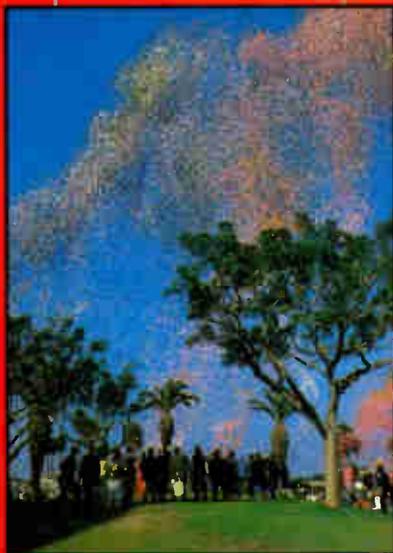


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**The active role
of passives**

**Western
show
tech
coverage**

January 1986



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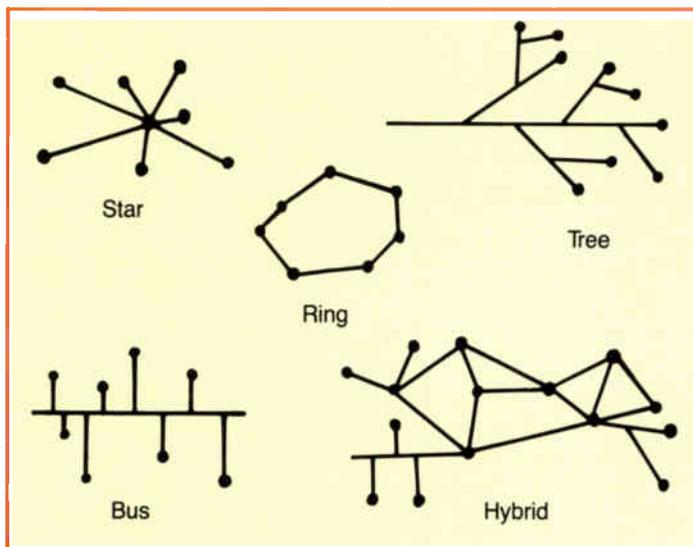
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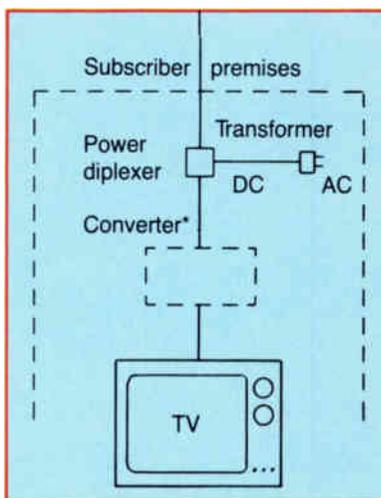
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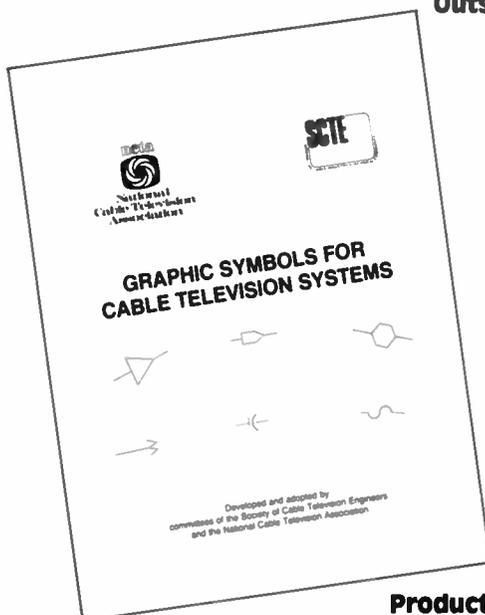
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Cover
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Reader Service Number 5.

Steady growth and expansion but . . .

As evidenced by this year's Western Show, a plethora of consumer interface devices are now available. Manufacturers, more than ever, are making an effort to fill the gaps in cable systems to increase revenues for the MSOs (and, of course, themselves).

But, while the cable industry may be experiencing good steady growth and expansion, a void is growing that will severely impact the technical community. There is no longer a major stable test equipment manufacturer. Texscan Corp. has had to file for protection under Chapter 11 of the federal banking laws; Wavetek has lost most of its key personnel; and the companies like Sadelco, ComSonics, Cadco, Triple Crown, etc., may not be able to handle the research and development that will be needed down the line. After all, test equipment for the new higher bandwidths is not available unless individual pieces are modified to those frequencies. Are we now setting the stage for the Hewlett-Packards of the world to step in and monopolize the cable industry?

On a more positive note, we were especially pleased that Sally Kinsman, SCTE Western vice president, was one of five women recognized for special achievement by Women in Cable (WIC). Barbara Ruger, 1985 WIC president, presented the awards at a special reception during the show. Kinsman is owner and president of Kinsman Design Associates. She has been doing design and mapping for the cable industry for many years, both through her own business and earlier, when she was manager of the design department of ATC in Denver.

Our compliments also go out to Pat Thompson, Louise Rauscher, Carolyn Chambers and Bernice Coe, the other entrepreneurs honored on Dec. 4 by WIC.

Pushing ahead

With the Western Show behind us, we can now look forward to the NCTA/Texas Show March 15-18 in Dallas. This combined show will feature the latest developments and trends in cable technology discussed by experts during 10 technical sessions. Forty-six papers will be presented on topics including impulse pay-per-view, stereo television, data delivery, cable compatibility with consumer electronics and signal security.

NCTA and the Texas Cable Television Association are combining efforts to present "Cable 86: The Value of Choice" in the Dallas Convention Center. Seven tracks of topics—management, finance, legal, programming, marketing, consumer electronics and public policy—are being planned in addition to the



technical sessions. During the three days, 14½ hours (during which no competing convention activities are scheduled) have been set aside for exclusive viewing of exhibits.

