments with the FCC on Feb. 23 in support of a petition by Westinghouse Broadcasting and Cable to exclude master antenna systems from CARS use. The use of CARS by MATV will create cable competitors that are otherwise free of regulation, NCTA said. —Craig Leddy

SCTE Spring Conference focuses on data transmission

LOS ANGELES—Discussion of cable's competition with local telephone companies for data distribution opened the spring meeting of the Society of Cable Television Engineers, attended by 100 engineers at the Biltmore Hotel.

Geoff Gates of Cox Cable pointed out on opening day of the SCTE meeting that the war with telcos already has begun in three states, where telcos are working to prevent cable operators from capturing the local loop. Telcos already have established themselves in the business transmission arena, Gates said. "Until we (cable) have a long-term track record, the customers are going to want to have the option to back out," he added.

Gates claimed that the cable operator will have two advantages over the local telco—the cost and quality of the transmissions. Both should be better than the telcos offer because of the topology of the cable network, Gates said.

In a related panel discussion, attendees discussed the relationship between management and engineering and the ways in which those two groups work together to create final hardware and software products.

Panelists suggested that engineering exists to fulfill management schemes for making money, because that, of course, is the purpose of the business.

Century III's Victor Tarbuton suggested that technology is the main thing and "engineering is the key to accomplishing technological advances."

An impromptu poll of those in atten-



John Kurpinski received the SCTE 1983 Member of the Year award at the Spring Engineering Conference

dance revealed that a high percentage of engineers thought management was receptive to the ideas and alternatives presented by the technology. Viacom's Joe Van Loan said, "It escapes me how an engineering team could not be part of a management team," and that, "to leave out one or the other is a big mistake."

Wendell Bailey of the National Cable Television Association said, "Management is bored by GHz and dB." Cox Cable's Claude Baggett shot back, "I think you're misunderstanding management. They know what dBs are—it means dollar bills."

—David Murdock

NCTA Engineering Committee meeting April 6-7

WASHINGTON—An NCTA Engineering Committee meeting is scheduled for Wednesday, April 6, 2-7 p.m., and Thursday, April 7, 9 a.m.-2 p.m., in the first floor conference room at NCTA headquarters. Space permitting, attendance is open to members of the cable industry's engineering community who also are members of the NCTA. RSVP to the Science and Technology department, (202) 775-3637.

M/A-COM, General Inst. sign DBS hardware agreement

BURLINGTON, Mass.—M/A-COM Inc. and General Instrument Corp. have announced they will jointly develop certain antenna hardware and exchange technology relevant to the direct broadcast satellite (DBS) marketplace.

Under the initial phase of the agreement, M/A-COM will provide complete antennas for use in certain advanced DBS satellite systems being developed by General Instrument. General Instrument will supply the low noise amplifiers and block downconverter electronics for incorporation into the antennas.

In February, General Instrument was awarded a \$600 million contract by United Satellite Communications Inc. (USCI) for electronic systems for home reception of entertainment, sports and other television programming via satellite transmission. USCI announced plans in August of 1982 for the world's first direct satellite-to-home pay-television service.

The equipment covered in the agreement between the two companies will be incorporated in the small diameter "earth stations" utilized in the USCI service. Both 1- and 1.2-meter dish antennas will be utilized in the single home service, and

1.8-meter dishes will be utilized for SMATV service.

The companies declined to disclose the number of units or the dollar value of the agreement.

In a related development, M/A-COM has announced that one of its operating companies, M/A-COM Video Satellite Inc. received a contract from the French group Matra to supply Ku-band satellite receiving equipment for the first operational 12 GHz video application in France.

According to M/A-COM, this order anticipates the early 1984 launch of Telecom I, France's first commercial satellite, by the French Direction General des Telecommunications (DGT). Thirty downlink sites at theatres and auditoriums throughout France will receive cultural and sporting events as well as video teleconferencing for professional groups, and continuing education programs.

M/A-COM predicts that, since all European domestic satellite communications will be in the Ku-band, this initial order may be the first step in addressing an enormous potential market for small diameter TVROs.

M/A-COM won the contract in compe-

tion with six international companies. The initial order for 30 sites includes M/A-COM's 1.8-meter diameter antennas, 12 GHz low noise block downconverters and MA-1003 satellite receivers equipped with 625 line SECAM operation. Delivery is scheduled for September of 1983 and will involve sharing technology with Matra for manufacturing in France.

Matra is a diversified group engaged in space, telecommunications transportation and various other industrial activities. Matra is the first satellite manufacturer in Europe and is the prime contractor for the Telecom I project.

Abstracts abound for NCTA '83 Tech program

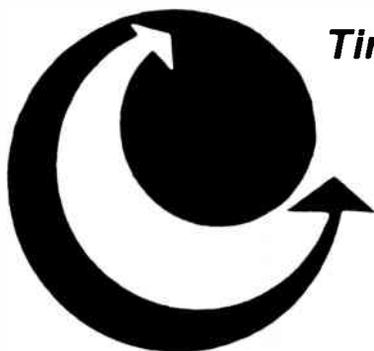
WASHINGTON—The Science and Technology department of the NCTA has reported a record number of technical abstracts submitted for the 1983 NCTA convention technical program. According to the department, over 100 top-ranking telecommunications experts, both domestic and international, submitted prospective precis' addressing engineering topics ranging from theft-of-service to the "marriage" of cable communications and consumer electronics.

At the Dec. 1-2 engineering committee meeting, NCTA staff liaison and 1983 Technical Program Subcommittee Chair-

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Cable The Competitive Choice '83

man Wendell Bailey named the members of a subcommittee that will review the papers and coordinate the technical sessions. Members of that subcommittee are: Dr. Joseph Garodnick, Stern Telecommunications Corp.; Joseph Preschutti, C-COR; Robert Luff, Rogers UA Cable-systems; Dom Stasi, Warner Amex Satellite Entertainment Co.; and Brad Johnson, Group W Cable. That group will confer on all aspects of the 1983 convention's technical sessions. This includes selecting abstracts; agreeing upon the number, size and theme of technical sessions, assigning panel moderators and approving a timetable for completing the program. The subcommittee held an all-day meeting on Feb. 22 at NCTA headquarters but was unable to finalize every aspect of the program. According to the Office of Science and Technology, "the quality of the submissions and subsequent lengthy deliberations necessitated a second meeting."

The theme at this year's NCTA convention: Cable: The Competitive Choice.

Business Notes

■ **Tribune/United** of Oakland County, Mich., has chosen **Jackson Enterprises**, Clayton, Ohio, as the aerial contractor for its entire 850-mile system. According to Jackson Enterprises, strand construction has already begun. An October 1984 completion date has been projected for the system.

■ **Lewis Research Center**, a NASA satellite communications center, has released a Request for Proposal (RFP) for the design, development, building and launch of the Advanced Communications Technology Satellite (ACTS). RFP invites communications satellite builders to bid on the ACTS system, which will consist of a flight spacecraft, ground system and operations. Scheduled for launch by the Space Shuttle in 1988, ACTS will be used for communications experiments for the next two succeeding years.

■ After a month long trial in which Oak TC-35 (TotalControl 35-channel) addressable converter/decoders were installed in employee homes, **General Electric Cablevision**, Peoria, Ill., has taken delivery of more than 10,000 Oak TC-35s. The Oak equipment will be installed in an addressable upgrade of segments of the Peoria system, with GE Cablevision planning to equip all multipay subscribers with TC-35s. GE Cablevision

plans to place additional orders as it increases its multipay penetration. The Oak TC-35 is a second generation Total-Control product and offers operators up to 35 channels of addressable control. It features 16 program tiers, Oak premium scrambling and an optional wired remote control. By choosing to install TC-35s in its system, GE Cablevision of Peoria became the forty-fifth operator to use the Oak TotalControl addressable system.

■ An agreement marking **Warner Amex Cable Communications'** first commercial use of cable communications in a major metropolitan market has been announced by **Westinghouse Electric Corp.** of Pittsburgh, Pa. Under the agreement, Warner Amex will provide Westinghouse with a high-speed, all digital cable link to serve three Westinghouse facilities in the downtown area of Pittsburgh. The connection is expected to be completed in the spring of 1983 and will be part of the Westinghouse national communications network that sends and receives satellite-fed information for Westinghouse facilities across the country. According to Warner Amex, the completion of this link will mark the first time a cable communications company has been able to interface successfully with a privately operated microwave system.

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When completed, the cable link will provide all digital interfaces to Westinghouse's telecommunications equipment in three of its buildings. It is expected that a fourth Westinghouse building in the downtown area will be included in the link, following a further expansion of Warner Amex's network in the near future.

■ **Zenith Radio Corp.** has reported a loss for 1982 of \$21.8 million, or \$1.15 per share, compared with net income in 1981 of \$15.6 million, or 82 cents per share. Sales in 1982 were \$1,239 million, compared with \$1,275 million in 1981.

The fourth quarter loss was \$17.2 million, or 91 cents per share. Earnings in the fourth quarter of 1981 were \$1.5 million, or 8 cents per share. Fourth quarter sales were \$311 million in 1982 and \$353 million in 1981.

Severe price competition in consumer electronics was the major factor affecting operating results in 1982. Prices for all Zenith consumer products were significantly lower than in 1981. In the fourth quarter, video cassette recorders accounted for approximately one-half of the year-over-year decline in operating results, caused principally by price reductions and provisions to recognize lower market value and lower volume.

■ **Jackson Tool Systems** division of Jackson Enterprises has entered into a distributorship agreement with Poleline Corp. to sell aerial cable construction and

installation tools. Poleline Corp. already has been stocking tools at its warehouses in Santa Ana, Calif., and in the Bronx, N.Y.

■ **Oak Industries Inc.** has reported its operating results for 1982 and said it is taking a pre-tax charge of \$23 million against 1982 earnings for write-downs of certain subscription television development costs and other assets. After the write-downs, net income for 1982 amounted to \$4.1 million, equal to 25 cents per share fully diluted. Sales for the year were \$545.7 million.

Oak said that before the charge for write-downs, operations produced net earnings of \$16.4 million, equal to \$1.00 per share fully diluted. Oak said its 1982 earnings were favorably affected by tax credits resulting from high domestic new product costs, investment tax credits and tax holidays granted its Taiwan operations.

■ **Anixter U.K.**, the British based subsidiary of **Anixter Bros. Inc.**, has begun sales to the cable television industry in the United Kingdom. Anixter U.K.'s cable television operations will fully utilize the network of existing sales and warehouse locations, which are being maintained in the U.K. and Europe by the electrical and electronic wire and cable division.

Anixter is stocking British-made product lines as well as its full line of U.S. cable television equipment and products. Products to be stocked in Anixter's distribution centers include: connectors, coaxial

cable, underground enclosures, subscriber materials, power supplies, heat shrink products, CATV passives, safety equipment and tools, and headend and distribution electronics manufactured by Jerrold and Scientific-Atlanta.

Anixter U.K. will be able to supply from a single source the wide variety of products needed in a large cable system. The company also will supply single line items to stage material, and will ship in accordance with customer requirements. Anixter U.K. currently provides the British cable TV industry with 24-hour, 7-day-a-week emergency service.

■ **Gill Management Services** has announced the formal opening of a GMS Eastern sales office. The office is located directly across from the World Trade Center at 114 Liberty Street, Suite 204, New York, N.Y., 10006, (212) 619-1262. Additionally, Gill announced the completed on-line installation of **Falcon TV** of Northern California at Atascadero. Over 11,000 subscribers currently have basic service. In addition to the main Atascadero franchise, other areas serviced include Los Osos, Cambria and Guadalupe. There are more than 15,000 homes passed, with plans for more homes to be passed in the future. Atascadero is now the second Falcon TV of Northern California account to be installed with the GMS on-line system. The other is Falcon Cable TV of Gilroy, Calif.



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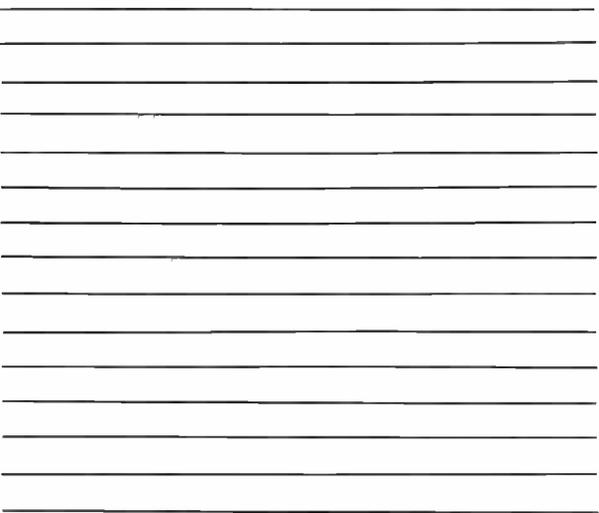
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CONSTRUCTION

TRENDS
AND

FORECAST



By David Murdock
managing editor
and **Toni Barnett**
editorial consultant

This construction issue of *CE* was developed to directly reflect information gathered from engineers at major MSOs in response to our questions concerning construction trends in the industry. Our questions covered a broad range of issues, but we were interested in uncovering specific information on new construction products and techniques; upgrading vs. rebuilding; the future of construction trends and system configurations. Generally, we tried to determine the effect that the overall economy has had on requirements for contractors and competition among contractors, and to some extent, how that same economy has affected the franchising process and the care with which today's systems are being built, i.e., quality vs. the quantity and the speed with which a cable system is put together, as well as more general elements of cable construction as they pertain to a particular MSO.

Many of the answers to our inquiries were not surprising. The construction process of typical tree-configured cable systems has not changed much over the years. Only the tools and the products and the skill-level of construction crews have made great strides. For the most part, utilities-type construction of any kind is still a "trucks and ladders" proposition.

It's obvious that the construction marketplace has entered a slow-down phase. The days of heavy franchise competition are over, at least for the time being, and now, all of the elements of construction are falling under close scrutiny as MSOs take a leaner look at building and operating today's cable systems. System operators are no

longer throwing systems together just to garner subscriber revenues.

We found that most new systems are preparing for the future by building the latest technological innovations into the plant without actually putting those innovations on-line. The smart operator knows that, in the future, there will be little room for systems that cannot effectively deliver the full range of cable's potential. MSOs today cannot afford the "let's just get it up and working" attitude in the hope that they can solve problems later on. That philosophy no longer prevails in the tightly scrutinized franchise-construction cycle. System operators who hope to utilize data, security, interactive and other ancillary services are looking for quality in construction and they want the job done right—from the first day of construction. While most of the heavy franchising activity is over, the equipment needed for rebuilds and upgrades promises to keep well-managed construction firms busy for an eight- to 12-year period.

Investigations conducted by our sister publication, *CableVision* magazine, show that the industry expects to rebuild about 91,000 miles of plant over the next four years. While MSOs have targeted rebuilding 30,658 miles of that total in 1983, the companies have the option to spread out the construction rebuilds more evenly over the four-year period. *CableVision* figures also indicate the four-year new-build mileage total to be 205,000 miles, including nearly 81,000 miles in 1983.

Anthony DeNigris, president of Nationwide CATV Services Inc., a leading communications contractor in Milford, Conn., believes that the trend of construction activity from mid-'82 into 1983 indicates that the explosiveness of the construction industry isn't going to be what it has been during the last

three years. "Contractors everywhere," DeNigris said, "have been feeling the pinch. There are more construction firms bidding for less contract builds than ever."

DeNigris pointed out that a great number of construction outfits emerged during this past explosion in an effort to jump on the bandwagon. However, cable operators are not rushing into construction decisions and it's becoming obvious that price competition is getting tougher all the time.

While the construction price-cutting war may seem a boon to system operators, DeNigris warns this situation may lead to false security. "With all this price-cutting in an easing market," DeNigris explained, "a grave injustice seems to be taking place. And," he cautioned, "that injustice is going to be felt by the system operator down the road."

Presently, MSOs and independent operators with immediate or near-term construction plans are taking advantage of the price war. While this seems like a reasonable cost-minded approach, operators should be aware of serious repercussions. "If a contractor accepts a build at a cut-throat rate," DeNigris warns, "he is going to be forced to cut corners. Two years down the road, when problems start cropping up that are attributable to the initial construction itself," he cautioned, "only then will system operators realize what they have allowed to happen."

Nationwide CATV Services has adopted a slogan they feel should be among the golden rules of CATV: "The sweetness of a low price is long forgotten after the bitterness of poor workmanship remains."

Critical issues

Not surprisingly, *CE* received identical responses on various

construction issues from different MSOs. When we asked, "Where do your construction problems start?" one engineer exclaimed, "My God! What do you want, *War and Peace*?" This same response was echoed in just about every conversation we had with system operators.

In the course of our research, it became very obvious that there are several issues critical to good plant constructions. These issues historically have been the bane of system operators:

- Signal leakage and maintenance is of paramount importance in construction projects, especially for two-way requirements.

- Workmanship and safety are perhaps the oldest and still most crucial problems plaguing cable construction. There are still many people hired for construction work who have little or no technical background or experience.

- Of equal importance is construction safety—wearing hard hats, steel-toed boots and other proper attire. Unfortunately, abiding by these rules still raises chuckles in the construction industry.

Improvements

According to one engineer, "If there's one thing that is never going to change in the cable industry, it's the amount of rapid change system operators continually find." The items in a construction toolbox today look entirely different than the items that were in it last year. There are new devices constantly being introduced to facilitate quality construction. The present market offers new crimpers, expansion loop formers and rollers, to name a few.

One of the newest construction devices available is a cable separator that's being utilized in multiple systems. This unit is actually a block of wood, known as a "magic box" in the field. The cable separator is placed in front of the lasher. It keeps the cables separated and in-line with each other along the complete span. The end result is the cable separator secures all cables in tight clusters, reflecting a neat bundled appearance.

Another improvement is the use of flatbottom expansion loops instead of roundbottom loops for improved system performance. Good mechanical benders supposedly will prevent problems that the old roundbottom loops caused by kinking in the center of the loop.

While these new devices tend to slow down production (unfamiliarity in using them), the trade-off is that systems are being built with quality vs. speed. Most MSOs and independent operators have finally realized that an initially well-constructed cable system is of paramount importance.

Rogers UA Cablesystems

Robert Luff, vice president of engineering

The number one area of prime concern regarding new-builds and rebuilds is life expectancy and electrical integrity. Signal leakage, its ability to perform and have shielding integrity, is becoming paramount in all of our construction projects. These projects are all two-way, and the two-way requirements for ingress and egress are borders of magnitude beyond what the industry is used to. For this reason, we have gone back and re-tested every device that the signal passes through or is related to, and measured its fueling parameters. Coaxial cable itself and the majority of connectors pass. However, we have found that most of the items on the market (splitters, grounding blocks, power inserters, etc.) are not meeting today's requirements for two-way cable systems. As a result, we have sent letters to the manufacturers with whom we presently do business advising them of our efforts to seek higher performances in this area. We are beginning just now to see some manufacturers responding and meeting the new RFI requirements.

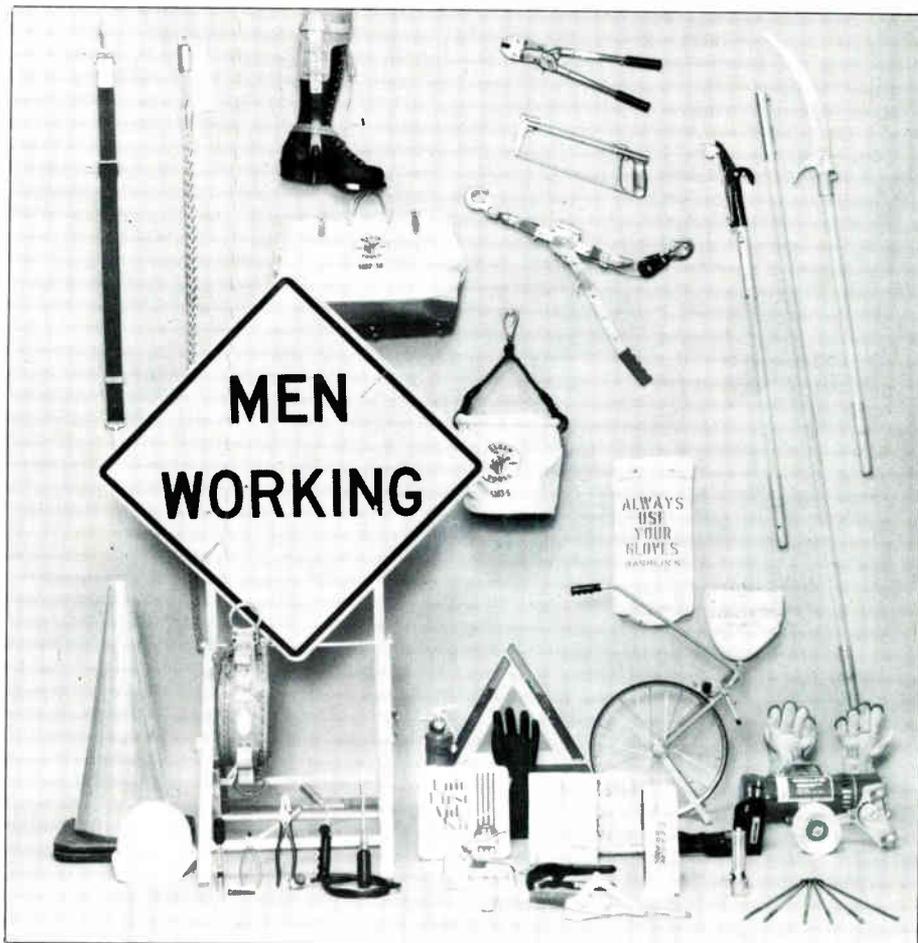
Concerning new construction products, there is hardly a new product that is listed that we don't seek out and do a trial of in

our systems or in our evaluation laboratory to see what applications it may or may not have in our business. There's new crimpers, new expansion loop formers, new rollers; there's new everything on the market and a lot of them are better than what we had before. But the major item is plant. We must get as much life out of the plant as possible. Plant is the single, most expensive item in our business, and getting a few extra years out of a plant because it was well-engineered and well-maintained is going to make the difference down the line between profitability and non-profitability.