Like father, like son

Congratulations and best wishes are in order for Sadelco Inc. Harry Sadel, president of the company, announced the appointment of his son, Joe Sadel, to director of R&D for Sadelco on the 25th anniversary of the founding of the company. Harry Sadel is a well-known pioneer in the test equipment arena and his son is following after him. Joe Sadel is currently working on the application of microprocessor and chip technology for use in signal level meters. As a result of his efforts, he has developed several new products for future use by Sadelco. We welcome Joe Sadel into the cable fold and wish all at Sadelco continued success.

Best wishes for a healthy and prosperous new year.

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United Cable tests home satellite market

LOS ANGELES—United Cable Television Corp. the nation's ninth largest operator of cable television systems, has purchased products and systems from Cable TV Industries' Home Satellite Systems unit as part of its planned market testing of the TVRO, or home satellite, market to consumers.

United is selling Home Satellite Systems' products, which encompass dishes and associated electronics including televisions. In addition, United is marketing VCRs, videocassette tapes and other accessories for home

entertainment centers. The test marketing of products is taking place in Casper, Wyo., and, depending on result, the cable operator will expand its test to other parts of the nation.

The market for home TVRO systems has been estimated to exceed \$1 billion annually. At present, 40,000 dishes are sold monthly nationwide and one-third of these are sold into cabled areas, according to the Malarkey-Taylor Associates report presented in May of last year at the National Cable Television Association convention.

Jerrold consolidates operations, will phase out Century III name

ANAHEIM, Calif.—Operations of Jerrold's California-based Century III Division will be consolidated into the company's Distribution Systems Division. Citing the need to achieve efficient operations within the Distribution Systems Division, Jerrold/Century III will discontinue manufacturing activities at its Brea, Calif., facility.

All distribution product manufacturing will take place at General Instrument's facility in Nogales, Sonora, Mexico, with Jerrold discontinuing use of the Century III name. The feedforward technology that Century III pioneered has been incorporated into Jerrold's line of Starline X-3000 trunk amplifiers and Series XFLE line extenders.

Jerrold will offer all present Century III customers the opportunity to make final purchase of any Century III equipment prior to its phase-out. The company will support current Century III products in the field via internal and authorized repair facilities for all warranty and non-warranty repairs. Complete consolidation is expected by May 1986. Jerrold will continue to

maintain an engineering staff and several key executive posts at a smaller Brea facility.

General Instrument Corp. acquired Century III Electronics International, a California-based electronics concern that pioneered the design and application of feedforward distribution amplifiers, in November 1983.

Disney chooses M/A-COM VideoCipher

BURLINGTON, Mass.—M/A-COM Inc. announced that The Disney Channel has selected the VideoCipher II scrambling system for securing its satellite television signals. This decision means that all the major pay programmers will be using VideoCipher II, since Home Box Office/Cinemax and Showtime/The Movie Channel have already made similar commitments. In addition, other basic and pay-per-view cable programmers have also chosen VideoCipher II.

M/A-COM will be supplying one spare and two on-line scrambling subsystems, as well as

Expo '86 registration

WEST CHESTER, Pa.—Active members of the SCTE can expect to receive full registration packages before long for the Society of Cable Television Engineers' Cable-Tec Expo '86. The packages will be mailed in February for the June 12-15 expo, to be held in Phoenix, Ariz.

SCTE board members recently met at that site for their annual two-day work session. They discussed SCTE developments, sampled local delicacies, and toured the conference facilities. (For more details, see this month's *Interval*.)

Non-members of the SCTE who are interested in attending the expo also can receive a registration package by circling #1 on the Reader Service Card in this issue or by contacting the SCTE national headquarters at (215) 363-6888.

over 3,000 commercial descramblers for The Disney Channel's CATV and SMATV affiliates. Delivery will begin in early 1986, with the beginning of test scrambling scheduled for March. Installation and testing should be completed by the middle of 1986.

The Disney Channel will also use M/A-COM's DBS control center to authorize VideoCipher II consumer descramblers, so that TVRO owners may subscribe to and receive the programmer's signal. The DBS control center will be available for Disney's use by July 1, 1986.

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AM secures financing, picks up new contract

QUAKERTOWN, Pa.—AM Cable TV Industries Inc. announced that it has sold \$2.7 million of its 13 percent Convertible Secured Subordinated Notes to a group of investors. One-third of the notes were purchased by Butcher & Singer/Keystone Venture II, L.P., a venture capital fund affiliated with Butcher & Singer Inc., the investment banking firm that arranged the financing. Three directors/officers of AM Cable—Maqbool Qurashi, Masood Qurashi and I.T. Saldi—each purchased \$250,000 of notes, as did a fourth director. The remaining \$800,000 of the notes were purchased by a group of individual investors.

The notes are due in July 1995, and require 20 percent annual prepayments commencing July 1991. They are convertible into the company's common stock at \$1.25 per share (subject to anti-dilution adjustments). They are also subordinate to all senior debt on the company, which includes other borrowings. Finally the notes are secured by a junior lien on company assets.

In addition, AM Communications, a division of AM Cable, announced the signing of a contract between AM and Comcast Cablevision of Philadelphia, a division of Comcast Corp. The contract covers about 800 miles of projected plant in franchise area #4 of the city and involves strand mapping, system design and makeready surveying.

Magnavox equips Australian LAN

ANAHEIM, Calif.—Magnavox CATV Systems Inc. has begun delivery of equipment to be used for a local area network (LAN) in the new Australian Parliament building under construction in Canberra.

Designed by Magnavox, this triple-cable system will use Magnavox sub-split systems on two cables to provide audio/video services. A third cable will use a Magnavox mid-split system for data transmission. When complete, the LAN will also offer stereo audio and teleconferencing services to the estimated 3,000 people who will work in the new Parliament building.

In addition to distribution equipment, Magnavox also is supplying cable, headend gear and passive devices—including its new 8000 Series taps.

Spectrum Planning purchases Compucon

RICHARDSON, Texas—Spectrum Planning Inc. has acquired Compucon Inc. from A.C. Nielsen Co., a move that brings together two of the telecommunications industry's largest planners of frequency engineering.

Compucon will continue its operations as a subsidiary of Spectrum Planning Inc. Spec-

trum's current microwave and satellite engineering services will be moving into Compucon's building. In addition to the microwave and satellite engineering services, Compucon will continue to offer services in mobile communications, marketing information services and computer assisted packaging evaluation.

The combined company will work under the name of Compucon Inc. as a subsidiary of Spectrum Planning Inc., with headquarters in Richardson.

Texscan Corp. seeks Chapter 11 protection

PHOENIX, Ariz.—Texscan Corp. has announced it has filed for reorganization under Chapter 11 of the federal banking laws. The equipment manufacturer, which will continue to operate during the reorganization, stated that it had been unable to negotiate an acceptable modification with its principal lenders.

Texscan indicated that the measure will best serve the interests of its stockholders, customers and vendors by enabling the company to restructure its debt, conserve its cash and reorganize its operations, in part through the disposal of certain assets.

C-COR supplies Warner

STATE COLLEGE, Pa.—C-COR Electronics Inc. announced that Warner Amex Cable Communications Inc. has signed an agreement to purchase C-COR's distribution electronics and systems design for Warner Amex's cable television systems to be installed in portions of the New York City boroughs of Queens and Brooklyn. The value of C-COR equipment for the project is estimated at \$4.5 million.

C-COR will supply 550 MHz, 77-channel trunk and distribution amplifiers with Quick Alert status monitoring. It also will supply Warner Amex with main line passives.

PacBell to build cable net

SAN FRANCISCO—Pacific Bell, under an agreement with Cable Communications Cooperative (CCC) of Palo Alto, Calif., will build and maintain an \$11.2 million, 465-mile transmission network to carry cable TV programs in the mid-Peninsula area in and around Palo Alto. CCC will be responsible for hooking the system to customer's homes.

Pacific will lease the network to CCC over the term of the 15-year cable TV franchise with the city of Palo Alto. CCC has further entered into a maintenance agreement with Pacific, valued at more than \$2 million over 15 years. Pacific will be obtaining necessary authorization from the Federal Communications Commission prior to constructing the system.

Cable Co-op has made an arrangement with Heritage Communications Inc., a Des Moines, Iowa-based company, to manage the Palo Alto system.

Times Fiber board approves merger pact

WALLINGFORD, Conn.—Times Fiber Communications Inc. said that its board of directors approved a definitive merger agreement providing for the acquisition of Times Fiber by LPL Investment Group Inc. LPL Investment Group is owned by a group of private investors headed by Lawrence DeGeorge, formerly chairman of the board of Times Fiber.

Under the merger agreement, all outstanding shares of Times Fiber common stock will be converted into \$15.25 per share in cash. Insilco Corp., which currently owns 66.1 percent of Times Fiber's 9.6 million outstanding shares of common stock, will receive the same consideration for its shares, but also will be subscribing for \$20 million of newly issued preferred stock of the merged company.

Times Fiber said that in anticipation of completion of the merger, it would be making a self-tender offer to purchase all outstanding shares of its common stock, other than those owned by Insilco, for \$15.25 per share in cash.

Distributor opens shop

NORTH BRUNSWICK, N.J.—Gerald Goldman, president, Gold Communications Inc., announced that his company recently began formal business operations. Gold Communications will be a distributor of electronic products for the field of communications. The targeted markets are: CATV, SMATV, CCTV, hotel, hospital, security and computer.

Heritage chooses TOCOM

DALLAS—General Instrument Corp. announced that its TOCOM Division has been selected by Heritage Communications Inc. to supply cable electronics equipment to the Dallas metroplex cable television system. Heritage will purchase 5503-VR baseband converters, a Micro-ACS addressable control system and TOCOM Plus headend video processing equipment. Value of the contract is estimated at \$15 million.

RT/Katek awarded build, installation contracts

EAST ORANGE, N.J.—RT/Katek's Communications Construction Group has been awarded the construction contract by Tele-Communications Inc. to build Areas 1, 4 and 5 in Chicago. CCG President George Tamasi said construction has already begun and will take three years to complete the approximate 2,000 miles of plant.

In other contract news, RTK's Installations Services Division President Richard Thomas announced the award by Cablevision International to perform the turnkey installations in 10 new-build municipalities on the North Coast of Puerto Rico. Cross Country Cable is the managing partner of the systems that will pass 45,000 homes.

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Warner Amex selects Pioneer converters

COLUMBUS, Ohio—Pioneer Communications of America Inc. has announced an agreement with Warner Amex Cable to purchase Pioneer BA-5000 addressable converters to be installed in portions of the MSO's system in the New York City boroughs of Queens and Brooklyn. Financial details of the agreement were not disclosed.

Pioneer will supply its 550 MHz, 77-channel BA-5000 addressable converters along with its M3 headend controller and software. The M3 is capable of managing over 600,000 subscribers.

Warner Amex's vice president of technical operations, Roy Thompson, said that the BA-5000 has been installed in the operator's Houston system since July of 1985 with favorable results.