New design techniques

Of equal importance are new design techniques that many systems now are implementing. We've looked very carefully at feed forward technology and find some applications whereby we may be able to increase channel capacity without needing a complete coaxial rebuild. That's predicated on the assumption that the system is tight RFI-wise because you need to take advantage of higher output levels. Anytime you have higher than average signal levels on a system, that's an aggravation to any signal leakage problems you may have had in the first place. This is one area management is looking at very carefully because the ability to have

continued on page 26



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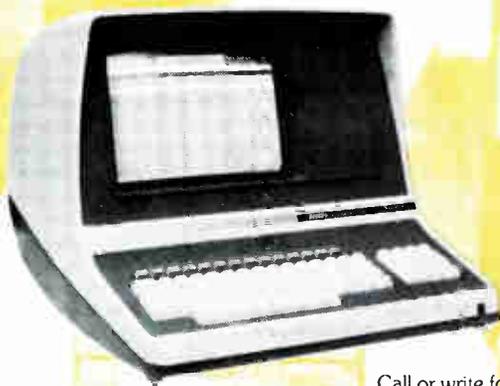
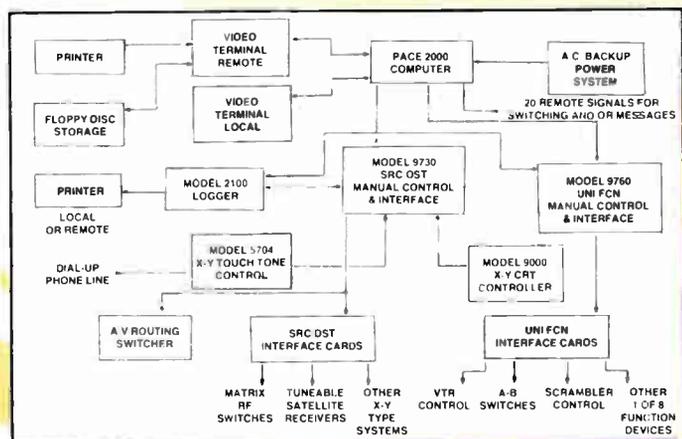
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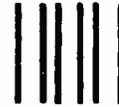
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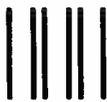
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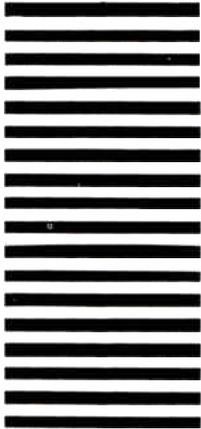
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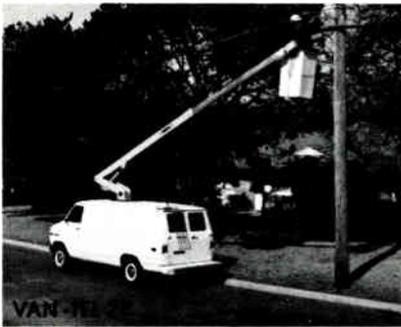
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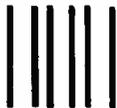
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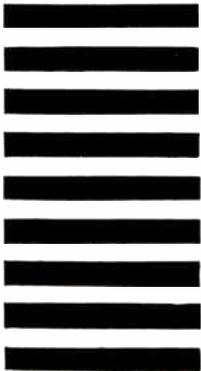


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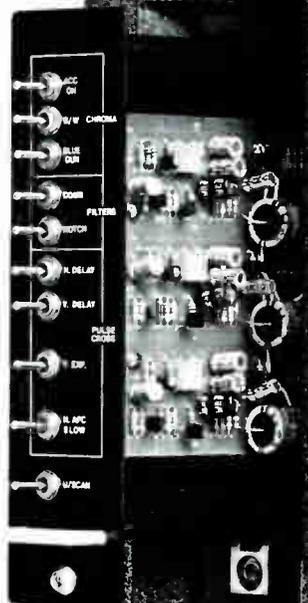


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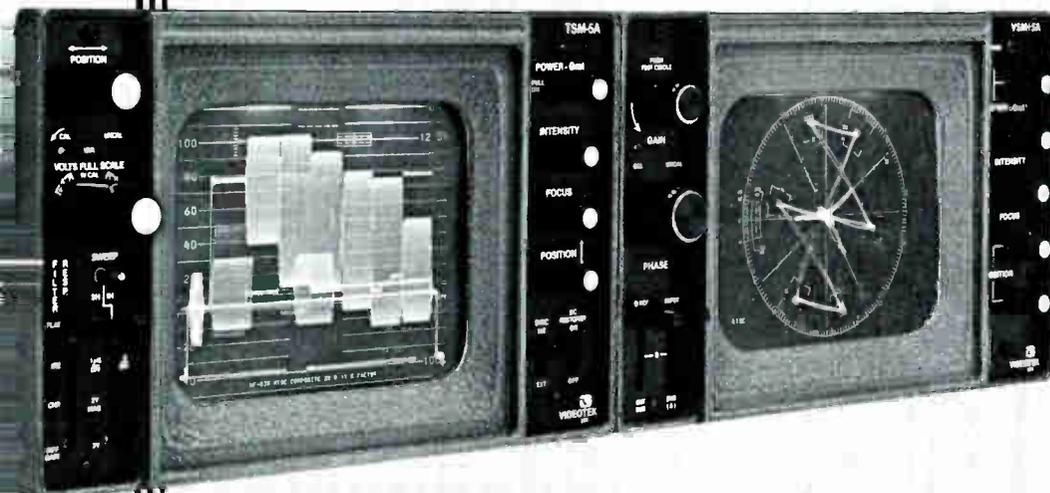
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THE OPTION THAT KEEPS SUBSCRIBERS HOOKED ON CABLE



TOCOM 55 PLUS® BASEBAND FULL-FUNCTION REMOTE CONTROL

Sometimes cable subscribers are fickle. They may like the cable programming one month, then dislike it the next. Sometimes they think about stopping their cable service . . . and sometimes they do stop it. Disconnects are costly and lost revenues are painful to any cable operation.

Every cable operator needs to find as many ways as possible to keep subscribers on cable month . . . after month . . . after month.

TOCOM's 55 PLUS full-function remote control is the smart enhancement that helps keep subscribers hooked on cable. It transforms any TV set into a super set with many excellent state-of-the-art features and provides an outstanding new marketing opportunity for the cable operator.

INSTANT TV UPGRADE

Subscribers who've never had a remote control for their TVs are quickly spoiled by the convenience of wireless control. Subscribers who have owned a remote are impressed with the 55 PLUS, rather than disappointed with a limited-function, no-volume-control RF unit for cable use.

Only baseband operation can provide a truly full-function wireless remote control. TOCOM's remote control has on and off, volume up and down, sound muting, a preferred channels memory and electronic A/B switch. With a touch of the remote's keypad, the subscriber has a digital clock and channel display on the TV screen. And a keypad code allows parental access to adult programs. Excluding the optional electronic A/B switch all of these are standard features with TOCOM's remote control.

TOCOM's two-way addressable systems also offer wireless remote control

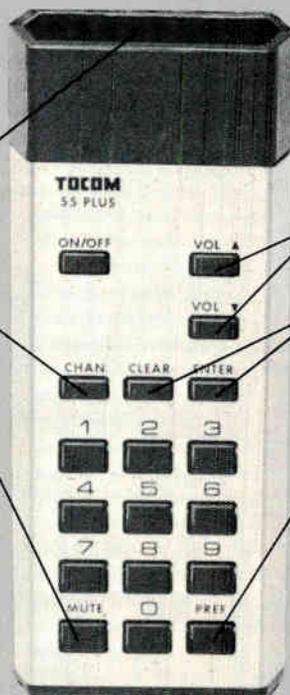


On-screen clock and channel number display are standard features of TOCOM's one-way and two-way 55 PLUS addressable converters.

Infrared wireless baseband operation

Single key on-screen clock and channel display

Single key sound muting capability



Full-function includes volume up and down

Clear/Enter preferred channels and parental access code into and out of memory

Up to 55 channels in preferred channel memory

of interactive functions as well.

With so many superior features, the 55 PLUS remote control is easy to market. And once subscribers use it, they won't want to be without it. It's a genuine people pleaser that helps keep them hooked on cable.

NEW REVENUE POTENTIAL

While subscribers are finding that TOCOM's remote control is a valuable enhancement to TV viewing enjoyment, cable operators are generating impressive new revenues.

Operators are selling remote controls for \$45-\$55 and/or leasing them for \$4-\$5 per month. Coupled with TOCOM's new lower prices, the margins are quite attractive. Subscribers find the baseband remote control an attractive bargain with a sale price of about half that of a remote control purchased with a new TV.

A TOCOM sales manager can develop a system cost/revenue analysis of baseband vs. RF addressability for you. He'd like the opportunity to show you how marketing TOCOM remote controls can pay the full cost of a 55 PLUS addressable control system equipped with one-way addressable converters in less than three years.

TECHNOLOGY UNSURPASSED

The 55 PLUS is a compatible family of addressable systems and equipment which deliver a wide range of services.

The 55 PLUS provides the most flexible pay packaging techniques in the cable industry. Channels and programs can be packaged in any conceivable configuration to fit subscriber demand and provide new pricing alternatives. And TOCOM's methods of one-way and two-way pay-per-view delivery are unsurpassed in the industry.

TOCOM's exclusive Baseband Encoded Scrambling Technique (B.E.S.T.) defeats theft of service attempts. And automatic sound suppression and blanked screen eliminate subscriber viewing on unauthorized pay channels.

TOCOM's 55 PLUS baseband design provides four models to choose from: the 5501 add-on addressable baseband decoder (without remote control), the 5504 one-way addressable converter and the completely compatible 5510, equipped either for one-way teletext or in a fully interactive two-way version that can accommodate both a full alphanumeric keyboard and a hard copy printer.



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

TOCOM 55 PLUS — DESIGNED TO LAST

TOCOM

The Leader in Interactive Cable Technology

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really part of the company. One of the weaknesses of a construction operation is that you don't have control over the sub-subcontractors, and if they are not safety-conscious, you'll start seeing erosion in the safety-consciousness of your own employees. Residents of the community cannot distinguish a sub-subcontractor truck parked in the middle of the road creating a safety hazard and other poor safety procedures from your own company and your own employees even though your cable system's name may not be on their trucks.

Speaking of contractors, there is

"Quality control may be the most important factor in construction today."

—Robert Luff
Rogers UA

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definitely a shift taking place in our company's evaluation of construction and construction contractor evaluations. We're moving away from the traditional manufacturer turnkey-type of a package. Rogers-UA actually is becoming the general contractor and hiring the sub-subcontractors directly, with no middleman. The reason for this is that the technology is beginning to slow down a little bit. We're very comfortable with 400-450 MHz or even 500 MHz bandwidth systems, single trunk, dual trunk, single feeder code-operated switches. We don't have the concern and the need to share the risk, so to speak, with the manufacturer of those devices. All of those bugs have been worked out and it is simply a matter of applying very traditional technology. And, frankly, we think we can save some money by using our own expertise and doing it ourselves.

Rogers-UA has no construction crews, *per se*, that are a stand-alone SWAT team that will go into a community and be the core of a construction project because our company is very, very decentralized. Each system may or may not have its own construction expertise, equipment and ability. If there is a rebuild, we would hire a construction supervisor and additional staff in that system and rely on our existing regional and divisional engineering management to oversee totally the general management of the build and our corporate quality control department for the day-to-day auditing, inspection and quality assurance roles.

Quality control may be the most important factor in construction today. There are so many things that inadvertently can happen or are not done properly that don't show up during even a very thorough examination and proof. When it all has the heat shrink tubing on, you can't tell whether the connector was put on properly or not. To cut the boot off is destructive testing, and usually you end up creating more problems by bending the cable, taking it off and rebending it to get it all back on again than you solve by opening it up and looking at it in the first place. The time to do the inspection and build the confidence of your construction work force is while they are actually doing the work before the units are covered up.

To ensure and maintain quality control, our company implements a manual of construction practices. Additionally, we use a separate notebook of electrical and housekeeping performance guidelines that we make available to our operating systems as an aid to use either by example or to give the subcontractors guides, procedures and illustrations with which to ensure the quality of the build and the electrical operation. We have this quality control arm that reports directly to the vice president of engineering, and it's totally independent of the system and the region. This division randomly visits and

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performs a technical and visual critique of that system—not only its new-build activity, but its standard everyday operation. And, we have a published list that all of our systems' chief engineers, technicians and managers are well aware of which details what we expect in minimum signal and noise ratios, composite triple-beat, various distortion parameters, percent of hum, right on down-the-line. If their performance has slipped, they receive a written discrepancy report and, depending on the seriousness of the deficiency, they have as little as 24 hours or as much as 30 days to correct the situation.

Higher reliability

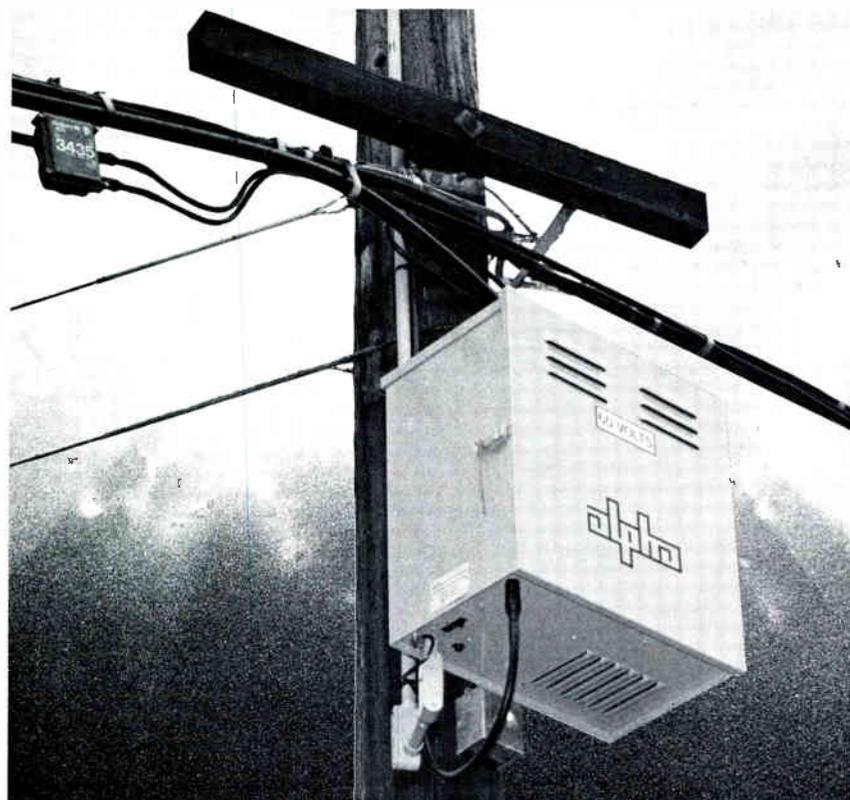
Of course, aside from quality control, many other factors must be considered in order to improve design performance. My number one consideration in designing a system is factoring-in higher reliability. What all systems are lacking is the overall reliability of the systems. It used to be that if you added standby supplies, reliability went down, not up, because of all the problems with the added complexity of a standby supply itself and the requirement for good religious maintenance of batteries, etc. That problem is all behind us now. There are many good standby supplies

in the marketplace and we are seeing more of our headends receiving generators to power them; and in a power failure, we're seeing many of our super trunks and major trunks getting into standby supply to protect the majority of the subscribers from a localized power outage in another part of town.

Another question plaguing the cable industry is how to avoid future rebuilds. In my opinion, a system operator is never going to avoid a future rebuild. The equipment only lasts so long. All one can do is postpone the day of reckoning, and there are a lot of methods and procedures that do exactly that. Hardly anybody builds plant today that falls off the pole before he's gone home that night. We're all capable of building very high quality construction that isn't going to be a hazard to navigation and road traffic. What separates the men from the boys is what that plant is going to look like 18-20 years from now. Perhaps, more importantly, how much is it going to cost those last 10 years to keep the plant working reliably with good service to the subscriber?

Regarding new technologies such as data and security, it is possible that the marketplace that will develop will be slightly different than the traditional CATV marketplace, which is primarily residential. We certainly have subscribers and the industrial parks that previously almost have been avoided by cable plants, except where franchises have required that the higher area—regardless of density of homes-per-mile—be constructed. Fortunately, most of the cable companies have been building for the future for many years, and already have wired the industrial parks. But, as we consider data and these other ancillary services on our cable systems, that rule is not just for a privileged few. It's almost an industry standard now to design the system layout with the entire area in mind. It is often very awkward to go back and re-design an area that you have purposely avoided in the initial design. Also, because of these data and other services, traditionally we have had a gigantic amount of signals and capacity going out, but only a sliver of spectrum coming back. That's fine for TV entertainment services, but particularly data may be a little more 50-50, and, therefore, mid-split trunks, as opposed to sub-split trunks, may be more applicable in the future.

My final comments concern future construction trends. I envision that the majority of construction during the upcoming five-year period is going to be rebuilds and upgrading of systems. These situations are actually more complicated than a new build because not only will you have to build with all the problems of putting new cable up, but you also will have to maintain the existing plant on a continuing basis to provide full service to subscribers.



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American Television and Communications Corp.



William Brown, vice president of construction

At ATC, we've learned to design and build quality cable systems using state-of-the-art technology. My main concern, however, is to develop the people that it takes to operate and maintain these systems in the long run, and our watchword of the day is personnel and human resources development.

As far as selecting contractors, we have a contracts administrator who carefully screens the contractors. We're interested in their track record, their financial responsibility, the type of equipment that they have, their capability, and we do a reasonably thorough search on what their background and experience is.

We also have our own in-house construction division that we've been training and building for three years. They probably number somewhere between 250-300 workers. We may well be the third or fourth largest construction company in cable construction.

We have our own training center, and to

planning, control and quality supervision. If you plan it, and control it, and you have quality supervisors, you eliminate many problems from the outset. If you work with the supervisors on planning, telling them what you expect them to do and giving them the tools to do it, and then you care enough to go and look at what they are doing and show interest in their problems, then it's all a big family and the family works together. It's pride, it's planning, it's family.

Some plant construction problems you have control over, and some you really don't. In the best laid plans, what happens is that the city decides to widen a street or, what was a residential area that you were going to build through magically became a shopping center overnight. Or, what was

balances. You want the construction person to recognize the problem and identify it, not just ignore it. Once the problem has been recognized, you want to make sure that that doesn't drop in the crack because that's an unplanned event, an unscheduled event. Those things have ways of dropping in the cracks. So, you really want to have someone that tracks all of these problems, especially in a big build.

Those are the types of changes that concern us the most today, because I think we've got a handle on the other aspects. These are the surprises we get and that's the nature of the business, you just have to build-in a good tracking systems.

Other construction problems regard

"Connectors have got to be the biggest problem area."

**—William Brown
ATC**

four houses on a corner is now a multiple unit and you need more signal or different tap levels, and these are real time problems.

Recognizing problems

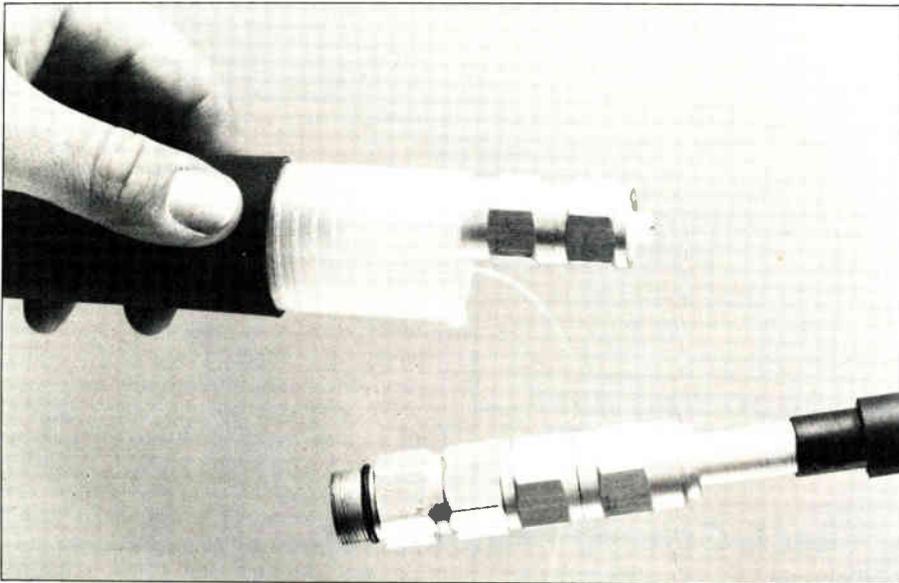
The first problem is to get the person who is doing the construction to recognize that what was designed, based on information that may be six months old, is not going to work now in that area. After you

the use of various devices. Connectors have got to be the biggest problem area. When you go to try to activate them, and the amplifiers are performing like they're supposed to, I'd be willing to bet that 70-80 percent of the time it's a connector problem.