Brad Cable expands service

SCHENECTADY, N.Y.—Brad Cable Electronics Inc. has announced that Brad Tampa now services Jerrold addressable converters. According to Robert Price, senior vice president, this now completes the spectrum for Brad; all three Brad locations (Schenectady, N.Y.; Tampa, Fla.; and Fife, Wash.) currently service addressable converters.

ATSC: Here we go again!

By Isaac S. Blonder
 Chairman, Blonder-Tongue Laboratories Inc.

ATSC is the acronym of the Advanced Television Systems Committee, formally organized on April 28, 1983. Membership is open to any organization willing to participate actively in the work of the committee and bear its appropriate share of the costs. "The committee's primary objective shall be the exploration of the need for and, where appropriate, the development of voluntary national standards for advanced television systems."

The first public meeting of the ATSC that I attended was held at the National Association of Broadcasters (NAB) building in Washington, D.C., on May 13, 1983. To an engineer, prepared to participate in an open and friendly exchange of technical viewpoints, the meeting was a legal cold shower. Lawyer after lawyer explained the exceedingly complex and predetermined charter. Questions (the few ventured) were met with legal scorn and obtuse arguments.

Nevertheless, just about every important cog in the TV industry has come on board even though the financial burden would exceed \$100,000 per member. Naturally, the smaller

companies cannot afford to join this club.

On June 3, 1983, I addressed a letter to ATSC recommending the following amendments to the charter:

- 1) Voting members shall only be U.S. citizens.
- 2) Voting members shall only be engineers.
- 3) Corporations will be members only if 50 percent or more of their electronic manufactured products are made in the United States.
- 4) Congress or the FCC or both will be asked to set the percentage and terms of royalties to be paid to the inventors or possessors of trade secrets used in the finally approved television systems.
- 5) If the proponent of a new television system does not have the funds to participate in the testing program, the committee will conduct tests on his behalf, as long as the results are competitive with the other proposals.
- 6) For a period of five years after the new television systems are approved, only the manufacturers with more than 50 percent U.S. content in their products will be licensed to sell in the United States.

These proposed amendments directly address the problems of payment to the inven-

tors, the loss of jobs, and the lack of innovation in TV technology by U.S. industry. No action was taken on my letter and the charter was left frozen in its original format. Apparently, I am alone in my concern for the future of the American electronics industry, since I was graciously allowed to present my case at the highest level and no one seconded my presentation.

Three technical subcommittees were formed to establish standards for "improved NTSC," "enhanced 525," and "high-definition TV." Although my contacts with ATSC are now sporadic and probably out of date, I will venture my thoughts about their deliberations and decisions as have appeared in the press.

Improved NTSC—In my opinion, the public is quite happy with the quality of NTSC in their home today. Tomorrow, even with no improvement in NTSC, the digitally programmed TV receiver, as conceived by ITT Germany, with progressive scan, will generate a picture on the popular small screen home receiver as good as the visual acuity of the eye at normal viewing ranges. Progressive scan eliminates most of the harmful color artifacts, retains the present bandwidth, doesn't obsolete the entire broadcast and receiving investment, and achieves a small screen picture indistinguishable from high-definition TV.

Enhanced 525—So far, the major change proposed here is an increase in the aspect ratio, derived from the extra bandwidth saved by eliminating sync periods. The home environment will not take kindly to the high cost for a 5:3 format, with no better picture quality than NTSC. The increased aspect ratio is only useful with large screen projection TV, which is unsuitable for the average home viewing environment.

High-definition TV—On March 19, 1985, ATSC approved a document specifying an international HDTV studio standard using NHK (Japan) 1,125-line technology. So, after two and a half years of deliberations, the only decision to be made by ATSC was to endorse a foreign design! How could this occur in the once self-sufficient United States of America? Why the rush to endorse a foreign design and disregard home brewed research? The answer was that we had to pressure the International Radio Consultative Committee (CCIR) into adopting a world standard for HDTV in 1985 or the opportunity for a single universal standard might be gone forever!

So what? There isn't a single international standard for TV today and we survive. No one has yet offered in evidence a clear balance sheet demonstrating the advantages of abandoning our current TV system in favor of dancing to the tune of international committees better labeled "International Barter Cartels."

But the blame is not really on ATSC; it lies on all of us for not supporting American R&D and for letting the foreign government-supported laboratories steal our thunder and lead the march to new technology. Need I say more?

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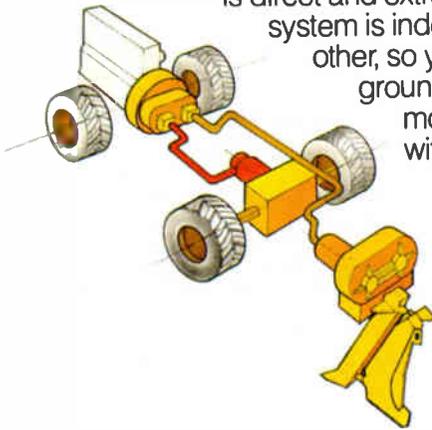
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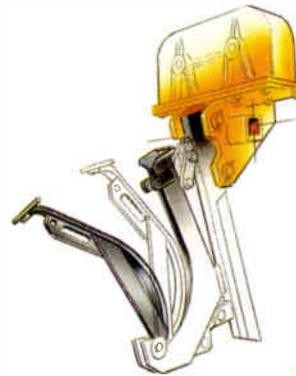
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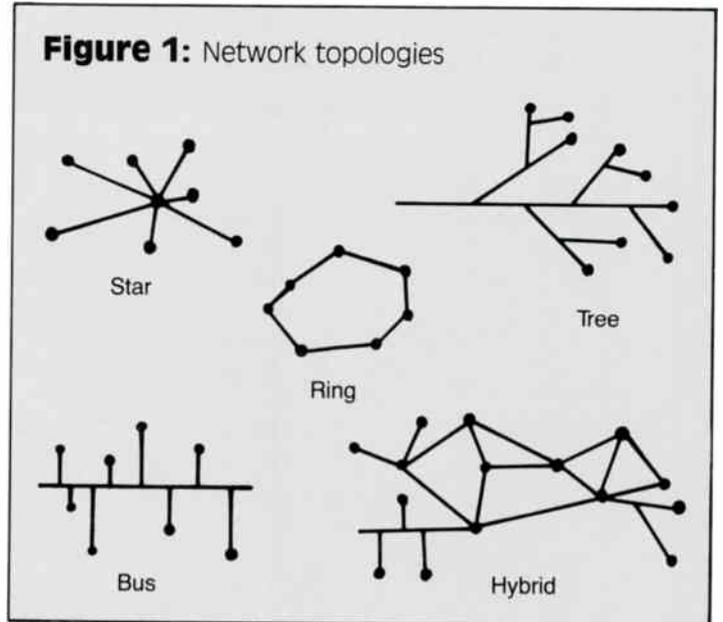


Data communications and CATV

This is the second article in a four-part series on broadband data communications. In the first part (November 1985) we gave a broad overview of data communications. This month, we will have a close look at networking with emphasis on local area networks (LANs). We will examine the similarities and differences between cable networks that are designed and built specifically to be used as broadband LANs and CATV systems that were originally installed to provide video service only. We will discuss concerns unique to each type of network such as size, node density, noise and signal levels. After examining the various approaches to utilizing the broadband spectrum, we will examine typical data applications, which include point-to-point or multi-drop connections using RF modems and switched networks employing intelligent network interface units (NIUs). We will conclude with a discussion of the testing and certification of cable networks.

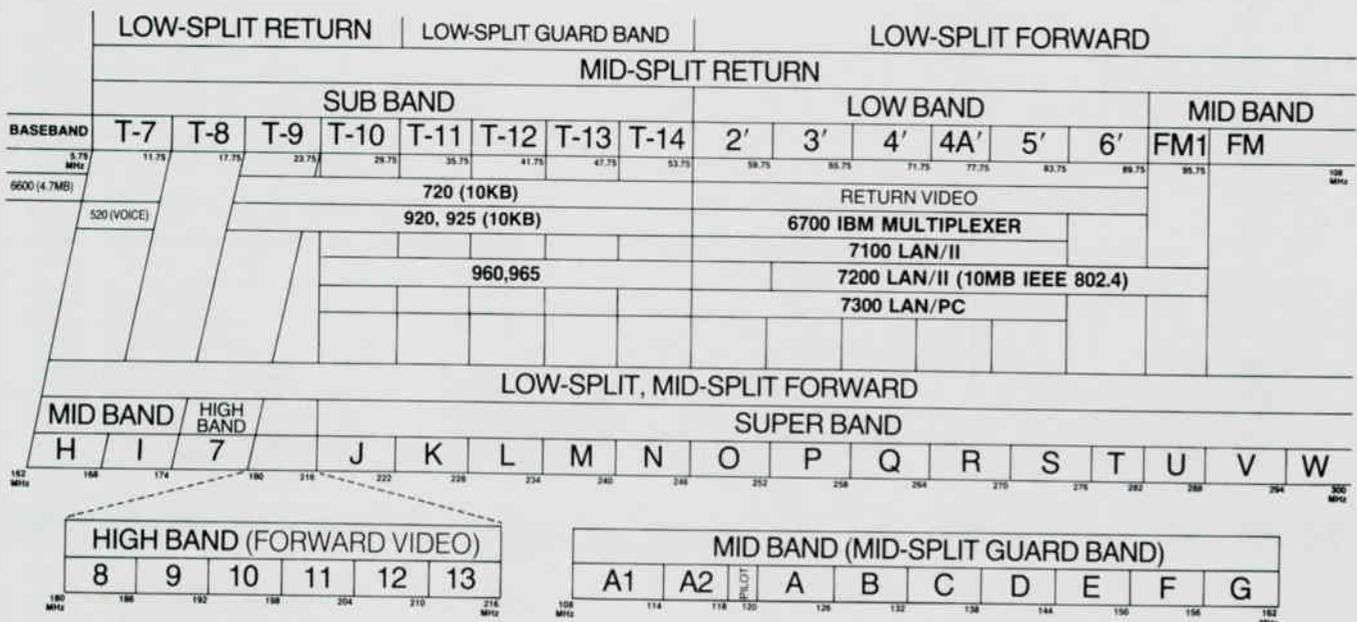
By Richard J. McKeon
 Director of Data Products
And Terry A. Stanard
 Dumbauld & Associates

You can walk into virtually any place of business today and before long you will hear someone talking about his "network." Networks are kind of like toothbrushes, everyone either has one now or plans to have one soon. People talk about their dial-up network, their multi-drop modem network, or the network linking their two host computer systems. Even the guy who has a few terminals hard wired to his mini-computer says he has a network. Everyone has his own idea of what a network is. If a customer wants to buy a few modems or a cable for his network, I don't argue about whether he has a true network or not. I just sell him the modems.



So what is a network? A very general definition of a network is an interconnection of devices for the purpose of communication or control. As it is understood today, a true network involves more than just some devices cabled together. Today's network involves both hardware and software. The hardware consists of the attached devices, nodes and

Figure 2: Broadband allocation chart



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links between nodes. The software provides intelligence for control, reliability and compatibility.

Why networks?

The motivation for networking can vary greatly from organization to organization, and can vary in time as an organization grows. Some of the most common reasons for networking are as follows:

- **Resource sharing**—Expensive peripherals such as high-speed printers and disk storage have the capacity to service many users. A network can allow those resources to be shared, and therefore help to cost justify them. The same holds true for host computer systems. Many organizations have several computers each running different applications. Via the network users can have multi-system access from a single terminal.