Part of the problem is tightening the connectors. Sometimes a manufacturer will use a very strong bonding agent so that the dielectric sticks to the center conductor, and if you don't get it off, the connector doesn't make a good connection to the center conductor. If you scrape too hard to get it off, you take some of the copper coating off the center conductor and it doesn't perform—particularly at the higher frequencies and sometimes at the low AC frequency.

There is a new product out now that I'm personally very excited about. It's a new connector that Raychem is developing. The reason I'm excited about it is that the key to any construction is splicing, and the connectors that we use today require a relatively high skill level on the splicers. This new connector is reducing the skill level requirement at the same time it is reducing the probability of an error. A large percentage of all the problems we have in activation or getting a plant built are all related to splicing, and if we can find a connector that is going to reduce those problems, I think it is going to be a tremendous asset to our construction.

Another new product I'd like to mention has been introduced by Comm/Scope. They've come out with a new cable that is lighter in weight and is much more flexible. We're doing several test runs with that new cable in Charlotte, and we're evaluating—is it easier to put up, does it put less load on the strand and how tough is it to maintain? We don't know the results



An important aspect of mechanical inspection is making sure that the heat shrink tubing has been applied properly.

the greatest extent possible, we utilize that center in training our in-house crews. But, of all of the construction that we do, I would estimate that probably 60 percent of our construction is done in-house.

The training and workmanship of construction crews leads directly to where construction problems start. It's all

get him to recognize that there has been some change, you have to have a mechanism for evaluating what you do with regard to that change to ensure that the equipment will perform and still do all of the jobs that it's supposed to. Get those changes documented and then get them implemented. It's a series of checks and

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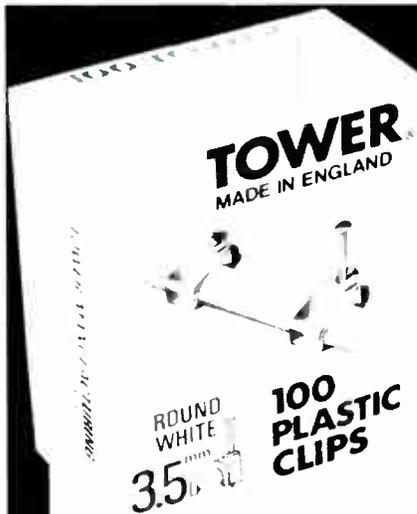
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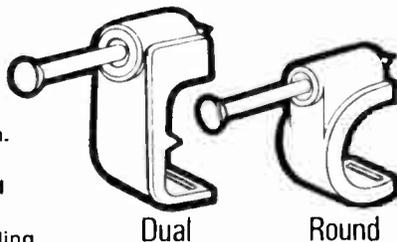
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me that we add too much weight to the pole, so we've spent a lot of time analyzing that. In some cases, we end up with too much going down one route. So, we ask design to redo it because we don't want to put that much on one pole. When you have dual amplifiers, do you put both of them on one side of the pole or do you put the A amplifier on one side and the B on the other; how do you do that consistently; how do you identify the cables and keep track?

We're working with manufacturers like Comm/Scope on putting paint stripes on the cable. In the absence of paint stripes, we actually may paint the cable ourselves. We just make up a set of rules and we're very consistent in following those rules.

Future construction trends are something all cable operators must take into consideration. System operators are going to have to work smarter, and the trends are going to make construction more like production. If an operator isn't smart enough to build a system, he shouldn't try to do it himself. The trend, in my opinion, should be to leave the construction of the cable system to the professional people that know how to construct cable systems. Don't try to do it yourself.

Capital Cities Cable Inc.

William Fullmore, vice president of plant and facilities

Construction problems start the day that the decision to do construction is made, and our job is to solve them. There are always problems with make-ready; with getting accurate and timely design; with getting people to work; and with materials. We deal with each situation as it comes.

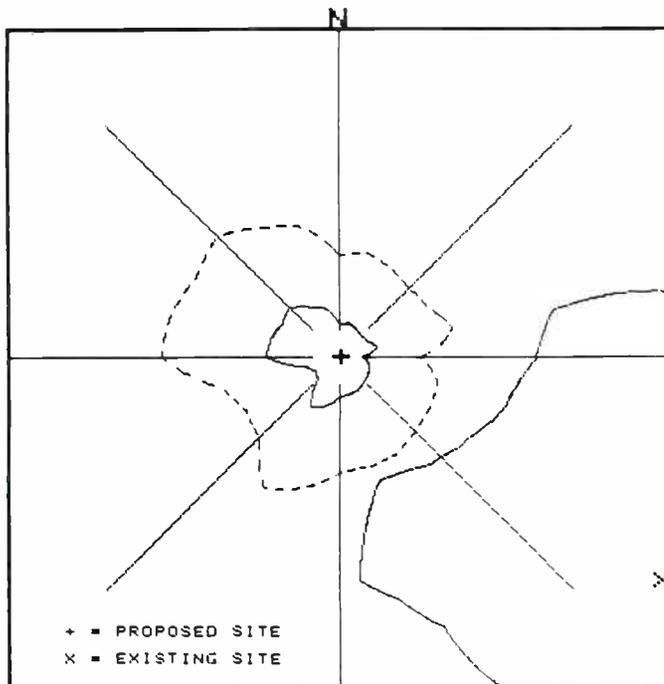
To alleviate some of these problems, we have computerized our inventory system, and we're in the process of implementing it to project material requirements and suggest ordering quantities.

We have also had a quality control program that is currently represented by two inspectors who report directly to me. They spend about a week on the job and in rotation, and go out and inspect the work that is done at every single pole. This is essentially mechanical inspection— are all of the pieces there; was the work done properly; are the tree guards and guy guards in place; have the loops been bent properly; is the cable straight and neat; is the heat shrink applied?— anything that can be visually inspected.

Probably the biggest problem we encounter in construction is getting everything done correctly the first time.

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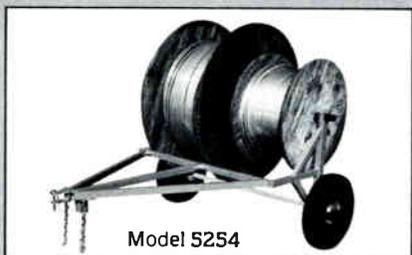
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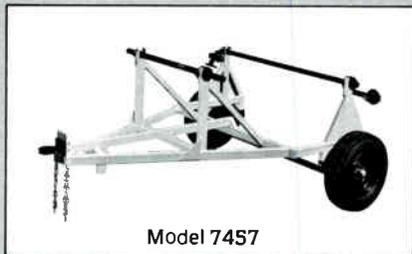
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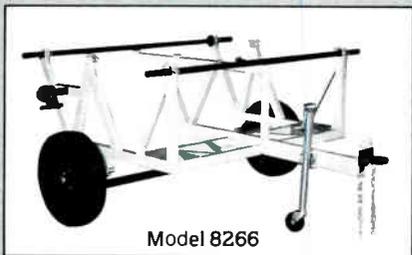
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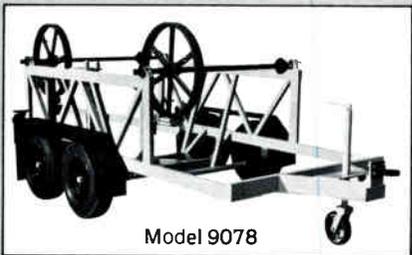
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That is one of the primary functions of our inspectors and our quality control people. We have found that we are losing a lot of time, which means money, going back to fix something. It is not necessarily a fatal mistake. The plant would probably work and work well, but it isn't correct. It might be missing straps in a spacer, heat shrink which wasn't shrunk down properly, or a guy guard that wasn't put in place.

At Cap Cities, we do most of our construction with an in-house crew. In the event that we need additional resources, we select contractors based on by-the-job bids and the contractors' historical performance. Generally, we use 80-90 percent in-house crews and the balance in contractors. Those percentages are highly variable, depending on the workload. If there's a big lump in the workload, then it makes sense to get contractors rather than for me to try to add more personnel.

To the extent that the workload stays at a constant level, about the only contractors we use are underground contractors, and actually we're getting into that end of the business ourselves.

Regarding new construction products, there are some imported hardware items which we reject when we find them. One item that comes to mind was a cadmium-plated staple rather than a galvanized staple. When the staple was driven home, the plating chipped-off. Those products have been rejected and are not acceptable. There's always somebody that will make something cheaper and try to pass it off. If we find it, we reject it.

Construction techniques

We have been implementing different design techniques in plant construction. Three or four years ago, we changed from putting expansion loops across the face of the pole to placing expansion loops to one side of the pole. And, we do place expansion loops effectively two at every pole because we place one on the span side of the equipment and the other on the opposite side of the pole.

I am also strongly opposed to direct burial of any cable, including armored. The cost of putting the equipment in to provide a re-entriable system is, over the long haul, a wise investment. With direct burial cable, you cannot re-enter a system. There are some new products on the market that will allow you to plow-in the conduit system. We are looking at these new products, but we have not had any experience with them yet.

Corporate battles

The subject of rebuilding versus upgrading is probably the question that strikes the hardest in many battles in corporate headquarters. There are some systems that lend themselves to upgrading, and upgrading can be done efficiently and profitably. There are many other systems where trying to do an

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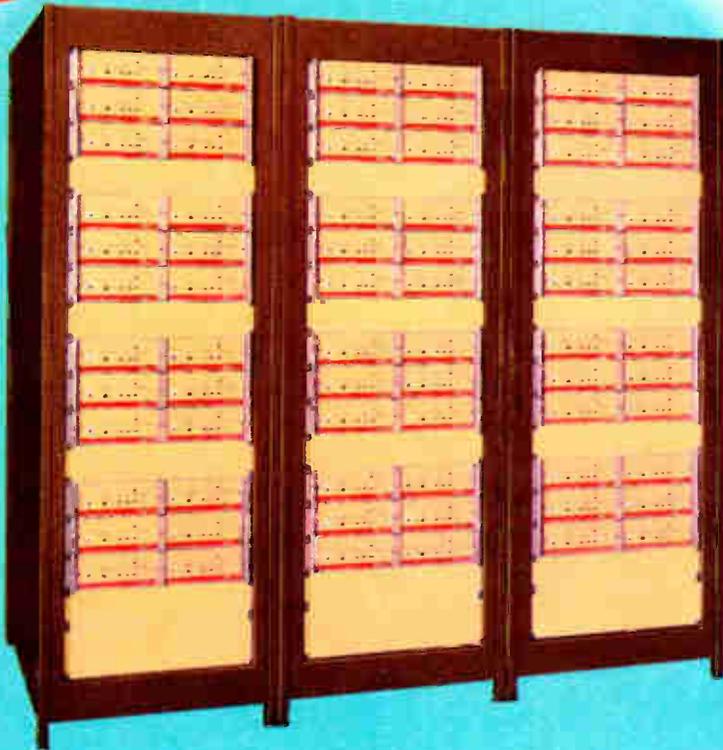
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upgrade will simply result in spending more money in the not-too-long-run than biting the bullet and rebuilding the thing. The problem lies in knowing which is which.

There are extremes, obviously. In a system that was first built 30 years ago and is literally falling off the poles with two complete sets of plant lashed to the strand, there is probably not too much question in anyone's mind that it needs to be rebuilt. The system that was built six or seven years ago, and needs only an extension in bandwidth to get another six channels, should probably be upgraded. It's the systems in the big gray area that cause the problems.

Planning to avoid future rebuilds is another major factor. The proper solution to avoiding future rebuilds is to build the plant properly in the first place. It's been my position that it doesn't cost any more to do it right, and in many cases, it may cost less. In terms of technological obsolescence, i.e., plant built with insufficient bandwidth or with a lack of knowledge of what the future is going to bring, there is no real defense. However, the plant that is built mechanically-well has got a much better chance of surviving through one or two upgrades than the plant that was shabbily built. Let me put it this way: Bell Telephone did not get to the financial position that it is in now by rebuilding it's plants every 10 or 15 years. And yet, Ma Bell has gone through many, many technological upgrades.

System performance goals should also be foremost in every operator's planning. I would like to see plant that, as a mechanical plant (span and hardware), should last indefinitely. It should have a life that is up in the 30-40 year range, simply because there is nothing to wear-out. Regarding the electrical plant, there are two aspects to it's life. The first is it's own mortality, because electronics won't last forever. Taps, etc., will eventually die, but more important than that aspect (the electrical plant) is the technological life of the plant. To the extent we can, we would like our plant to last 20 years, and we recognize that in those 20 years it probably is going to have to undergo one upgrading to expand the bandwidth.

I feel there is a great deal of work that can be done to improve the efficiency of plant design. By that, I mean make the amplifiers go a little bit further. All of this ultimately relates to the cost of building a plant—the fewer amplifiers, the fewer dollars are spent. I would like to see and acquire the best possible equipment, and then use as little of it as possible.

Improving technology

As far as forecasting future construction trends, I suspect that there's inevitably going to be a lessening of new construction because most of the markets are gone.

“...the biggest problem we encounter in construction is getting everything done right the first time.”

**—William Fullmore
Capital Cities Cable**

There will be an increase in rebuilds because so many of the plants that were built 15-20 years ago are failing, either for technological reasons or because they weren't built very well to begin with. The improvement in technology is something that could only have been guessed at 10-15 years ago. Some people guessed well, some didn't. The need to rebuild for technological reasons is motivated by the desire to improve service, and hopefully, profits. The motivation to rebuild for mechanical reasons is simply to stay in business.

I would love to see some bright, entrepreneurially-minded engineer establish an independent-testing laboratory

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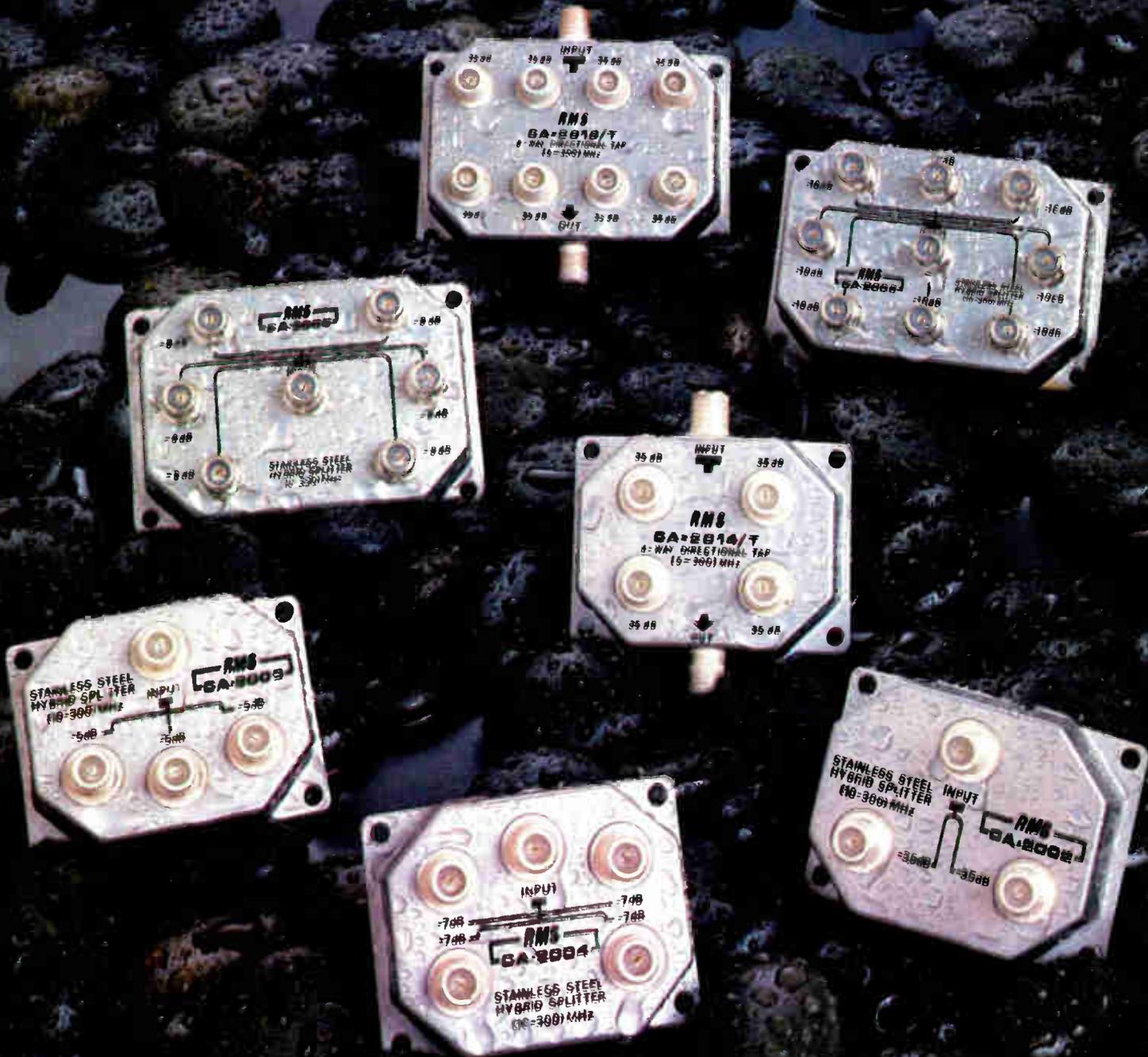
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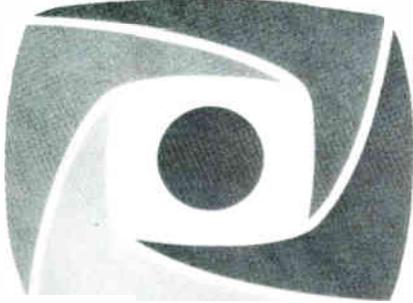
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that would serve the cable industry as does Consumer's Laboratory or Underwriter's Laboratory, where we could be reasonably sure that there is no built-in bias. We need factual input on situations like mean time between failures, true insertion losses measured by, or from, statistically valid samples—what are the mechanical characteristics of cable?; how does it behave under certain conditions?; etc. Presently, the manufacturers' themselves do very little testing. A few do some testing, but most do too little. And, that's because it's not demanded of them. Most companies have no way of corroborating the manufacturers' claims, so they pretty much take what's offered.

United Cable Television Corp.



Al Sharback, engineering manager

At United, we use construction contractors that have been utilized successfully elsewhere in the corporate structure, or those contractors who come very highly recommended by other cable companies. The contractors have to meet the requirements of our construction manual that contains some pretty well-defined policies and procedures in terms of requirements.

Presently, we use 100 percent contractors and no in-house construction crews, although we have just hired our first in-house crew. We are just starting-up that department within our own organization. We expect that we will use them to maintain our plant and for small construction projects—five miles or less a month, an extension of a street, etc. If the project becomes too involved; i.e., if a new subdivision opens up, we would wait until we had enough work to hire a construction contractor to do the bigger jobs.

In the area of new design techniques, one of the only things we've done regarding changes in design is that for a long time we did as-builts after the plant was turned over and hot. We now are instituting procedures where we do them in the proofing and splicing process before it becomes hot plant. There's a lot of advantages to doing that.

At United, we use a lot of fused disc cable. This type of cable is a little bit more temperamental than standard foam-type cable. We have to insist on more training

by our contractors so that they handle the cable with the idea in mind of not producing any ill-effects. That has been a problem for a lot of cable companies—to institute that awareness and training for contractors. Probably the biggest special procedure that we have is the handling that's involved in using the fused disc cable.

Uninformed public

Regarding the broad topic of where construction problems start, these problems begin before you put a stake into the ground. Many, many of these problems have to do with public relations. It's important to inform and educate the residents, particularly in the underground process. I think that the biggest construction problem that I would pinpoint is a lack of an informed public or a misinformed public as to what exactly is going to happen in their backyard, and what the system operator's responsibilities are with regard to restoration of their property.

I don't think we see many equipment problems like loose connectors, crimped cable, etc., because when we see those kinds of problems, we get together with the contractor and get them rectified immediately, otherwise you have a snowball process. I would say that our problems are not so much related to installation but are preparatory problems or finishing-up problems.

No matter how cooperative or how well-written your permit is to allow you access to public right-of-ways and easements, there always are going to be people who really oppose your being there, and that's the kind of thing that creates problems. If

"No matter how well written your permit is . . . there are always going to be people who really oppose your being there . . ."

—Al Sharback
United

the city or county won't back you by escorting you onto the easement and allowing you to construct, then you are forced sometimes to re-design or abandon some cable and are not able to serve some homes because of blockages. It's rare to have total cooperation from everyone in the community. It's very difficult to put in a new utility without some opposition.

There are certain design factors that need to be considered to improve system performance. The obvious design factor, of course, is cascades. In our systems, we are very interested in microwave paths because we are oriented so much around

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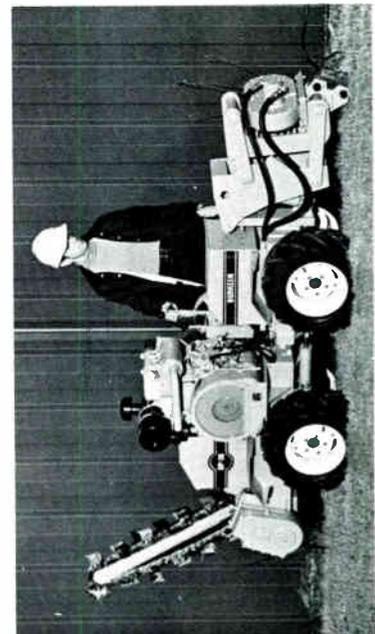
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microwave. So, microwave performance is probably the key factor because if you don't start with something good, you're not going to finish with something good. That's the obvious side effect from it. We design around the limitations of the microwave first, and then around the system limitations.