- **Information and program sharing**—The same data base can provide information to many users. A typical situation would involve a personal computer (PC) user downloading from the corporate data base, working with that information, and then either producing reports based on that information or restoring the altered data. A network can solve the problem of floppy disks being lost or damaged by mishandling. If security is an issue, diskless work stations can prevent floppies from walking out the door. Also, there are many harsh industrial environments where floppy disks are not practical.

- **Model sharing**—Once a model has been generated, it can be called up and used by anyone on the network who is allowed access to it. Why spend time writing a special program if the guy down the hall did the same thing last week?

- **Information distribution**—The problem of information distribution can rival that of information gathering and processing. Networking can allow you to get the information to those who need it and prevent access to those who shouldn't see it. Many companies have established networks for the sole purpose of messaging or electronic mail.

Table 1: Contrasting local and wide area networks

Feature	LAN	WAN
1) User	Single organization	Many organizations
2) Responsibility for operation	User	Vendor
3) Area covered	A few miles	Country or worldwide
4) Transmission speeds	High	Low
5) Delivery delays	Short	Long
6) Cost	Low	High
7) Complexity	Simple	Complex

- **Decreased operating cost**—A large organization using many leased lines can often realize a cost savings by installing their own network. For example, the city of Scottsdale, Ariz., is connecting many different government buildings using numerous leased telephone lines to remote clusters of data terminals. Working with Don Cook from the city of Scottsdale and Ted Grycell of United Cable, we have replaced 9,600 BPS telephone modems and leased analog circuits with RF

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Figure 3: Full-duplex communication with point-to-point RF modems (non-translated)

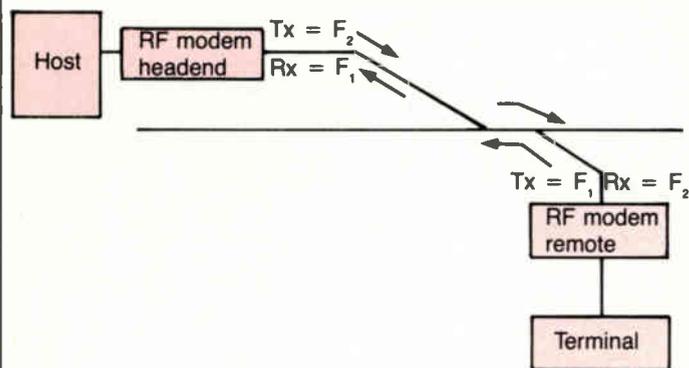
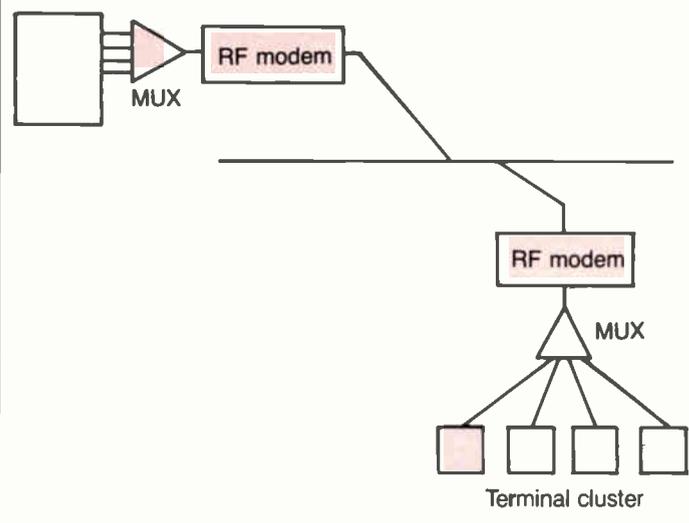


Figure 4: Full-duplex, high-speed link using point-to-point RF modems (non-translated)



modems on their institutional cable network. The broadband modems are much less expensive than the comparable telephone modems and reducing or eliminating leased lines is a great savings. The savings increase as use increases, and when high-speed links are required, the savings can be quite dramatic. We will discuss this and other "real life" examples in the next article of this series where we will be discussing applications.

- **Compatibility**—Equipment from many vendors can often be networked using the built-in versatility of the network operating system. Most intelligent network controllers can be configured for devices using various speeds, character codes and protocols. Installing a network is certainly not a one-step solution for all compatibility problems, and equipment from different vendors can vary widely in price and function. Each situation is unique and the way we apply network equipment to a broadband cable plant has to be tailored to the customer's needs. Next installment, we will give more details on how we have achieved compatibility in various networking situations.

- **Expansion**—Adding new equipment or extending peripherals beyond the usual distance and speed limitations can often be simply accomplished by the network without restringing cable or adding more line drivers. Extending service to another floor or department might be simply a matter of adding a length of coaxial cable with the appropriate taps instead of running many individual cables. Even better, if an office building or factory is prewired with a grid of tap ports, expansion might be accomplished by simply attaching another drop cable to the appropriate tap. Because of the bandwidth available on broadband coaxial cable, expansion of a data network might mean adding completely new services such as security cameras or machine control.

Historical trends

The trend in networking has been from centralized control in the 1960s to decentralized networks in the 1970s, and now in the 1980s the trend is toward distributed processing. Lots of central control with a master/slave relationship between the host processor and its peripherals is giving way to intelligent, autonomous nodes with a client/server relationship. Any node in a distributed network can take the role of client or server, and a busy unit can deny access to other units. Also, today's networks are characterized by greater physical distribution, which means that error checking and retransmission, network routing, and flow control become important parts of network overhead.

Competition is forcing both the public, value-added networks and vendors of private networking equipment to offer more features together with greater reliability and speed. As network technology matures and standards evolve, hardware cost will go down.