Looking to the future

Concerning new technology designs like security and data, all of our designs and plans are related around what we think the state-of-the-art will be years down the road. You always can't foresee what's on the horizon, but I think every cable operator is looking at addressability. I don't think anyone, though, has come up with a solution that works well for the subscriber as well as for the operator. Therefore, you don't have any real answer on addressability. In as far as the actual system being able to be compatible or carry security and return signals, we design all of our systems so that we can implement them when we need to. We don't necessarily construct a full two-way system, but our systems are certainly designed with that in mind.

I also don't think we're going to see that many new future construction trends emerge. I believe that we are at a point now where the construction side of the industry is not being addressed as state-of-the-art. We still are at the point where they are working on the electronics, and the construction side of it is falling by the wayside. However, I believe construction will play catch-up within the next few years. We'll see construction techniques and personnel quality control come up to spec more than they have been. As we find operators using more and more in-house construction, we'll find operators with more and more trained personnel that know what's going on as opposed to relying on contractors.

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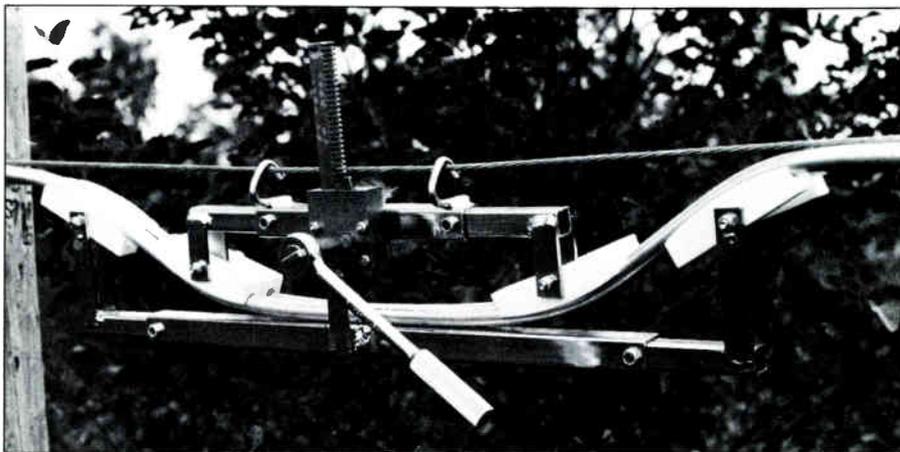
Dave Willis, director of engineering

In discussing construction trends and methods, I believe the first step is contractor selection. Vendor selection for contract construction work is based on several factors: the contractors' reputation for fair dealing and for quality workmanship are very important; his pricing and the way his pricing is structured also are significant factors. Insurance coverage is dictated by our company and is mandated for any successful contract bidder.

Regarding the use of in-house construction versus contractors, we do virtually all of our major construction jobs with a

contractor. We feel that dedicated in-house construction crews, with broad geographical requirements, are relatively inefficient. We think our small line extensions and our maintenance-type construction can be efficiently handled by in-house labor.

In our company, it is mandatory for all of our operations personnel to complete the NCTI installer technician course as an incoming requirement. This course provides some construction training, and when you apply this course in conjunction with our procedural drawings and instructions in the TCI construction manual, the employee gains a fairly complete expo-



The use of mechanical cable shaping devices and cable placement rollers has greatly facilitated cable construction.

sure to proper construction techniques.

As a company policy, we do not recommend one product over another to outside firms unless stipulating that our use of a particular construction product is not possible. We do believe in the use of mechanical cable shaping devices, and in the use of cable placement rollers and cable placement equipment. We feel these devices are mandatory for quality construction. I'd like to note that we absolutely abhor the hand-formed loop.

Constant change

Design techniques today constantly are changing. The necessity of calculating multiple frequency losses for each cable span has enhanced greatly the value of computer system design. Any good design plan will include the simultaneous design of the return path. The broader band of newer systems requires far more attention to relative levels of all frequencies carried on the system. The advent of addressability, however, has interjected additional performance requirements, which must be considered in the system design.

The question of rebuild vs. upgrade is not basically an engineering question. The factors that bear most heavily on this decision are the economics of a specific system; the number of channels required for carriage of must-carry signals, which

dictates the number of channels available for satellite and other services; the age and condition of the existing cable; and the spacing and bridger output levels used in the original system design.

As far as construction problems are concerned, we have encountered few new construction problems. Rather, we find that continual vigilance against the reoccurrence of historical problems is really the prime concern. By training the construction crews in proper procedures, our contractors tend to be very experienced cable companies, and they tend to have well-trained crews. When you have a long relationship with the contractor,

their crews become extremely well acquainted with your particular requirements, and they actually perform their function very similar to an in-house construction crew.

Future trends

The prognosis for future construction, at least regarding TCI, is that we're heavily involved in upgrading systems. We will see about 2,000 miles of system upgraded in 1983. And, this effort will continue until our programming needs have been satisfied. We are not pursuing new franchises aggressively, and we haven't been for some time.

Concerning future construction trends, I believe that as long as the franchise requirements remain what they are, cable trends are going to continue the way they have been. You are going to see more use of lower-loss cable; you are going to see extensive use of very broadband AML systems; and you are going to see a big influx of feed-forward type amplifiers. In fact, I expect that probably two or three additional vendors will introduce feed forward equipment this year. I feel this type of activity will be prevalent in the future, assuming that we remain in the extremely broadband area that we are currently in. I also expect to hear of some new higher frequency systems by year's end.

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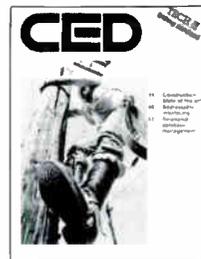
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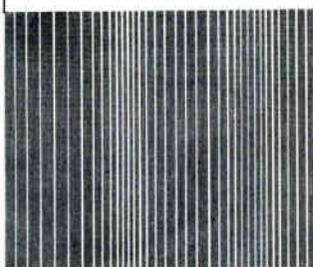
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Billing and addressable management

Interfacing business management systems with billing computers and addressable converters now is one of the industry's hottest topics, and it seems that everyone has a plan for a totally interactive business management system that can handle inventories, scheduling, disconnects, trouble calls, financial data and virtually any other manipulation of a database that an operator needs to extract. Billing services exist either as batch processing centers, on-line systems, or as stand-alone in-house business computers. Billing has become a product or tool of a larger management system.

Developing addressable interfaces is yet another aspect of the business management system and currently there are billing services working with specific manufacturers and vice-versa to develop compatible software that allows a management system to handle pay-per-view, connects/disconnects and a number of other addressable functions including interactive and enhanced services. There are no standards in this area, and that is a sore point among software manufacturers, but the lack of standards protects proprietary hardware technologies.

One correction from last month's **TECH II**: Joe Gregory, a microwave staff engineer at UA-Columbia's San Antonio system called to say he'd been misquoted about the number of microwave links he maintains for that system. Gregory is responsible for 34 channels of AML microwave and 20 channels of FM microwave and he has a staff of seven, not five, microwave engineers. We regret any confusion this may have caused.

Interfacing addressable control

The "wire link"

By P.E. Morse

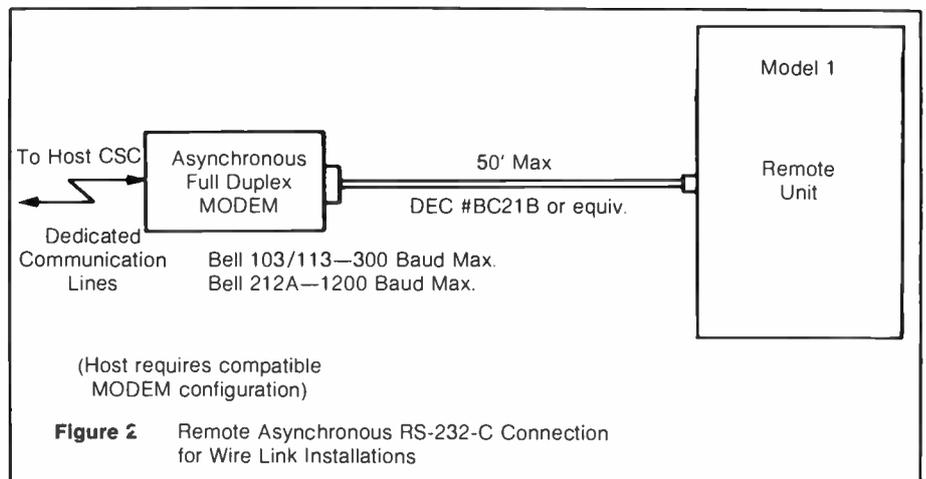
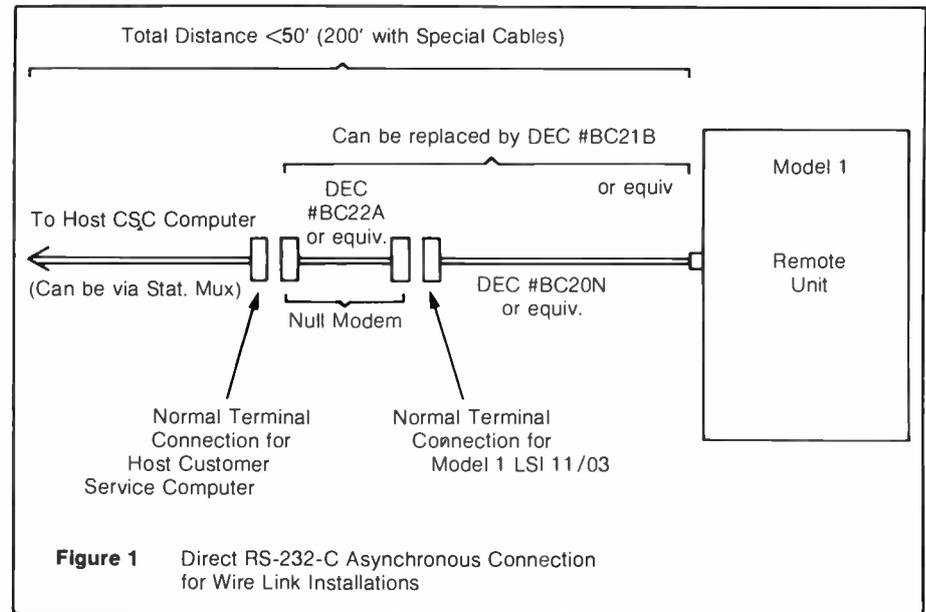
Jerrold Subscriber Systems
Division of General Instrument Corp.

Data redundancy is a common feature of most addressable cable systems, but it is a mixed blessing. At the cable system business office, both the addressable controller and the customer service computer (CSC) contain information showing the operator which subscribers are paying for what and who is receiving what; however, since data is entered manually and separately into both the CSC and the controller, there is no easy way to ensure that the two data bases are identical.

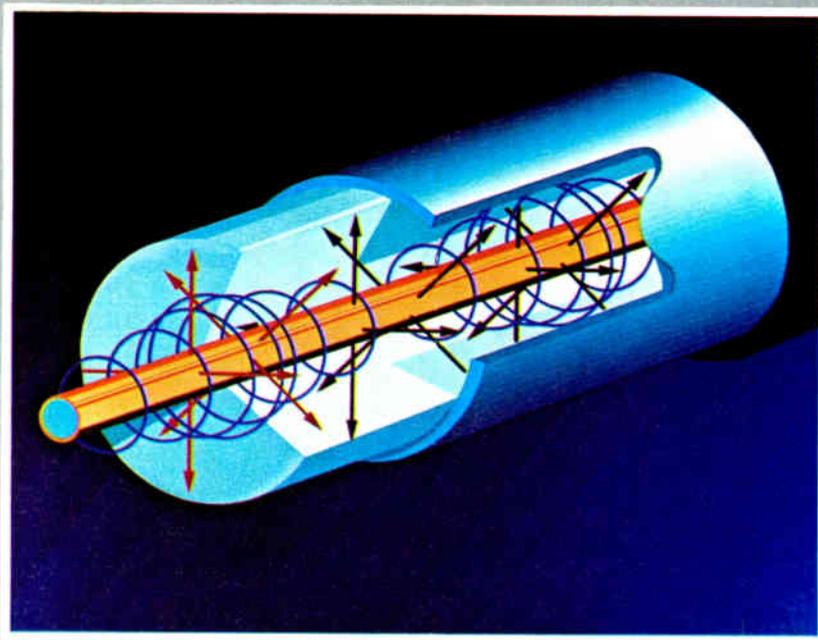
Tying the addressable controller to a sophisticated billing computer is one way around the problem, but this can mean replacing an inexpensive CSC

with one that might cost as much as \$750,000. To avoid this kind of expense, the Jerrold Division of General Instrument developed a CSC/controller interface dubbed "the wire link." In this scheme, Jerrold provides its customers, or the CSC vendor, with an easily met software specification that allows connection of a \$25,000 Jerrold addressable controller to any one of nearly 50 brands of customer service computers priced from \$750,000 all the way down to \$15,000. Data bases are then synchronized between the two systems. The controller stores information in the event of a power-down, and it either can upline load the controller data base or generate hard copy for entry into the CSC when the system is on-line again. (Addressable

continued on page 49



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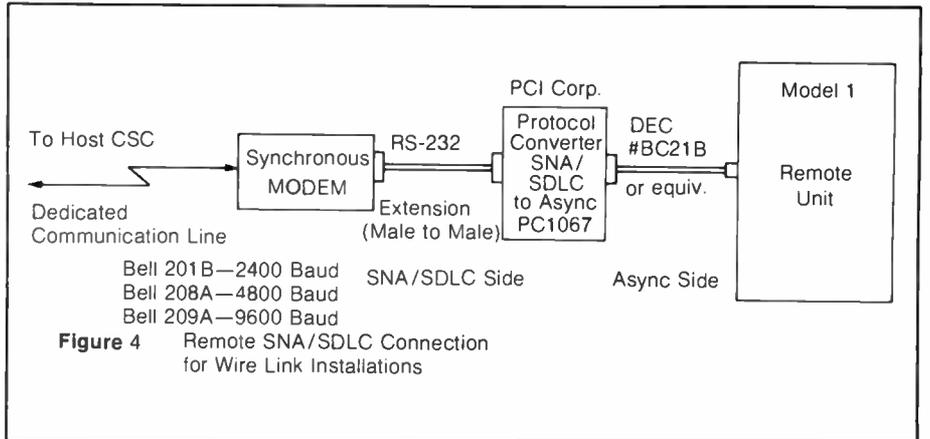
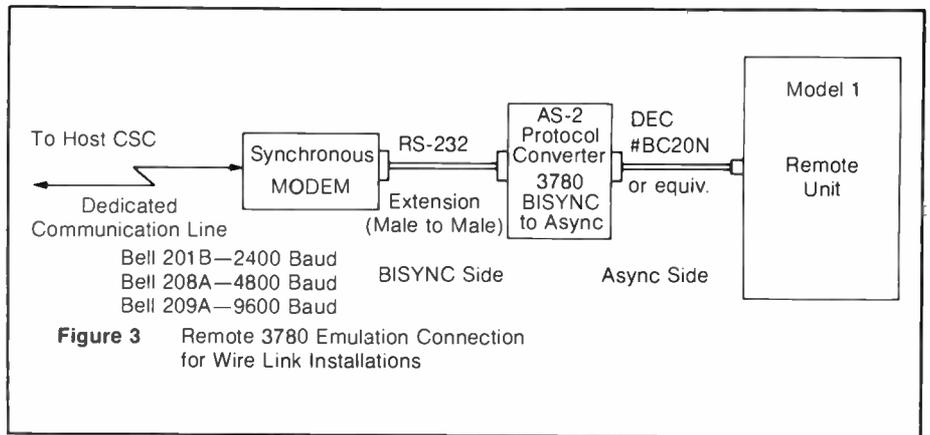
controller and CSC impulse pay-per-view interconnection capability will be on-line by the third quarter of this year.) Routine data entry is required only once instead of twice, and if parity between data bases is lost, it is easily restored.

These characteristics are derived from a synchronous or asynchronous EIA standard RS-232-C interface between the addressable controller and the CSC. Direct asynchronous connection is shown in figure 1, remote in figure 2.

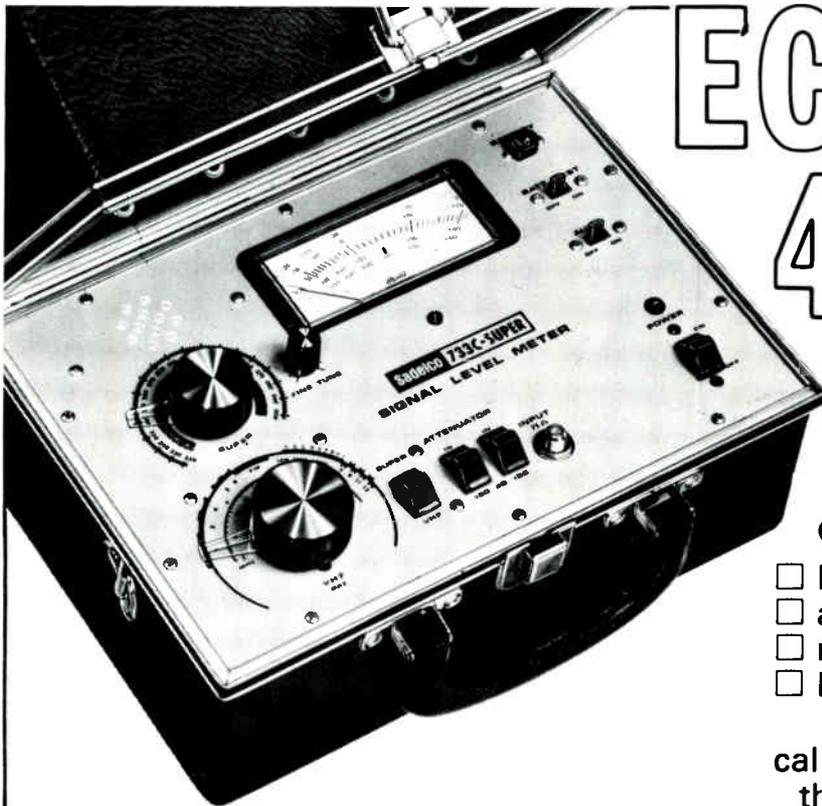
Each 8-bit binary data byte is encoded into two ASCII characters representing its hexadecimal value. The ASCII characters may consist of seven or eight data bits. Data transmission of binary images without encoding also is permitted; these data strings must be 8 bits long. Parity may be even, odd, or no parity. Baud rates range from 150 to 9600 baud, all allowing for either one or two stop bits.

The wire link system can be controlled through a synchronous data link using either 3780 BISYNC or SNA/SDLC communications disciplines. The 3780 BISYNC emulation permits the non-transparent operating mode used to transfer hexadecimal ASCII encoded

continued on page 51



TECH II



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(609) 683-0123

Shortly after a division of Applied Data Research (ADR) developed the CADRE product, a software product that provides accounts receivable and management information to cable TV operators, Storer Communications expressed an interest in investing in the product. This interest led to the formation of an independent corporation, ADR/CADRE Inc., in 1982. ADR/CADRE is owned jointly by Storer Communications, a cable TV operator, and ADR, a computer software manufacturer and supplier to the business industry. Drawing from the experiences and strengths of its two parent companies, ADR/CADRE is committed to producing the best product possible for the cable industry. It also converts existing data bases from other billing systems for CADRE operation. With a five member board of directors, three of whom are from Storer and two from ADR, ADR/CADRE employs a data processing, cable TV, sales and marketing staff. Through its two offices in Princeton, N.J., and North Andover, Mass., the company also provides complementary sales, customer support and development and maintenance services. While the CADRE product still is under development, portions of it have been released to users, including Storer, Susquehanna Broadcasting Co., Harron Communications and Continental Cablevision. Anticipated release of the full product is due prior to the end of 1983.

Apple/Store Computer Service

P.O. Box 692
Beaver Dam, Wis. 53916
(414) 887-7964

Apple/Store Computer Services began with an idea by its founder, Renee Rosado, to develop a software computerized billing program that would address the needs of the small cable operator. Having accumulated approximately 10 years of experience in cable TV billing, Rosado used her experience to develop this idea and then went out and commissioned professional programmers to make it an actuality. The result was the devel-

opment of a cable TV billing program. Since May 1982, Apple/Store Computer Services has been marketing this cable TV billing program. The program works with the Apple II computer and is accompanied with a manual that Rosado wrote herself. To date, 10 Apple/Store Computer Service software programs and Apple II computers have been installed in cable systems. In addition to the cable TV billing program, the company has developed six other programs for the cable industry, including: a cable system design, inventory control and business management programs. According to the company, it is rewriting its cable TV billing program in Pascal to appeal to IBM and Radioshack computer systems. The company also is working on interfacing with addressable converters.

Business Systems Inc.

2720 Wade Hampton Boulevard
Greenville, S.C. 29615
(803) 292-0840

Business Systems Inc. was founded as a private company in 1978 by Larry Edwards. It began as a software house and distributor of various products manufactured by Digital Equipment Corp. (DEC). In 1979, the company entered the cable TV computerized billing market at the suggestion of a business acquaintance of Larry Edwards, who wanted in-house computerized billing for his cable TV system. Since then, the company's interest in the cable computerized billing market has grown considerably, to the point where its sales to the cable industry now comprise 60 percent of its business. In 1982, Business Systems Inc. first became involved with the Jerrold division of General Instrument in a joint marketing effort, when a Business System in-house billing system was installed in a cable system along with a Jerrold addressable converter. This joint marketing effort between Jerrold and Business Systems continues today, with both companies committed to providing the customer with the service necessary for installing an addressable, computerized billing system. Business Systems Inc.'s relationship with DEC, however, is more formal. Business Systems Inc. is an authorized distributor of DEC equip-

continued from page 49

on the synchronous data link. To use IBM's SNA/SDLC communications, a protocol converter is used to emulate a 3767 SNA/SDLC supported terminal. Hexadecimal EBCDIC encoded on the data link is translated to ASCII coding by the protocol unit, resulting in Hexadecimal ASCII data formats at the async port at the remote controller site.

At the controller, for both 3780 ASYNC and SNA/SDLC communication, a protocol converter translates the synchronous data stream back to an asynchronous terminal connection. These configurations are shown in figures 3 and 4.

Operating software conforms to DEC operating system RT-11, which supports a high-priority real-time job in the foreground while running a lower priority job in the background. This system supports both system console and serial line printer peripherals. The foreground program handles SCX11 card control and updates information with the background program. The background program handles communications with the wire link, and the foreground program, maintenance and updating of subscriber and pay services information, handles the system console and printer.

The wire link software also allows configuration options for remote response delay, flow control, I/O byte swapping, text byte swapping, input header, terminal line ID, input trailer, output header, output trailer, and program language.

These software options, along with several hardware interconnection options and implementation versions, make this CSC/controller interface sufficiently adaptable to meet a broad variety of business office applications. Based on proven, standard technology from Digital Equipment Corp., it fits easily with most of the cable system computer equipment now in general use.

The first 17 Jerrold wire link installations have tended to be quick, simple and reliable, according to field reports. The database synchronization of this kind of design dramatically improves reliability while promising substantial labor savings. Hardware investment is reduced significantly, without any sacrifice in redundancy. Judging from this experience, CSC/addressable controller interfaces show every sign of becoming the premier management tool in addressable systems today and into the future.

Paul Morse is marketing manager for addressable, interactive and other computer-based systems at the Jerrold Division of General Instrument Corp.

Relational database management systems

Tuned Intelligence Inc., formerly Cybertech Inc., was started in 1977 and originally produced billing computer systems software exclusively for the cable television industry utilizing micro-based systems and 16-bit minicomputers. Today, as a turnkey OEM software house, Tuned Intelligence is using a relational database management system that can be maintained and modified by a non-technical staff.

By Al Clark

President, Tuned Intelligence Inc.

Our original philosophy was, and is, that a tremendous amount of computing capability is necessary at the operations level. This ensures responsive, accurate, timely information for business reasons and at the same time, allows sufficient power to support addressability in a one-way or two-way environment. Our computer system is written with a modular architecture such that we can easily modify the control monitor to support any device that a cable operator may choose for one-way or two-way addressability. These modules also are used to structure the methods by which large-, medium- or small- sized cable operators may choose to operate. As an example, a major MSO could have all of his computer power in his main office or at regional locations with CRTs and communications lines running into the local office. Likewise, it is possible that all of the computing power could be at the local site. So the operator has his choice as to how much hardware he wants to place at which location as well as what software modules. He may choose to have work order processing, trouble call processing and inquiry capability along with inventory control at a local level, while retaining billing functionality and payment processing at the home office or in a regional site. This also can be matched with an operator's sense of direction for pay-per-view.

Our original billing systems were designed for in-house, on-line, real-time processing but did not have the structure to support the broad power and revenue potential of addressability. As early as 1978, we had had experience working with addressable devices. In 1978, we had produced a system that controlled an intelligent

tap and used an audio-response system for automated order-taking from the subscriber. In 1980, we became aware of the direction of Zenith Radio Corp. in addressability. In mid-1981, we negotiated with Zenith and Viacom Cable, defining the functional requirements for the nation's first 400 MHz cable system using one-way addressability. In December 1981, we installed that system for Viacom's two franchises in Milwaukee, Wis. In February 1982, we installed a second system for Viacom in Pittsburg, Calif., and in mid-summer 1982, we installed a third system for MultiVisions of Anchorage, Alaska.

The system that we originally designed on behalf of Viacom was a management control system that offers extensive security and control of addressability. From that experience and insight, we positioned our firm to design one, if not the first, total billing management control system that is integrated into one product. This system is being designed for our first customer, which is MultiVisions. The system for MultiVisions will be the basis for our industry standard product.

Our philosophy, after being in cable for approximately six years, is that we need a product that can respond to a very rapidly changing industry. We need a product that is tightly structured for accounting control but is extremely flexible in terms of allowing the operator to get at information that he himself can define on a day-to-day basis. This means that we need tools that are uniquely different from any that have been used in cable previously. We have found flexibility that was required by non-technical people through the use of a relational database management system.

Relational databases store information in computers very differently than

has been the case in the past. Previously, in computer science, if you used a database, it was a very complex piece of software that required a very sophisticated staff to maintain and modify it. The unique difference that relational database structure provides is that the information is all stored in the computer as tables, and therefore new columns of information can be added by non-technical people and information can be accessed without hard coded programming written specifically for that function. Therefore, marketing people, marketing executives as an example, can analyze the history of services throughout a franchise in a very unique and different way as they may feel the needs brought forth by the future. This also allows the cable operator's personnel to add new pieces of information to the database that they could not foresee at the time the software was originally designed.

Another unique feature of this software is that it is being written so it can be ported from one computer to the next through the use of the UNIX operating system. The UNIX operating system was designed and written at Bell Laboratories with the idea that it could run on a multitude of different computer hardware systems. When we write applicational code specifically for the cable industry, that code can be ported to any hardware vendor a cable operator may choose as long as that particular hardware supports UNIX. For those cable operators that currently have hardware in place and want to utilize our software package, the opportunity is there for them to do that also. Today there are over 30 major manufacturers that support the use of UNIX and the number is growing literally every week. It is getting to be the *de facto* operating standard in the computer industry.

We have postured our product not only to support one-way addressability but two-way as well. We believe that by mid-summer of this year our product will be installed and available to other operators and may serve the industry to a degree that has not been possible in the past.

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ment. To date, Business Systems Inc. has installed approximately 18 systems for cable and has eight to 10 accounts currently pending. Its sales and personnel have doubled in the last year. While the company operates out of its South Carolina headquarters, it provides educational, support and installation services for its customers across the nation.

CableData

3200 Arden Way
Sacramento, Calif. 95825
(916) 485-2911

Founded in 1965 by Robert Mathews, its current president, CableData began as a company not only interested in the cable TV industry but in the field of computer data processing as well. The company's original objective was to consolidate these two interests and provide the cable operator with the best possible means to control his business.

In 1975, CableData marketed its first on-line computer system, Cable 33, and, shortly thereafter, introduced dispersed data processing, DDP, an on-line software system. Since its inception, Cable 33 has been replaced by Cable 80 and other software products, and DDP has gone through seven major rewrites of its 144 programs and through dozens of mini releases. One of the company's most recently introduced software products is Pay 80, which allows the MSO to consolidate reports for all of its systems and to break these reports into subscriber and supplier activity categories.

In addition to its Sacramento, Calif., headquarters, CableData has five regional offices—opened in 1980—in Philadelphia, Dallas, Atlanta, Indianapolis and Sacramento. These regional offices provide service, training and other services to CableData customers. Today, the company offers on-line customers a choice of three products: an on-line mini system for small cable operators, an on-line shared system for medium-sized customers, and an on-line exclusive system that provides cable operators with total on-site control of their respective businesses.

In addition to being a supplier of batch and on-line services, CableData is a full turnkey house, offering the hardware, software and support services necessary for maintaining a complete in-house computerized billing system.

Developments in CableData hardware have kept pace with its software and include CableData's home terminal unit (HTU), a software-driven addressable converter. The company also now offers a pay-per-view product and phone entry processor (PEP) unit. According to the company, the pay-

per-view product alleviates the problems associated with volume ordering, event reporting and inventory control and also allows the cable operator to track services by outlet.

Cablefacts

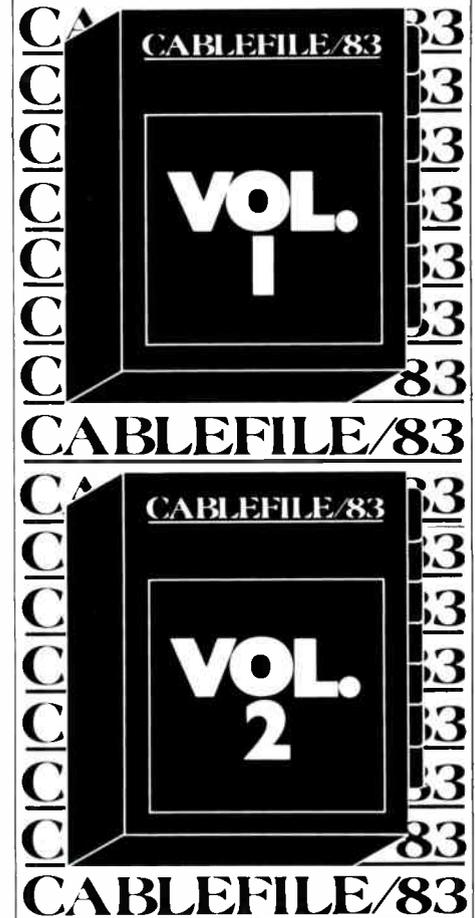
P.O. Box 11908
Lexington, Ky. 40578
(606) 259-1366

Cablefacts was founded in 1972 and acquired one year later by Tymshare. Since its inception, Cablefacts, now a Tymshare division, has been providing computer services to the cable TV industry. To date, the division has installed 450 systems in 43 states. Cablefacts presently bills more than three million subscribers. Cablefacts' on-line system operates with IBM hardware and is able to interface with the Jerrold division of General Instrument's addressable converters. Plans, however, to interface Cablefacts' system with a TOCOM addressable unit are underway. The Tymshare division also is working on the development of a system in which a stand-alone computer system transmits data nightly from the cable operator's office to its Lexington, Ky., offices. This system would allow billing, dispatching and other functions to be carried out during the night. Another project the company is considering is the development of a new computer terminal for remote batch users. Cablefacts currently employs 90 full-time and 170 part-time employees. According to a Cablefacts' official.

Computel

1623 Front Street
Blair, Neb. 68008
(402) 426-9511

Computel was founded in 1975 by Russel Caauwe, a former IBM customer engineer and the current president of Computel, and Robert Hunt, the owner of a group of telephone companies collectively known as Unitel. Originally, Computel did the billing for Unitel and other independent telephone companies in Nebraska and surrounding states. In 1977, due to the telephone industry's association with cable TV, Computel inadvertently started providing billing services for cable TV. While Computel's primary business still is telephone billing, it now offers both batch and on-line services for cable operators and plans to introduce an in-house package by the end of 1984. This in-house package will include an IBM System 23 computer and appropriate billing software. Computel currently provides billing services to cable systems in Nebraska and hopes to expand its market into other states.

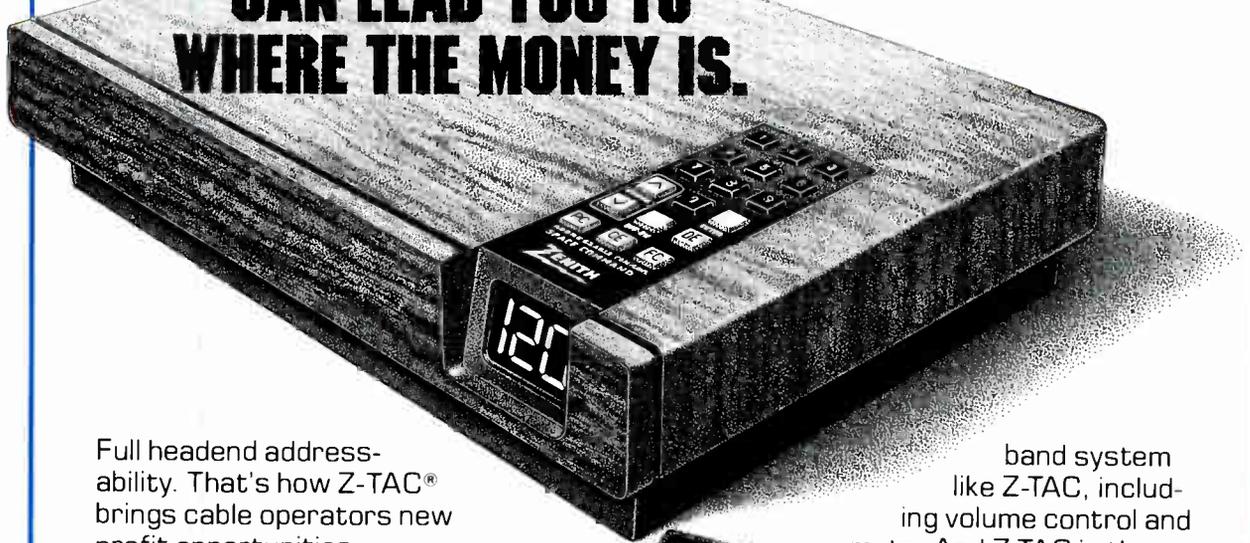


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Computer Utilities of the Ozarks Inc.

P.O. Box 1062
 Highway 66 South, Route 2
 Harrison, Ark. 72601
 (501) 743-1616

Computer Utilities of the Ozarks has been providing data processing services to the cable TV industry for nine years. This past January, the company introduced CABLE/I, a management information system designed specifically for those cable TV companies that use the IBM Series I computer. Since its introduction, CABLE/I has been installed in locations throughout the U.S. and Canada and in cable companies with as few as 2,000 subscribers to those with more than 40,000 subscribers. An integral part of CABLE/I is the program PROMPT, which is a set of system development tools that utilize the data base concept. CABLE/I software support is available nationwide through the PROMPT dealer network and hardware is maintained nationally by IBM. Available with a selection of statement formats and billing modes from which to choose, CABLE/I can be modified to conform to any cable operator's needs. In fact, the cable operator or one of his staff can modify the system himself, without needing

any prior programming experience. A four-day training session is offered by the company to teach the operator how to use the system and how to modify it to suit his wishes. According to the company, this modification feature distinguishes CABLE/I from other cable software products currently on the market.

First Data Resources Inc.

7301 Pacific Street
 Omaha, Neb. 68114
 (402) 399-7027

First Data Resources Inc. (FDR) was incorporated in 1971 and, since then, has become an independent operating subsidiary of American Express. The company began by providing data processing services to the bankcard industry, and now, according to FDR, is the largest bankcard processing company in the world. There are presently four continents on which FDR systems operate. In addition to bankcard processing, FDR has entered the telemarketing, cable TV and consumer information service industries. FDR's Cable Control System (CCS) is an on-line billing service for the cable operator. It is available with various options that the cable operator can choose to use when he wants. CCS

allows the cable operator to determine his own billing policies and philosophies, and can be used by both small and large cable operators. Training programs, customer service and other services also are included with CCS. FDR currently employs 2,000, with 200 of these employees being system design and programming professionals.

Gill Management Services Inc.

2050 Bering Drive
 San Jose, Calif. 95131
 (408) 998-8078

Surprisingly enough, Gill Industries began as a bakery in San Jose, Calif., in the 1930s. In 1955, Allen Gilliland Sr., the bakery's principal owner, indulged his long-term interest in communications and television by joining a group of investors to build KNTV, Channel 11, in San Jose. Over the next few years, Gill Industries became the sole owner of the San Jose television station.

During the 1960s, Allen Gilliland Jr. assumed responsibility for Gill Industries and went on to form Gillcable in 1972. In early 1975, Gilliland Jr. began developing an on-line computer billing system for cable TV. This system



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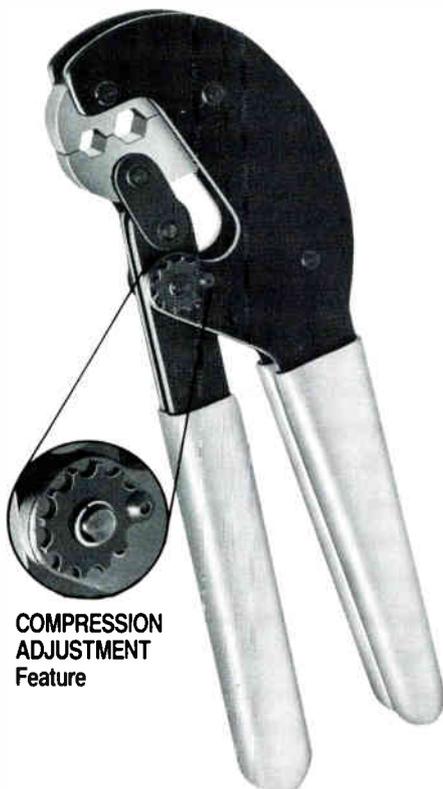
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eventually resulted in the formation of Gill Management Services (GMS). In late 1980, Allen Gilliland Jr. contracted the GMS regional system and hired three Xerox Computer Service executives to head GMS. These three executives, two of whom became the GMS president and vice president of marketing, reorganized GMS, consolidating its regional data centers and expediting the conversion of all clients to the new GMS software.

As time progressed, more staff were added, bringing the total number of present-day GMS employees to 85, with 35 of these in the programming and technical support areas. GMS now has added product modules, including trouble call, equipment inventory, addressability and advanced pay-per-view functions to its computer system. Long-range plans for GMS project the opening of a nationwide computer network that will be "wired" by satellite and capable of meeting various cable industry needs. GMS also plans to continue with its development of the following products and services: mini-computer systems, communications facilities and hardware, custom software, a user-flexible report writer, turnkey systems and add-on modules, two-way addressability and construction control.

Florida Automated Resources

28 West Beach Drive
Panama City, Fla. 32402
(904) 769-2131

Florida Automated Resources has been supplying computer billing services to the cable industry for 12 years. Its present billing system is designed for the small- to medium-sized cable operator. It is made to work with the Burroughs B-20 minicomputer. In addition to providing an in-house computer billing system, the company provides all the necessary support services to install, use and maintain the system. The company also provides an on-line billing service to cable operators.

KMP Computer Services Inc.

703 Central Avenue
Los Alamos, N.M. 87544
(505) 662-5545

KMP Computer Services Inc. of Los Alamos, N.M., markets a CATV accounts receivable and billing system to cable TV systems throughout the U.S. The company's principal product is a turnkey in-office system, which includes both hardware and software. While KMP Computer systems are available in a number of hardware configurations, from single-user systems to systems with 16 user stations,

KMP says that its software can run on most microcomputers that use the CP/M or MS-DOS operating systems. The company offers on-site training and installation to back up its system.

As part of its current project to write software that provides an interface from billing systems to front-end computers on addressable converter systems, KMP Computer Services is working on a plan to interface its billing system with the Jerrold addressable converter system. Once this project is completed, KMP will provide interfaces to other major converter manufacturers as well. The company has sold 60 systems to cable companies over the past three years through its numerous sales offices located throughout the country. It considers one of its strong points to be the technical expertise of its staff, who each have an average of 17 years of experience in the computer field. According to KMP Computer Services, each KMP staff member spent 14 out of these 17 years at the Los Alamos National Laboratory, which is reputed to be one of the world's largest computer installations.

LDM Inc.

529 South Second Avenue
Covina, Calif. 91723
(213) 967-1506

LDM Inc. began providing computer processing and programming services on a fixed contract basis to the business community in 1966. Since then, the company has expanded its services to include management consultation and total systems development, and extended its markets to include other industries besides the business community. Today, LDM offers several turnkey computer software packages in addition to on-line programming, information and management services. LDM first entered the pay-TV industry in 1978. At that time, the company offered management information and operations support services to the pay-TV industry. LDM now offers the cable operator a choice of computerized billing services: a batch service, a remote batch service, an on-line service and an in-house service. Collectively, these services are called SAS, Subscriber Management System, and each one provides subscriber billing services. The SAS system was designed by LDM to accommodate the cable operator's changing needs and changes in subscriber growth. The SAS in-house system uses a Burroughs computer in conjunction with SAS software. Various options are available on all types of SAS services. According to LDM, SAS is the only computerized billing system that can access and interface with Zenith Z-TAC conver-

ters in a real-time, on-line environment. SAS also can interface with converters presently manufactured by other companies as well.

Parallex Corp.

P.O. Box 30110
Lansing, Mich. 48909
(517) 882-6063

Formed in 1974 to provide information processing services to the CATV industry, Parallex Corp. continues to fulfill this function today. Presently, more than 50 cable systems, encompassing a subscriber base of 350,000, are using Parallex information processing systems and complementary services. The Parallex system is designed specifically to perform billing and accounting functions for cable operators. The data acquired to complete these functions then can be used to produce management reports and the like. According to the company, its system is based on a "parameter driven" design approach, which means that the options a cable operator chooses are automatically chosen by the Parallex computer when it is processing the cable system's information. In that way, the unique needs of each cable system can be addressed and satisfied. Based in Lansing, Mich., Parallex offers both the batch and on-line computerized billing services. This choice allows cable operators to start with the batch system and then switch to the on-line service when growth warrants.