Local area networks

A local area network (LAN) typically covers a restricted geographical area such as a single building or campus, has a composite data rate in excess of 1 MBPS, and is usually owned and operated by a single organization. Although there is no clear cut distinction between local area networks and wide area networks (WANs), the features listed in Table 1 help to distinguish the two.

Transmission rates can be high for LANs because they are cable- or fiber-based, and are not restricted to the voice frequency bandwidth of the telephone network. The field of data communications is very dynamic, and we can expect to see more competitive offerings from telephone companies in the form of higher speed switched data transmission. Now is the time to get cable-based data networks in place.

Topology

The topology of a network refers to the way the individual nodes are connected together. Figure 1 shows the various topologies that a network can assume. There are some fundamental differences in approach to networking in terms of access technique and medium, which will determine the topology to be used.

A star topology implies that a central controller such as a data PBX is used to do the switching to provide any point to any point connectivity. A simple arrangement of terminals each with its own line back to a single host computer also would take the form of a star.

A bus topology is much simpler and uses only a small fraction of the amount of cabling required for a star arrangement, but all of the attached devices are tied to the same cable. This means that some type of access techniques must be used to ensure that conversations between devices do not interfere with each other.

The tree arrangement is simply a branching bus. Most broadband cable networks have a tree structure. In this case the backbone or trunk provides signal to all of the areas to be served, and the branches provide distribution. In a high-rise building the trunk would typically run up the elevator shaft or vertical riser, and branches off the trunk would supply connectivity to the various floors.

Depending on the physical arrangement of nodes, the ring topology could have the minimum amount of cabling. This arrangement is ideal for fiber-optic cable because multiple tapping with balanced signal levels at all points is still a problem with this medium.

The hybrid network is usually large and complex enough so that it doesn't fit any of the other models. Public packet networks such as Tymnet and Telenet, which have many intelligent switching nodes and multiple connectivity between nodes, fall into this category.

Access techniques

The access technique of a network is the method used to control how any individual node can use the network medium to gain access to the available resources without interfering with other conversations taking place on the network. Access methods can be classified into the three major categories of dedicated, controlled and random access.

- **Dedicated access** implies that part of the transmission medium is permanently dedicated to each node of the network. Dedicated access techniques include space division multiplexing, frequency division multiplexing and time division multiplexing.

Space division multiplexing provides each node with a separate

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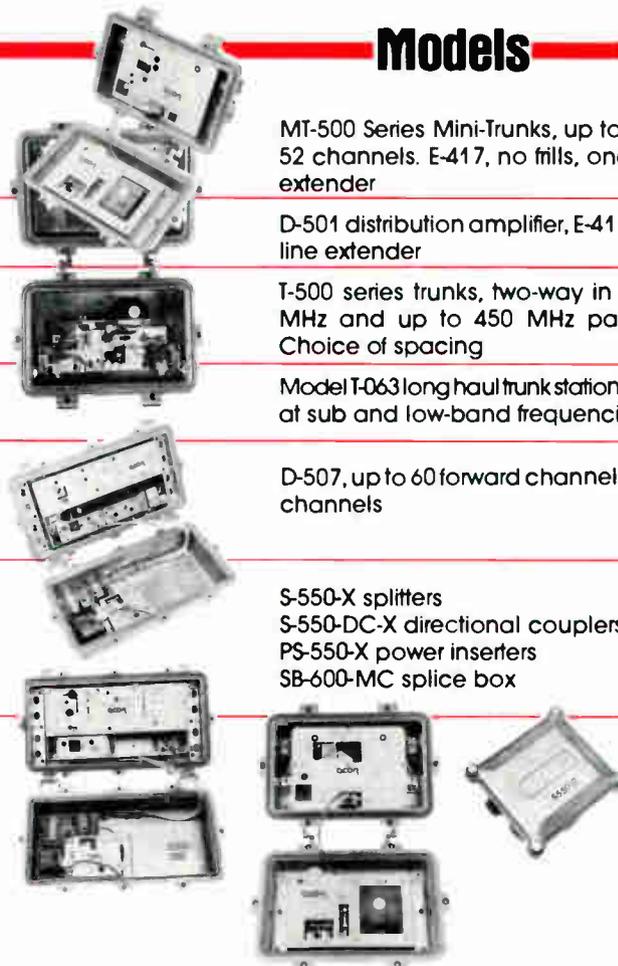
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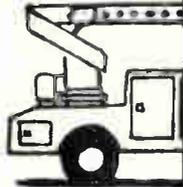
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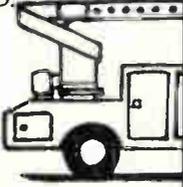
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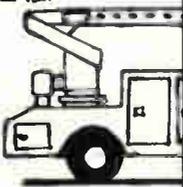
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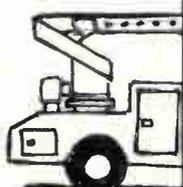
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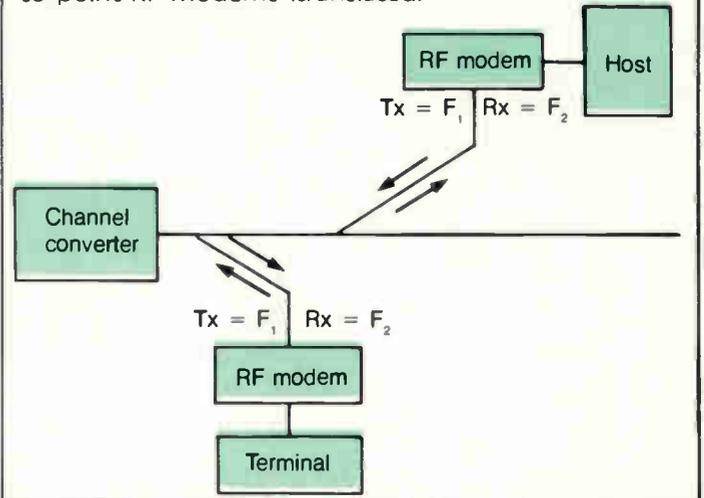


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Figure 5: Half-duplex communication with point-to-point RF modems (translated)



dedicated line to the central network controller using a star topology. Each node gains access to other nodes through the central control unit. This unit can set up connections from one node to the other for the duration of the session as in a private branch exchange (PBX) or can operate on a store and forward basis.