Station Business Systems

600 West Putnam
Greenwich, Conn. 06830
(203) 622-2400

Station Business Systems is a division of Control Corp. and is headquartered in Greenwich, Conn. The company develops and markets in-house computerized financial and management control systems to the TV and radio broadcasting, cable and subscription TV industries. According to the company, it was first to market in-house, minicomputer-based systems to the radio and TV industries in the early 1970s. Since then, approximately 400 broadcasting stations throughout North America and Australia have chosen to employ Station Business Systems' products. Shortly after introducing its in-house minicomputer system to the broadcast industry, the company introduced a line of automated systems to meet the data processing needs of cable TV operators. The Subscriber Business System 2000 and Subscriber Business System 2000 accounting software are the company's most recent product introductions to

the cable industry. The Subscriber Business System provides a variety of services, including billing, and was designed to grow in capacity or capability by adding the appropriate hardware or software. It is based on a computer processor and multiple terminals manufactured and locally serviced by Texas Instruments, plus one or more printers. In addition, company education specialists provide complementary on-site training. Among other options offered with the system is addressability, which interconnects the system with addressable converters so that service can be activated or disconnected from the cable office.

Telease Inc.

1875 Century Park East
Suite 930
Los Angeles, Calif. 90067
(213) 552-1055

Robert Block founded Telease Inc. in 1972. The company's original purpose was to develop and license technology that would assure secure transmission by pay-TV broadcast operators. In the mid-70s, such a technology was developed. This technology incorporated the following features: a parental control lock; a phone system that used data, which was collected on those pay-TV events viewed by each subscriber, for billing purposes; and an addressable feature. After entering the international market in the late 1970s, Telease Inc. joined up with a group of advanced communications engineers to form Telease Technology Inc. (TTI). The subsidiary's primary objective was to develop the next generation of pay-TV technology and expand the market area for Telease. Since then, TTI has been involved in the research and development of various advanced applications for pay TV, broadcast TV and cable TV. On Sept. 30, 1981, Telease entered into a License-Option Agreement with MAAST Partners, Ltd., whereby Telease granted to the partnership a development license to certain patents and other proprietary information owned by Telease. This information was to be used for the development of a Multiple Application Addressable Secure Television System, now known as the MAAST system. An early version of this technology has been used by SelecTV since October 1981 in three cable systems in the United Kingdom. TTI, in conjunction with MAAST Partners LTD., developed the system and then redirected its efforts toward the development of a MAAST system with impulse-pay-per-view capability (IPPV). In late 1981, a Research and Development Limited Partnership was

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established to provide additional funds for this development effort. This effort resulted in the introduction of the MAAST B system, which is now available to the cable industry. MAAST B features an electronic billing system that automatically bills each subscriber for either the pay-per-view or pay-per-view and tiered programs he has watched during the preceding month. Other features of the system include: a Telease Inc. Encryption System (TIES), multiple audio, tiering, impulse-pay-per-view, decoder control keys, etc. Telease Inc. is an international company based in Los Angeles.

Toner Cable Computer Systems Inc.

969 Horsham Road
Horsham, Pa. 19044
(800) 523-5947

A CATV equipment supplier since 1971, Toner Cable first entered the CATV data processing field in 1977 when it founded its own computer division. This division was established for the purpose of bringing data processing into the cable TV office. After hiring a programming staff, the company began to develop its own software. Two years of research and development resulted in the introduction of SMART, Subscriber Management and Accounts Receivable Tracking CATV software. As an OEM distributor of Texas Instruments equipment, Toner combines its CATV software with Texas Instruments hardware to provide computer systems capable of handling as few as 1,000 subscribers to as many as 100,000 or more. According to the company, it is the largest supplier of in-house CATV computer systems. Complementary support services are included with the system.

Tuned Intelligence

3100 Broadway, Suite 1111
Kansas City, Mo. 64111
(816) 561-1800

Tuned Intelligence, formerly Cyber-tech Inc., was founded in 1977 by its current president, Al Clark. The company began as a manufacturer of computer billing system software for the cable TV industry and currently considers itself to be a turnkey OEM software house. As a turnkey OEM software house, it sells either the software or the complete system, including both the hardware and software. The company's original billing systems were designed for in-house, on-line, real-time processing and cannot support the broad power or revenue potential associated with addressability. In 1977, the company entered into a joint venture with Zenith

Radio Corp. The agreement gave Zenith the right to market its addressable decoder and Tuned Intelligence's control computer system as a package to cable operators. As a consequence of the agreement, in December 1981, Tuned Intelligence installed a 400 Hz cable system that used one-way addressability for two Viacom Cable franchises in Milwaukee. In February 1982, the company installed a second system for Viacom in Pittsburg, Calif.; and, in the summer of 1982, it installed a system for MultiVisions of Anchorage, Alaska. According to Tuned Intelligence officials, the control system that it designed for MultiVisions is going to be the basis for its standard industry product. On July 20, 1982, Tuned Intelligence entered into another agreement with MultiVisions to add a billing system to the control system that it already had installed. Current company plans include negotiations with Zenith to permit Zenith to market an integrated billing/control system, now represented in the Multi-Vision system. The company also expects that, by this summer, its software, which can be ported from one computer to the next via the Bell Laboratories UNIX operating system, will be installed by and available to even more cable operators.

Billing service companies

ADR/CADRE Inc.
Apple/Store
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Cox Data Services Inc.
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G&Z Systems Inc.
Gill Management Services
KMP Computer Services Inc.
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North American
Satellite Communications Inc.
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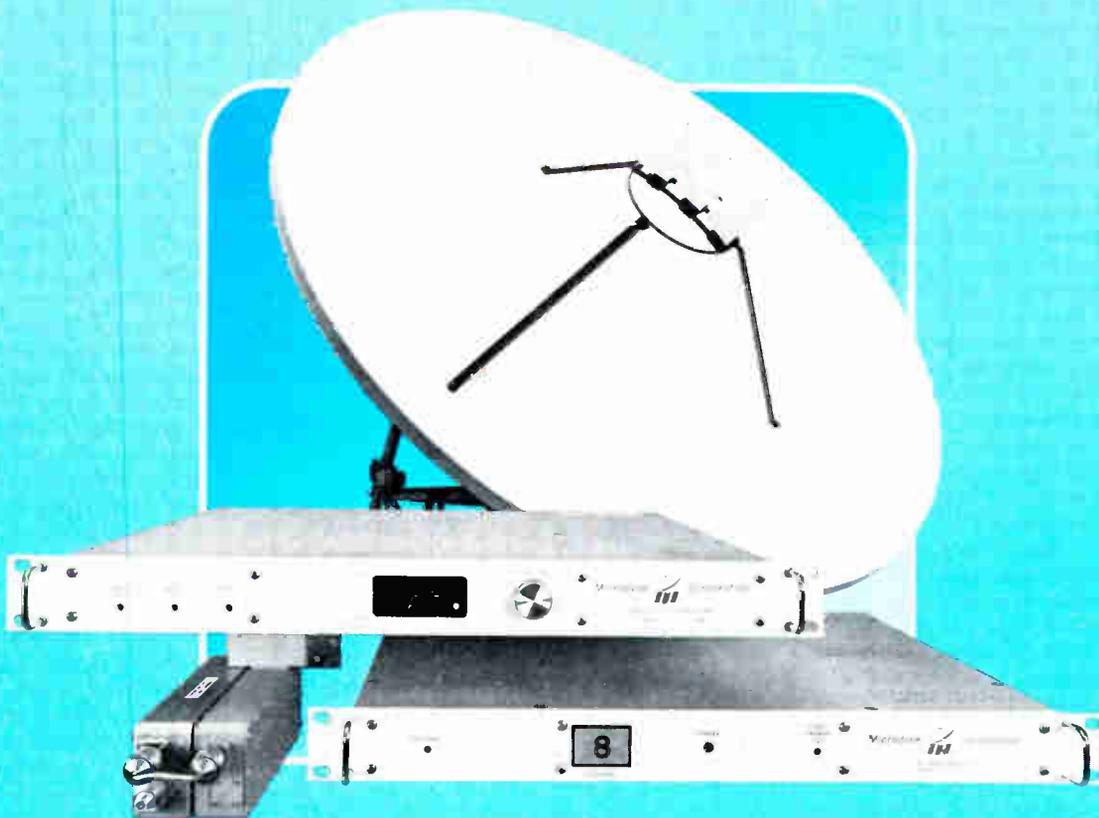
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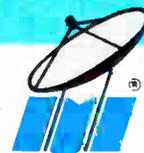
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| E: Cable T.V. Component Manufacturer/Distributor | M: Law Firms/Legal Counsel/Attorneys |
| F: Microwave/Telephone Companies | N: Trade Associations/Institutions |
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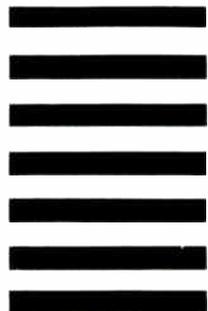
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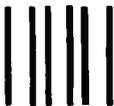
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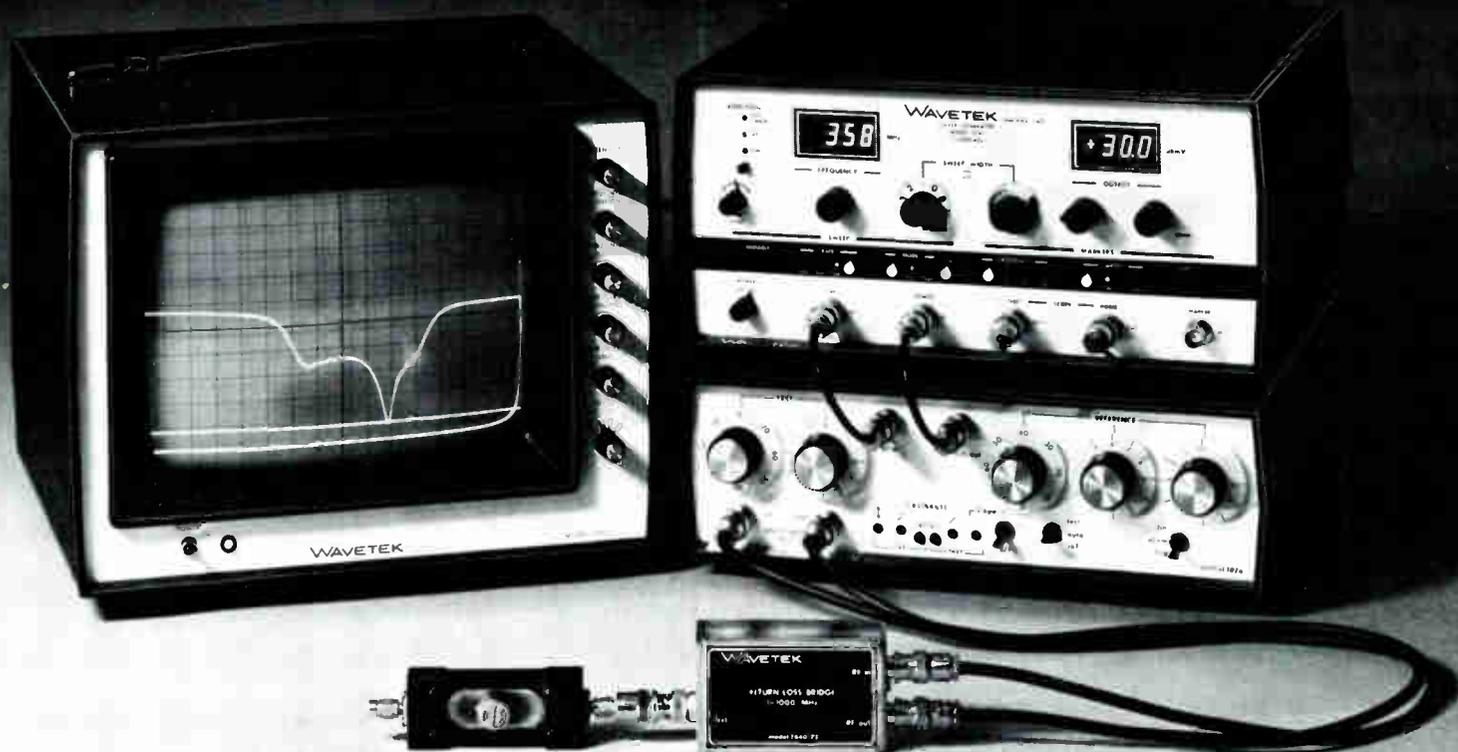
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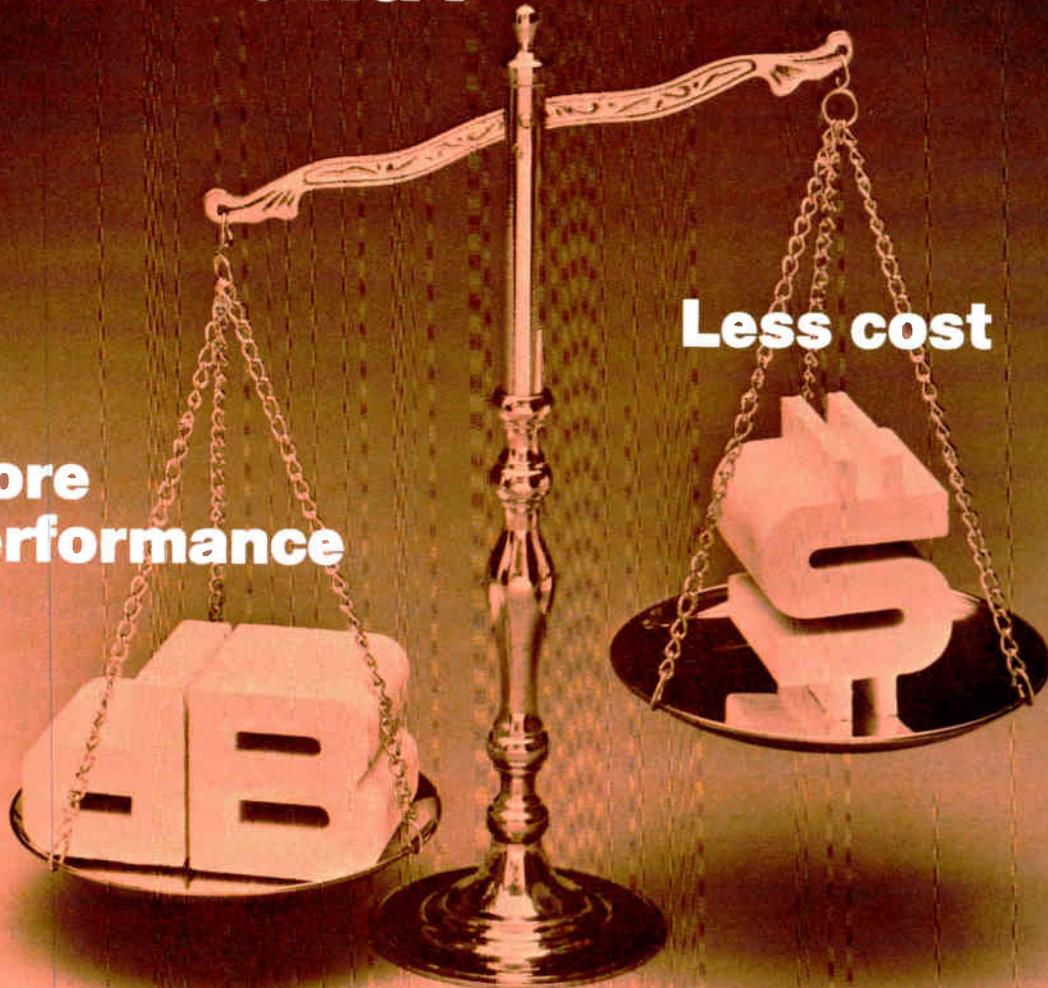


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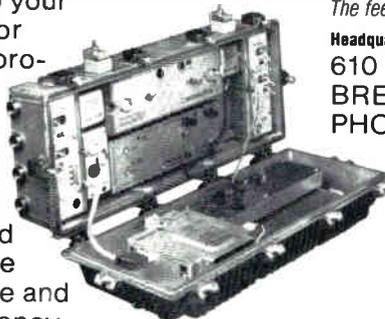
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■ **F. Raymond McDevitt** has been appointed senior vice president, technical operations for **Warner Amex Cable Communications**. In his new position, McDevitt will be responsible for engineering, purchasing, standards and practices and technical training. McDevitt joined Warner Amex in 1981 as vice president, technical operations. He previously was director of the fiberoptics laboratory of the electro-optical products division of International Telephone and Telegraph and served as program manager for engineering programs at the Harris Corp.

■ **John Rittenhouse** has been named group vice president by **RCA Corp.** During his 25-year tenure with RCA, Rittenhouse most recently served (since February 1981) as division vice president and general manager for the RCA picture tube division in Lancaster, Pa. In his new position, Rittenhouse will be responsible for RCA's government systems division, commercial communications systems division and for the RCA Service Co. In 1958, Rittenhouse joined RCA as an engineer in the company's applied research activity division and went on to earn his master's degree in electrical engineering as a member of the RCA graduate study program. In 1962, he was named leader in the electro-mechanics section of applied research. Since 1964, he has held various managerial and executive positions with the company. Among other programs he has managed for RCA are several programs at the government communications system including: Maroon Shield, a classified government program; recording equipment operations; and radio and transmission systems.

■ **Ray Truluck** has joined **Standard Communications Corp.** as TVRO product manager. Truluck will have complete charge of all product and market planning. He will be based at the company headquarters; Carson, Calif. Truluck's former cable experience was as vice president and co-owner of a company that was founded to design and market home TVRO equipment.

■ **The Games Network** has appointed three people to newly created executive positions within the company.

Steve Klein has been named executive vice president, research and development, for the company. **Barry Megdal**, Ph.D., has been elected to the position of vice president, engineering. According to

the company, Klein and Megdal have been credited with the development of the multifaceted TGN technology, which allows subscribers to play video games over cable TV systems, SMATV and MDS operations.

■ **Jim Summers** has been appointed vice president, program acquisitions. To date, he has contracted over 1500 video game programs for use on the service. In his new position, Summers will be responsible for acquiring additional software, including learning programs and children's educational programs.

■ **Tony Barclay** has been appointed vice president, Southwest region for **Anixter Communications**. In his new post, Barclay will direct sales efforts to the cable TV and telephone industries in the Southwestern United States. Formerly, manager of Anixter Communications' sales and distribution facility in Houston, Barclay has been with Anixter since 1973.



■ **George Mierisch** recently joined **Toner Cable Computer Systems** as Western regional sales manager. Mierisch has 16 years of experience in the CATV industry and has worked for both Magnavox and Scientific-Atlanta. In his new post, he will be primarily responsible for the sale of Toner's Smart™ in-house computer systems to MSOs. Mierisch will be based in the Salt Lake City area and will have a regional office in Salt Lake City.

■ **William Coyle** has been appointed vice president of operations for **Warner Amex Cable** of Dallas. As vice president, Coyle will be responsible for all customer service operations for the Dallas system, including business office, repair/service and installation activities. Coyle, a graduate of SMU's Edwin L. Cox School of Business, comes to Warner Amex from Xerox Corp., where he served for six years as office products branch manager and was responsible for office products sales and support services within a six-state area. Prior to his post with Xerox, he worked with Rockwell International and operated his own real estate development firm.

■ **Computer Video Systems Inc.** (CVS) has announced several organizational changes in its sales force for the com-

pany's COMPUVID product line. Among other organizational changes affecting sales representatives and their territories were the addition of two in-house sales managers for the company's Eastern and Western regional offices. **Larry Salchow**, formerly with DIP Inc., was named sales manager for the company's Eastern regional office, located in Atlanta. **Bob Morgan**, also formerly with DIP Inc., was elected as the company's Western regional sales manager. The CVS Western regional office is located in Lake Matthews, Calif.

■ **Paul Rozzini** has been named vice president of **Chyron Corp.** by the company's board of directors. As corporate vice president, Rozzini will direct the company's expanding manufacturing operations. Rozzini joined Chyron in 1976 as director of operations of Systems Resources Corp., then a Chyron subsidiary that has since totally merged into Chyron. In June 1981, he became vice president in charge of manufacturing at Chyron's Telesystems Division. Prior to joining Chyron, Rozzini was manager of industrial and manufacturing engineering at Telephonics Corp. He also has worked for several electronics corporations based in Long Island, N.Y.

■ **The Disney Channel** has made two additions to its staff: **Peter Giambrone** as manager of on-air operations and **Joe Zsohar** as manager of video tape operations.

Giambrone, a former manager of Warner Amex's quality assurance department, acquired more than three years of experience in program operations management while at Warner Amex Satellite Entertainment Co. Before assuming his post at Warner Amex, Giambrone worked in program management at Courier Cable of Buffalo, N.Y., now known as Cable-scope. In his new post with The Disney Channel, Giambrone will be responsible for on-air operations and logs and will monitor programming for the company's new pay-TV service from an operational perspective.

Zsohar, The Disney Channel's new manager of videotape operations, was formerly associated with NBC-TV as a special service representative. While at NBC-TV, Zsohar was responsible for coordinating satellite and ground feeds, helped establish NBC's videotape library inventory control system in New York City and assisted in converting KNBC in Los Angeles to its present computer system.

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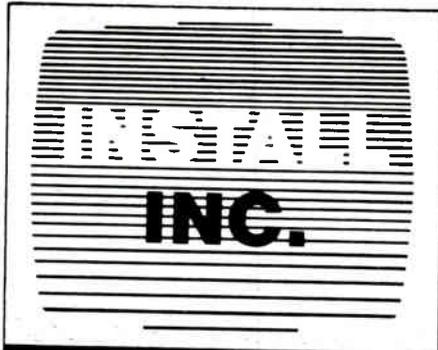
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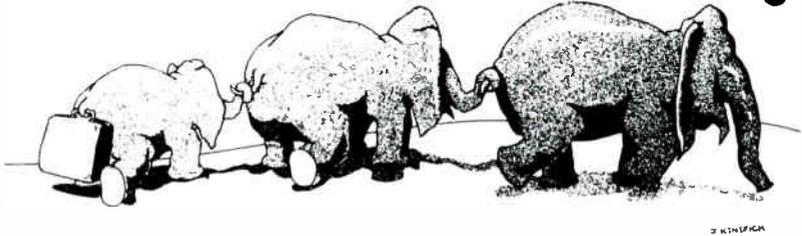
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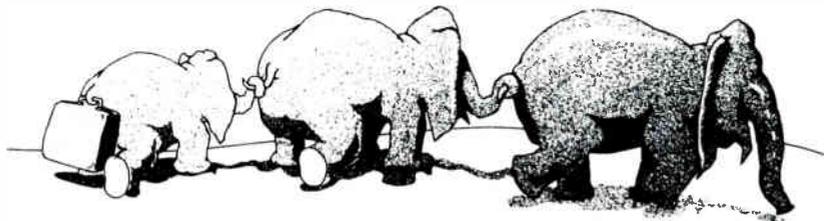


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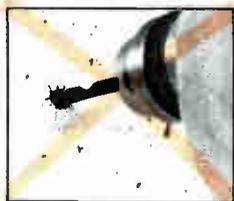
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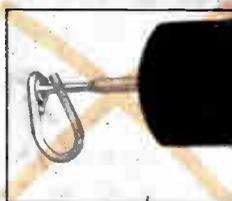
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Product News

C-COR LAN-100 amplifiers

C-COR Electronics has introduced a series of split-band amplifiers, designated the LAN-100 series, that were designed specifically for broadband local area network data systems. These amplifiers provide full-duplex data transmission over a 5-450 MHz bandwidth. The units also offer 35 dB forward gain and 30 dB reverse gain for data communications environments, such as high-rise office buildings with large amounts of flat loss, and for metropolitan area institutional networks where reverse signals are injected into a feeder cable. Other features of the amplifier include; a reverse bandpass of 5-112 MHz; a forward bandpass of 150-400 MHz capable of handling most LAN data transmission requirements; and housings that are made of sturdy, die-cast aluminum. In addition, housings can be installed indoors or outdoors and are fitted with both a silicone rubber gasket and a metal mesh gasket to protect against environmental contaminants and radio frequency interference. C-COR offers a three-year warranty on the LAN-100 amplifiers.

For more information, contact C-COR, (814) 238-2461.

Tektronix 1240 logic analyzer

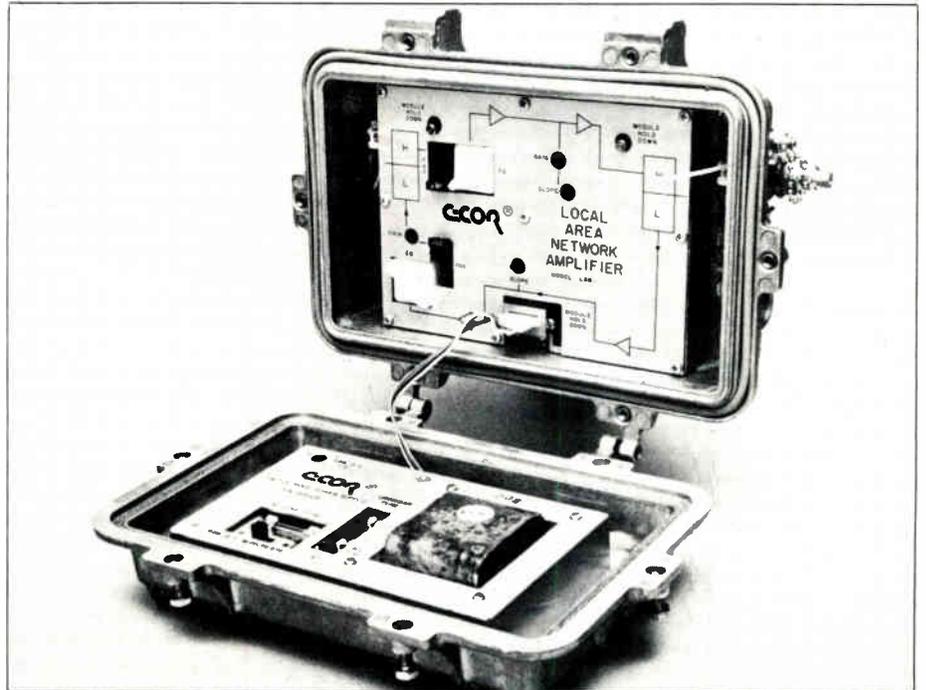
The Design Automation Division of Tektronix Inc. has introduced its 1240 logical analyzer. The unit is intended to attain the same position in stand-alone logic analyzers as that pioneered by the firm's successful 465 Portable Oscilloscope—long considered the "industry standard" of 100 MHz scopes.

A card-modular mainframe, coupled with ROM and COMM packs, lets the user select the data acquisition channels and speeds, data analysis and communications interface support, with upgradability for future applications. The user can select the level of instrument functionality by choosing from four graduated levels of operation that take advantage of a touch-sensitive display with menu-driven, on-screen soft keys.

The 1240's proprietary "dual timebase" allows data to be acquired concurrently from two separate timebases while its triggering and software analysis tools are optimized for a broad spectrum of software debug problems.

The 1240 features a menu system with four levels of user-selectable operation.

The incorporation of soft keys on a touch-sensitive display eliminates the confusing array of multifunction keys found on the keyboards of competitive



C-COR LAN 100 split-band amplifiers

logic analyzers. The 1240's various functions are presented as rectangular graphic fields containing the menu label, each selectable by touching the appropriate area on the display. Each of the menus uses on-screen selection fields to perform certain operations unique to that display. By making maximum use of the on-screen selection fields, the number of keys on the keyboard has been kept to a minimum.

The 1240 mainframe accepts up to 4 data acquisition modules of two types: The 1240D1, with nine channels and acquisition speeds up to 100 MHz; and the 1240D2, with 18 channels and speeds up to 50 MHz. These modules can be configured in any combination. Up to 72 channels of data acquisition and speeds to 100 MHz can be supported.

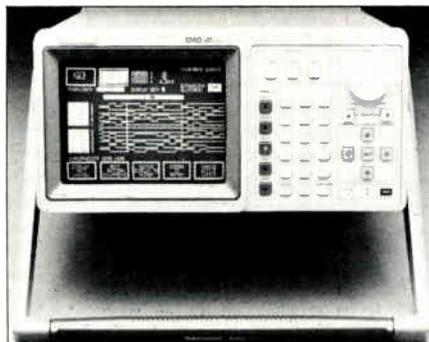
Internally, a non-volatile, battery-

backed CMOS memory holds up to two complete instrument setups. Additionally, RAM packs act as external non-volatile memory to support mass storage of both instrument setups and reference memories—providing for more productive instrument use and facilitating transfer of tests from engineering to manufacturing and service.

For hardware debug, the 1240's triggering includes counters, timers, duration filters and glitch detection down to 5ns. A special auto-run mode aids in locating intermittent problems without continuous user attention.

Available in spring 1983, 1240 configurations range from \$7,500 to \$19,500. The 1240 weighs 26 lbs. and meets rugged MIL-T-28800C environmental Class 3 specifications.

For more information, contact Tektronix Inc., (800) 547-1512, in Oregon, (800) 452-1877.



Tektronix 1240 logic analyzer

Chyron Corp. announces new VP-2

The Video Cable Products Division of Chyron Corp. announced its intention to introduce the new Model VP-2 character and graphics generator at the 1983 NAB show.

The VP-2 is the second in the VP series of low cost, high resolution graphics generators. The VP-2 is a compact stand-alone unit, including a complete keyboard and micro disk drive for composing and storage. The VP-2 utilizes menus and a

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cursor for ease of operation.

Incorporating many features found on more costly and elaborate studio generators, the VP-2 offers 35 nanosecond resolution, a 512 color palette, six-font capacity and sophisticated capabilities for character edging, placement and graphics composition. An extensive library of fonts, as well as custom logos, are also available.

For more information, contact Chyron Corp., 265 Spagnoli Road, Melville, N.Y. 11747.

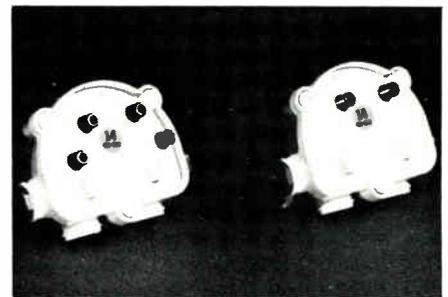
Arvin/Diamond 450 MHz tap

Arvin/Diamond has announced the availability of a new 450 MHz directional tap. The new series 4600 tap features 5 MHz to 450 MHz bandpass capability combined with a new RFI gasket.

According to the company, the series 4600 tap is made of highly corrosion-resistant zinc alloy casting that is zinc chromated and painted with an epoxy-based polyurethane paint. Extensive independent laboratory testing has shown this finish to be the most corrosion resistant available.

The new metal mesh/neoprene gasket offers enhanced RFI ingress and radiation protection. Laboratory testing and field usage have proven this gasket's ability to provide signal protection that surpasses the FCC requirements—typically in excess of -110dB.

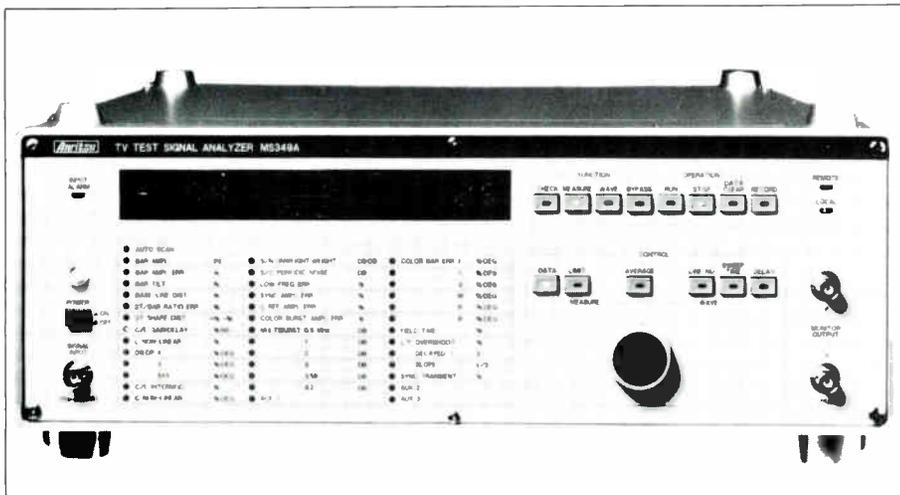
For more information, contact Arvin/Diamond, (614) 756-9222.



Arvin/Diamond 450 MHz taps

Anritsu test signal analyzer

Anritsu America Inc. will introduce its most recent TV test signal analyzer, the MS349, at the April NAB Show in Las Vegas. The unit, which automatically analyzes TV test signal waveform distortion, can also be used for data processing, analysis of experimental data, record-keeping and other related purposes. Able to be used with the NTSC, PAL and SECAM systems, the MS349 can accommodate the FCC and CCIR test signals and display the measurement results. It also can be used for both insertion test signal (ITS) and full field test signal (FTS) measurements. In the ITS measurement, a test signal is inserted in the field-blanking intervals of TV signals. This method can be used in broadcasting and transmitting stations, microwave



Anritsu TV test signal analyzer

networks, coaxial networks and satellite networks.

In the FTS measurement, a test signal is transmitted in the full field of TV signals. According to the company, this method goes beyond the ITS capability and provides higher accuracy. The method can be used for measuring transmission characteristics in the repeater section of a long-distance network or for making adjustments and conducting performance tests on transmitting equipment, such as VTRs. The MS349 measuring ranges include: input level range of 0.5-2.0 V, peak-to-peak; input impedance of 75 ohms, unbalanced; signal-to-noise ratio of 65-30 dB; low frequency errors of 0-50 percent; color burst amplitude error of +40 percent; and sync transient of 0-50 percent. Deliveries are stock to 12 weeks, while single unit price is \$17,820.

For more information, contact Anritsu America Inc., (201) 568-3838.

Aetna fiberoptic coupler

Aetna Telecommunications Laboratories is offering a fiberoptic coupler that permits bidirectional communication over a single fiber. According to the company, the device, designated the ABD-50, reduces by 50 percent the amount of optical fiber needed to create a point-to-point communication system. Designed for use in CATV systems, local area networks and computer networks, the ABD-50 coupler is available with a premounted emitter and detector, which are factory mounted to obtain 45 microwatts of coupled power. Other features of the coupler include: a meter-long, graded-index fiber pigtail of either 50/125 or 100/140 micron fiber; 0.25 A/W typical coupler responsivity; 25 dB typical crosstalk; and a spectral half-line width of 35 nm and maximum forward bias current of 200 mA. In addition, the coupler's premounted emitter can achieve a peak wavelength of 820 nm and a response time of 3 ns. The unit weighs less than 25 grams, is fabricated in one piece for

ruggedness and operates efficiently over a wide range of temperatures (from -20°C to +65°C). Prices for the couplers vary, depending on the quantity ordered.

For more information, contact Aetna Telecommunications Laboratories, (617) 366-0400.

Blonder-Tongue multitaps

Blonder-Tongue also has expanded its product line to include directional multitaps that have been designed for use in CATV and MATV systems. All of these taps have a wide frequency range of 5-400 MHz. The DMT model 4041 has two subscriber drop taps while the model 4042 has four. Both models are designed for messenger strand or pedestal mounting. All units have pressure-tight, weather-proof, heavy-duty aluminum cases and a seized center conductor post that, according to the company, can withstand over 100 lbs. of stress caused by thermal contraction. A counter-bore is tapered in all four entry ports to enable the connector gasket to sit perfectly inside the entry port. This allows the metal shoulder of the connector to make total metal-to-metal contact with the entry port, providing 100 percent RFI integrity.

For more information, contact Blonder-Tongue, (201) 679-4000.



Blonder-Tongue directional multitaps

General Optronics adds products

General Optronics Corp. has introduced three new products: a wideband analog fiberoptic transmission system, a series of passive optical couplers that use single mode fibers and a Gallium Arsenide Indium Phosphide Laser Diode.

Models Laserline 8000 and Laserline 13000 are two versions of the company's newest wideband analog fiberoptic transmission system. Both units can operate at either .8um or 1.3um wavelengths and feature system bandwidths of more than 250 MHz, with corresponding distortion of less than 1 percent over the entire bandwidth. By utilizing a General Optronics laser diode that emits at either .8um or 1.3um wavelengths and a General Optronics PIN FET or APD receiver, both unit models provide a means of fiberoptic analog distribution that requires low noise and low distortion. In addition, laser performance is optimized by a unique peak limit circuit that maximizes linearity. Both models employ an AGC control, which utilizes a pilot tone transmitted independently of the analog information. This control allows link integrity to be maintained regardless of the signals transmitted and can transmit burst data now being used in local area networking. The AGC also can be defeated for operation in a manual gain control mode. According to the company, applications for the Laserlink 8000 and Laserlink 13000 include video trunk and distribution links; studio-to-transmitter links; broadband local area network systems; CATV; and high-speed instrumentation monitoring. Single quantity basic systems are priced at \$5,500 for Laserlink 8000, operating at .8um wavelengths, and \$10,500 for Laserlink 13000, operating at 1.3um wavelengths. Delivery is 6-10 weeks.

General Optronics' passive optical couplers use single mode fibers, with excess loss below 2 dB. The basic coupler is a "2 in x 2 out" device that splits or combines optical signals and can be used in various fields of fiberoptic engineering. The couplers have fiber leads of one meter in length and are housed in a ruggedized package for use in industrial environments. The two models, GO-SMC8 and GO-SMC13, use single mode fibers with 5 and 9 micron diameter cores respectively for 0.8 and 1.3 micron operation. They can be ordered with a 1:1 splitting ratio or any other ratio up to 20:1. Both couplers can be used in distribution and wavelength division multiplexing. Single quantity prices for both models is \$1,250. Availability from stock to six weeks.

The new Gallium Arsenide Indium Phosphide Laser Diode, model GOLS 6300, has a single longitudinal mode spectral output and can be operated at room temperatures without the use of

Peltier-type thermal electric coolers. The laser features more than 7mW per facet optical power, has typical thresholds of less than 50 mA, operates at 1300nm and is offered in the standard General Optronics dual in-line package, which can be ordered as model GO-DIP 6300. It can be packaged with or without an optional thermal electric cooler and thermistor and with single or multimode fiber pigtailed. Optical powers of better than 1 mW (core power) are available with optional single mode fiber pigtailed of 5-9um core fiber. The company expects major markets for the model GOLS 6300 to be in long-haul or high-bandwidth telecommunications as well as in some optical sensor applications.

For more information, contact General Optronics Corp., 2 Olsen Avenue, Edison, N.J. 08820; (201) 549-9000.

New time-interval oscilloscope

Offering 50-picosecond accuracy and 10-picosecond resolution, the new Hewlett Packard 1726A time-interval oscilloscope can make fast, reliable timing measurements on complex, repetitive signals.

The HP 1726A combines counter and oscilloscope technologies. It has the viewing and measuring capabilities of a 275 MHz oscilloscope and the ease of a time-interval counter.

Designed to make precise timing

measurements, the HP 1726A uses a crystal-referenced time base (the counter-measurement technique) in conjunction with a CRT and stable triggering circuits (the oscilloscope-measurement technique).

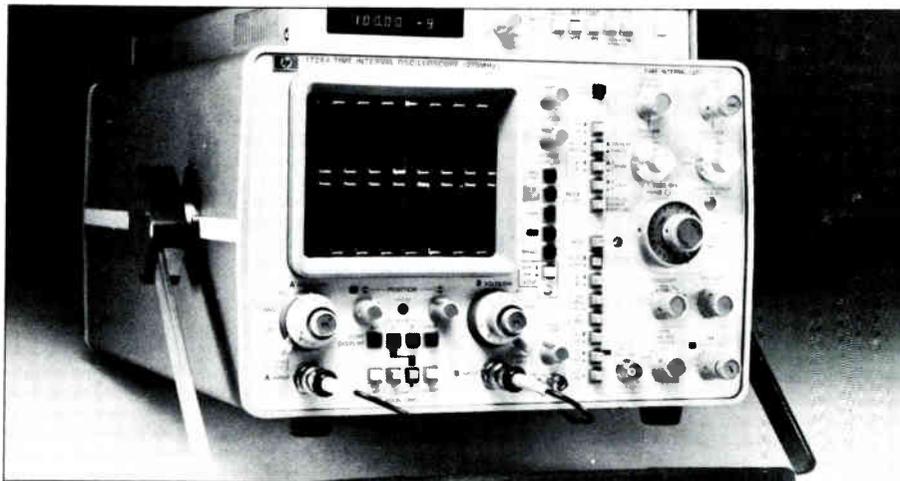
This combination enables the HP 1726A to display the signal being tested as well as measure the designated interval with up to 50-picosecond accuracy.

According to the company, the HP 1726A's technology provides new capabilities, such as first-pulse measurements, with a repeatability characteristic of

+/-30 picoseconds. The HP 1726A's crystal-referenced time base also permits accurate timing measurements with the horizontal-sweep vernier out of calibration. This extends the useful measurement range by a factor of three.

The HP 1726A can be operated in two timing-measurement modes—the overlap mode and the triggered mode. Both operating modes incorporate time-interval averaging, which automatically is controlled through the MAIN TIME/DIV switch on the front panel.

For more information, contact Hewlett-Packard, (415) 857-1501.



Hewlett-Packard 1726A time-interval oscilloscope

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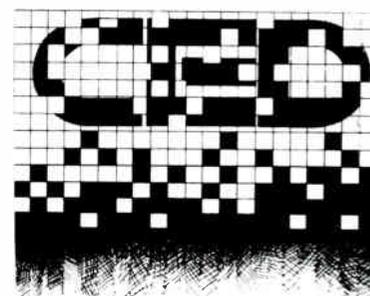
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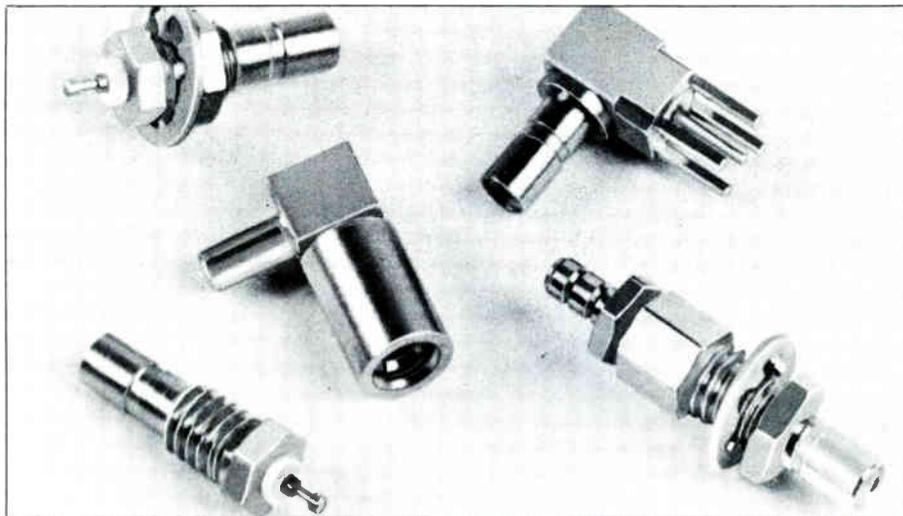
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AEP microminiature connectors

A newly released group of microminiature RF connectors, named the series 7000 microminiature RF connectors, are now available from Applied Engineering Products (AEP). According to the company, these connectors can mate with "Nano-hex®-type units and have been manufactured for cable sizes ranging up to .110-inch in diameter. Available with either nickel or gold plating, these connectors have a frequency range of DC to 12.4 GHz and can meet both short-and long-run requirements. The units are available in straight plug, right-angle plug, bulkhead jack, front- and rear-mount bulkhead and straight-and right-angle PC board mount configurations. According to AEP officials, the connectors meet special purpose requirements quickly and efficiently. Delivery for the Series 7000, based on run, is six to eight weeks.

For more information, contact Applied Engineering Products, (203) 387-5282.



Applied Engineering's 7000 microminiature connectors

Flat ribbon cable plugs, sockets

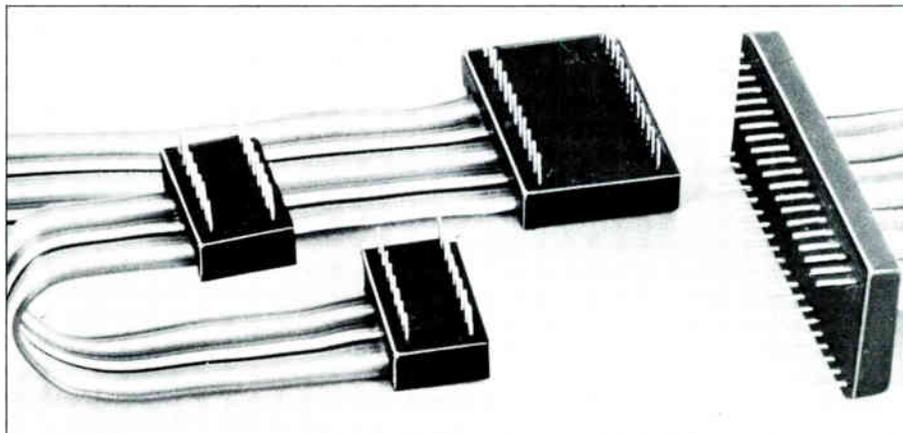
Samtec Inc. is offering color-coded cable plugs from 8 to 64 pin conductor sizes. These single or double end plugs, available with a female socket or with a male plug on one or more ends, come in twisted pair or flat ribbon cable versions. All connections are hand soldered, encapsulated and tested for continuity and shorts. Cable can exit from the top, side or the end of the plugs. Male plugs are G.F. Nylon UL rated 94V-0 with gold plated brass terminals. Female sockets have precision-machined lead sockets with heavy four-finger gold plated inner contacts. Body material is G.F. polyester UL rated 94V-0. Flat cable and twisted-pair stranded is #26 awg, PVC insulation. Units are priced from \$1.67 each for 100 units.

For more information contact Samtec Inc., P.O. Box 1147, New Albany, Ind. 47150, (812) 944-6733.

3M tapes

3M's Telcomm Products Division is offering four Scotch brand telecommunication tapes contained in an introductory-priced kit. The tapes are specialized CATV tapes for use in a variety of insulating, sealing, repairing, color coding and related uses. Each kit includes 12 rolls of Scotch brand 88T vinyl plastic tape (1 inch x 36 feet); five rolls of Scotch brand LR linerless rubber tape (3/4 inch x 30 feet); one roll of Scotch brand LR linerless rubber tape (2 inch x 30 feet); one roll of Scotch brand VM vinyl mastic tape (1 1/2 inches x 20 feet); one roll of Scotch brand VM vinyl mastic tape (4 inches x 10 feet); and nine rolls of Scotch brand 35 vinyl plastic tape (1/2 inch x 20 feet) in nine different colors, including white, slate, yellow, orange, red, violet, blue, green and brown.

Scotch brand 88T vinyl plastic tape is



Samtec flat ribbon cable

formulated to meet industry insulation, wrapping and splicing needs. Its vinyl backing also permits the tape to stretch tightly over irregular surfaces, providing physical and electrical protection without puncturing or tearing. The LR linerless rubber tape is self-bonding, needs no adhesive, is highly stretchable and, according to the company, conforms closely to irregular surfaces for void-free permanent seals of insulation. Scotch brand VM vinyl mastic tape, which combines ruggedness and chemical resistance of vinyl film with a thick rubber-based mastic adhesive, is ideal for on-the-job preparation of protective coverings for damaged cable jacket repair.

For more information, contact 3M's Telcomm Products Division, Box 33600, 3M Center, St. Paul, Minn. 55144, (612) 733-9817.

The expandable "Challenger"

Intersat Corp. has unveiled an 11-foot expandable antenna, dubbed the "Challenger." Constructed of thermal compressed fiberglass, the "Challenger" is manufactured under exacting standards on a 3000-ton press and shaped into a perfect parabola. Through the addition of pre-manufactured extender panels, the "Challenger" can expand to 13 feet. The

antenna features an 11-foot diameter prime focus parabolic reflector, is comprised of eight easy-to-assemble sections, can withstand winds of 125 miles per hour and temperatures of -40 degrees (Fahrenheit) and can accommodate button hook and back splash feeds.

For more information, contact Intersat Corp., 2 Hood Drive, St. Peters, Mo. 63376, (800) 325-6122.

VSA teletext decoder

Videographic Systems of America (VSA) has announced the price and availability of its professional teletext decoder. Priced at \$1,375, the teletext decoder will be available in November 1983 and will operate on the NABTS standard. In November, VSA also plans to introduce teletext decoding boards for manufacturers to build into TV sets, set-top adapters and addressable converters. The R-10 board, developed by VSA, will sell for \$561, in quantities of 1-5000, and for \$275, for quantities of over 10,000. It will operate on NABTS, with a 256 x 210 bit map display VLSI.

For more information, contact VSA-Videographic Systems of America, 520 Madison Ave., New York, N.Y. 10022, (212) 682-6300.

thereby requiring the user to count graticules for at least one of these measurements.

All measurements are made through one probe, available on both channels, eliminating any extra time-consuming lead hookup. PPV, time and I/time are also featured for any waveform section using a variable bar called "delta measurements."

Sencore guarantees that if the added speed and accuracy of the SC61 waveform analyzer does not at least double your testing and troubleshooting productivity during the first 30 days, the instrument may be returned for a full refund, including freight both ways.

For more information on the SC61, contact Sencore, (800) 843-3338.



Sencore waveform analyzer

Augat has new data link, scribes

Augat Fiberoptics has announced the release of its new M25 data link. The M25 system can transmit digital data at rates from DC to a minimum of 25 Mb/s with a bit error rate (BER) of less than 10^{-9} . With a 16 dB system loss budget, transmission lengths greater than 2 km can be obtained. As an added feature, the M25 can transmit simultaneously an analog signal up to 10 kHz.

Two connector systems are offered, including Augat's DSC, which is designed to meet newly proposed EIA standards.

Pricing for the M25 data link, less cable, is \$259 in 100s. Delivery is four weeks.

Augat also has introduced two new diamond tip scribes. These scribes provide an economical tool for quick fiber end preparation. The scribing surfaces are made of selected industrial grade natural diamond, which is then ground and lapped to provide a well-defined extremely hard tip. This tip is mounted in a convenient pen-style durable holder.

Two tip styles are offered: conical-shaped, 698-SC-T401 and wedge-shaped, 698-SC-T402. Scribes are color-coded for quick reference and are supplied with plastic covers for protecting the tip. Prices

are \$44.40 for the conical and \$68.80 for the wedge.

For more information, contact Augat Fiberoptics, (617) 222-2202.

Large core NA "data" fiber

A new large-core, high NA, graded index optical fiber for the data market is now available from Valtec. Designated the LC10, the new fiber features a 100 micron core, a nominal numerical aperture of 0.25 and less than 3.5 dB/km attenuation and up to 400 MHz-km bandwidth at 850nm. Valtec is offering the new fiber designed for use at either the short (850nm) or long (1300nm) wavelengths.

Valtec offers simplex, duplex and multi-channel data cables with the LC10 fiber. According to the company, LC10 fiber is ideally employed in long distance applications. Furthermore, the large core and high NA of LC10 fiber allow for the use of inexpensive light sources and detectors.

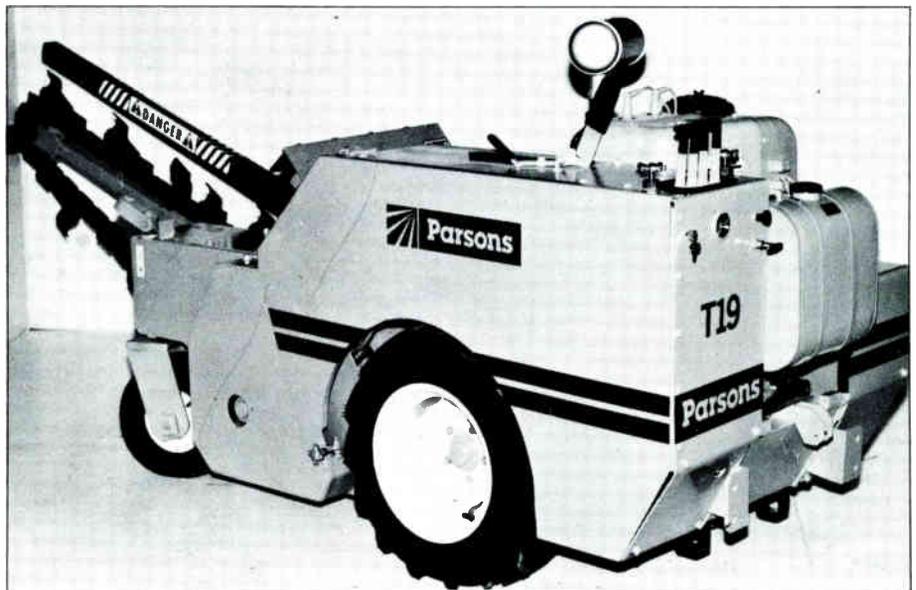
LC10 fiber specifications are highlighted in a new data sheet available from Valtec.

For more information, contact Valtec, (617) 835-6082.

Parsons walk-along trencher

Parsons Co. has unveiled the T-19, a steerable walk-behind trencher. The trencher was designed for the rental and light construction markets. Its features include a 18 HP Wisconsin TJD engine, a full-circle front caster wheel for maneuverability, hydraulic traction drive and a hydraulic boom lift. Options include a backfill blade, a boring unit and a crumber attachment. According to the company, the T-19 also has a special feature, a 35-inch width for backyard gates.

For more information, contact Parsons Co., P.O. Box 25309, Milwaukee, Wis., 53225, (414) 781-8900.



Parsons T-19 steerable trencher

New low-cost up/down converter

A fully synthesized up/down converter that permits easy selection of transponders for use with C-band satellites is being introduced by TELSAT Corp. of Houston. According to the company, the low cost model SC1010 features compact packaging and microstrip/modular construction for increased reliability, reduced spares and fewer interconnections. An oven-stabilized crystal oscillator provides exceptional frequency stability and low-phase noise. This converter allows up to three channel operation without external power dividers and, according to the company, is intended for use in SCPC or other demanding satellite communication systems.

For more information, contact TELSAT Corp., (713) 270-0081.

Proof of performance program

SBM Communications has developed a computer program that, according to the company, presents the very latest in state-of-the-art system proof of performance, balancing, sweeping and troubleshooting.

The copyrighted computer program automatically measures and plots the following system parameters and provides a hard copy with a calibrated bar graph for each location.

- Video levels
- Audio levels
- Hum modulation
- Signal to noise
- Frequency up to 450 MHz

This program offers a foolproof method to provide a printed readout for your FCC file and complete readout of all amplifiers for technicians. A technician cannot "fudge" the results because the procedure is fully automatic.

For more information, contact SBM Communications, (616) 345-0109.

STS satellite video modulator

Satellite Transmission Systems Inc. (STS) has developed a new satellite video modulator for either broadcast and CATV program origination or video teleconferencing purposes. For use with STS synthesized-agile up converters (C or Ku bands), this modulator, the STS model MOD 702, features local or remote switching of 525 line/60 Hz or 625 line/50 Hz video format. It is adjustable for full- or half-transponder video (70 MHz IF output) bandwidths of 36 or 17.5 MHz. Modulator frequency is automatic-phase controlled (APC). According to the company, a new IF filter design reduces delay-amplitude ripple while providing low-delay distortion noise. The MOD 702 accepts standard IV peak-to-peak video signals and can accommodate single, dual or stereo audio, as well as digital subcarrier input formats, which are externally modulated above the video. Primary power input is single phase 115 or 230 VAC, with low power consumption of 25 VA nominal. In addition, the unit contains extensive built-in test equipment (BITE), with relay contact and RS422 data interfaces for compatibility with analog or digital monitor and control systems. Reaching a total height of 3½-inches, the unit is constructed according to a modular slide-drawer design, which simplifies maintenance and servicing. This design also enables the unit to be mounted in standard 19-inch racks or cabinets. A video input bandpass filter is available as an option.

For more information, contact Satellite Transmission Systems Inc., (516) 231-1919.

Apollo Q-1

National Microtech Inc. has announced the addition of the Apollo Q-1 satellite receiver and down converter to its product line.

According to the company, the Apollo Q-1 satellite receiver/down converter is an outstanding mid-priced receiver.

It features push-button transponder selection, automatic polarity control, an audio IN signal strength meter display and a built-in modulator. It is packaged in a wood-grain cabinet with a black anodized face plate. A separate down converter with an integral LNA power block completes the package.

For more information, contact National Microtech, (800) 647-6144.

Telpar CTI-180

The CTI-180 is a color character text generator from Telpar Inc., which the company claims, can adapt to any TV system. Equipped with 16 pages of standard text, the unit comes with 32-, 48- and 64-page capacity options. Text is entered into the system via a standard typewriter keyboard. This keyboard has special function keys for color selection, cursor control, centering, character



The MOD 702 video modulator



The Apollo Q1 satellite receiver

flashing, size selection and underlining. Text and backgrounds can be comprised of any combination of eight colors: red, green, yellow, blue, magenta, cyan, black and white. While the user has a choice of 15 lines of 32 characters or seven lines of 16 characters, the last lines of both options display the day, date and time of day. The unit is easily installed and easy to use and, through the use of a modulator, can be made to operate on ordinary TV.

For more information, contact Telpar Inc., 4132 Billy Mitchell Road, Addison, Tex. 75001, (214) 233-6631.

Blonder-Tongue trunkline splitters

Blonder-Tongue Laboratories Inc. has announced the availability of a new line of CATV-type trunkline splitters. The TLS series of power passing, directional couplers feature a wide frequency range (5-400 MHz) and, according to the company, offer excellent backmatch at the tap port, which makes them ideal for two-way CATV systems while meeting FCC radiation standards.

TLS's are versatile, permitting pedestal or messenger strand mounting. They are constructed with a heavy gauge cast aluminum housing with an acrylic based finish for added anti-corrosion protection.

All TLS's have a tapered counter-bore in all entry ports so that the connector

gaskets sits perfectly inside the entry port. This allows the metal shoulder of the connector to make total metal to metal contact with the entry port, providing 100 percent RFI integrity. The seized center conductor posts can withstand over 100 PSI stress caused by thermal contraction.

For more information, contact Blonder-Tongue, (201) 679-4000.

TFT receive/transmit system

TFT Inc. has announced the availability of a new satellite receiver/transmitter remote control and status monitoring system. The TFT 8350 system provides 24-channel control and verification BCD interfaces to two or more satellite receivers and earth station facilities, as well as alarm status monitoring of the satellite receivers. The input and output interface are TTL logic.

Additional features of the new system include optional EPROM 24 line personality modules with binary interface for frequency synthesized equipment, built-in data modems for transmission between the satellite earth station and control point via 3 kHz bandwidth phone lines or bi-directional radio links. External auto-dial/auto-answer equipment is available as an option. Initial delivery of the 8350 systems is scheduled for May 1983 at a basic price of \$2950 per system.

For more information, contact TFT Inc., (408) 727-7272.

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In Orbit

Signal	Day	Start/Stop	Alert Tone	Transponder	Signal	Day	Start/Stop	Alert Tone	Transponder	
Satcom 3R					The Movie Channel					
ASCN-The Learning Channel	Weekdays	6 a.m. / 4 p.m.	192*/#	16			24 hrs.	None	5	
	Weekends	6 a.m. / 1 p.m.			Modern Satellite Network	Weekdays	10 a.m. / 1 p.m.	243*/# 421*/#	22	
ARTS	Daily	9 p.m. / 12 a.m.	311* /# (E,C,M) 519* /#(P)	1	MTV: Music Television		24 hrs.	None	11	
Cable Health Network		24 hrs.	361* /#	17	National Jewish Television	Sundays	1 p.m. / 4 p.m.	None	16	
CBN		24 hrs.	None	8	Nickelodeon	Daily	8 p.m. / 9 p.m.	311* /# (E,M,C) 519* /# (P)	1	
Cinemax		24 hrs.	None	20 (E,C) 23 (M,P)	PTL		24 hrs.	None	2	
CNN		24 hrs.	024* /#	14	Reuters	Weekdays	4 a.m. / 8 p.m.	None	18	
CNN Headline News		24 hrs.	635* /# 541* /#	15	Showtime		24 hrs.	576* /#	12 (E,C) 10 (M,P)	
C-SPAN		24 hrs.	195* /#	19	Spotlight		24 hrs.	None	4	
Daytime	Weekdays	1 p.m. / 5 p.m.	None	22	USA Blackout Network		O/V after 5 p.m.	295* /#	22	
ESPN		24 hrs.	048* /#	7	USA Cable Network		24 hrs.	438* /#	9	
Eternal World Television Network	Daily	8 p.m. / 12 p.m.	762* /#	18	WGN		24 hrs.	None	3	
HBO		24 hrs.	Program 729* /# Scramble 835* /# Duplication 940* /#	24 (E,C) 13, 22 (M,P)	WTBS		24 hrs.	None	6	
HTN Plus	Daily	4 p.m. / 4 a.m.	207* /#	16	The Weather Channel		24 hrs.	None	21	
Major Communications Satellites Serving North America					Satcom 4					
Location:		Satellite			The American Network		Daily	5 p.m. / 5 a.m.	None	19
Degrees West Longitude	Present	Future		BizNet		Weekdays	9 a.m. / 2 p.m.	None	15	
66		Sat com 2R (Dec. 83)		Bravo		Daily	8 p.m. / 6 a.m.	None	6	
70		Southern Pacific-2 (Oct. 84)**		The Entertainment Channel			24 hrs.	None	8	
74		Galaxy-2 (Mid 84)		HBO		Mon-Fri	5:30 a.m. / 12 p.m.	729* /#	18	
79		Advanced Westar-2** (Mid 83)				Saturday	6:30 a.m. / 5:20 a.m.			
83	Satcom-4			The Playboy Channel		Sunday	6:15 a.m. / 1 a.m.			
87	Comstar-D3	Telstar-2 (1984)					8 p.m. / 6 a.m.		7	
91	Westar-3	Advanced Westar-1**		National Christian Network			6 a.m. / 8 p.m.	073* /#	7	
94	SBS-3**			Trinity Broadcasting Network			24 hrs.	None	17	
95	Comstar-D2 & D1	Telstar-1 (Mid 83)		Westar 4						
97	SBS-2*			Eros		Thurs-Sat	11 p.m. / 2 a.m.		10D	
99	Westar-4			Financial News Network		Weekdays	10 a.m. / 5 p.m.	975* /# 738* /#	9X	
100	SES-1*	GTE-1* (1984)		GalaVision		Weekdays	4 p.m. / 4 a.m.		12X	
103		GTE-2* (1984)				Weekends	24 hrs.			
104.5	Anik D-1			SelecTV		Weekdays	8 p.m. / 4 a.m.		9X	
106				SIN			24 hrs.	None	8X	
108.5	Anik C-1			SPN			24 hrs.	429* /#	11X	
109	Anik-B**			Westar 5						
114	Anik A-3	Anik D-2 (1984)		BET		Daily	8 p.m. / 2 a.m.	406* /#	12X	
116		Anik C-2 (Mid 83)		CBS Cable		Weekdays	4:30 p.m. / 4:30 a.m.	524* /#	4D	
117.5	Anik C-3	Southern Pacific-1 (Feb. 84)**				Weekends	5 p.m. / 5 a.m.	531* /#		
119	Satcom-2			Satellite News Channel			24 hrs.	None	4X, 6D 7X, 8X, 9X	
123	Westar-5	Telstar-3 (1986)		The Nashville Network		Daily	9 a.m. / 3 a.m.	866* /#	9D	
123.5	Westar 2	Galaxy-1 (Mid 83)		WOR			24 hrs.	None	2D	
127	Comstar-D4									
131	Satcom-3R	Satcom-1R (Mid 83)								
135										
136	Satcom-1									
139										
143	Satcom 5									
*Ku Band										
**Dual Ku/C Band										
Orbital slots and launch dates often change without notice										

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Model #	Rejection Depth	Lower Video	Lower Adj. Sound	Upper Adj. Video
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5-NF A-F, mid band	-75db	1.0db	-5db	-1db
5-NF G-I, mid band	-75db	1.5db	-6db	-1db
5-NF 7-13, high band	-75db	2.0db	-10db	-2db
5-NF J-W, super band	-70db	3.0db	-15db	-3db



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