Frequency division multiplexing divides up the transmission medium by segmenting the available bandwidth into a number of frequency channels. Two nodes using the same channel have essentially point-to-point communication, and can disregard what is happening on other channels of the same medium. This method is similar to what happens when two people talk on a CB radio. Traffic on channels other than the one you are using should go unnoticed. Frequency division multiplexing is used on broadband cable because there is lots of bandwidth available. Many pairs of point-to-point RF modems can occupy a single 6 MHz channel. A local area network will typically occupy a single pair of channels, and GM's new manufacturing automation protocol (MAP) still only uses up to two channel pairs. We will discuss these applications in more detail later.

Time division multiplexing provides each node with a time slot during which it has exclusive use of the medium. This method is similar to a group of people agreeing that they will each take one minute to say what they want, and then it will be the next person's turn. As soon as the last person has spoken, it will be the first person's turn again, and the whole process starts over. Of course, each node can transmit very quickly and their turns are much shorter than a minute.

- Controlled access implies that there is a method that guarantees that each node will have its turn to speak in some predetermined order. The technique of controlled access that is emerging as a standard in local area networking today is token passing. This access technique does not need to use a physical ring topology, but it will always be a "logical ring" in that there is a predetermined order in which nodes are allowed to speak. Each node will eventually receive a "token" or message giving it permission to use the medium; when it is done talking, the node possessing the token will pass it on to the next node of the logical ring so it can take its turn. If a node has nothing to say, it simply passes the token on. This technique is like a meeting where there is a predetermined order in which people can speak. When a person is done talking, he passes control of the meeting on to the next person.

- Random access techniques do not use a predetermined order or grant special permission to individual nodes. Instead, each node is free to decide when it wants to transmit. The technique that has become the LAN defacto standard for random access is called carrier sense multiple access with collision detection (CSMA/CD). That's a mouthful to say, but not too hard to understand.

In a network that uses CSMA/CD, each node first listens to the line. If no activity is detected, it is free to go ahead and talk. This is similar to normal conversation among a small group of people. If no one else is talking, and you have something to say, then you are free to talk. As with a group of people, two devices might start to transmit at the same time.

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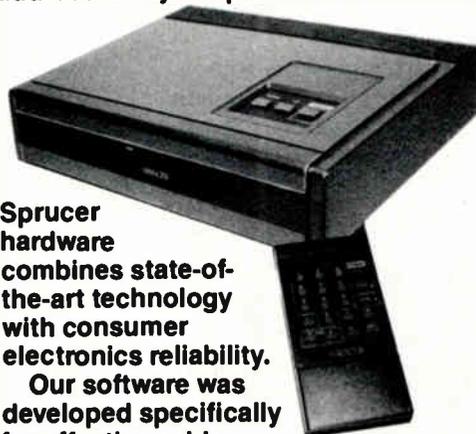
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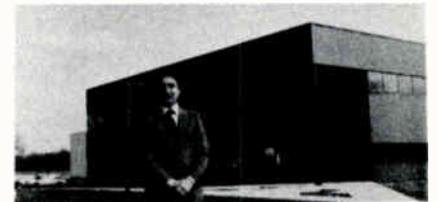
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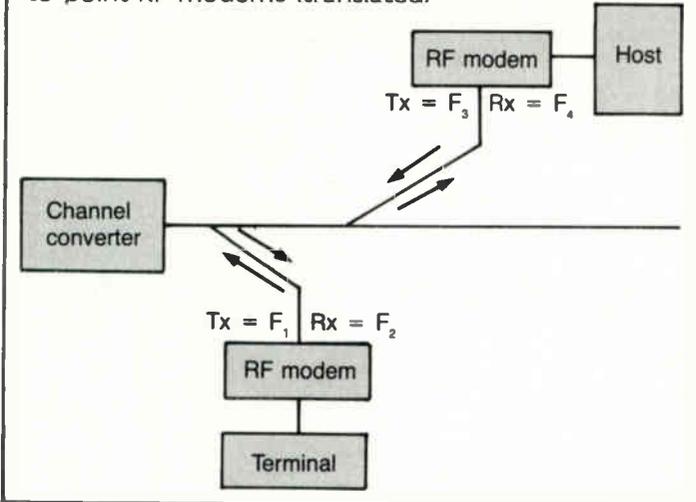
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Figure 6: Full-duplex communication with point-to-point RF modems (translated)



This is called a collision. When a collision is detected both devices stop talking and wait a random length of time before trying to transmit again. This "random back off" prevents the same two devices from repeated collisions. Such a procedure does not always happen in human conversation.

It appears that token passing and CSMA/CD are going to be the dominant access methods for local area networks. An important point that should be made here is that they both work and appear to perform equally in virtually all situations. Therefore, although it is nice to understand what the different access techniques are, which one a given network uses is really not all that important.

Decisions about what LAN to implement for your business should not

be made on the basis of access technique. Factors that you should consider are price and performance features such as throughput, maximum number of nodes allowed, ease of installation, flexibility, maintainability, expandability, compatibility with other LANs and gateways to wide area or value-added networks.

Broadband LANs vs. CATV networks

The medium and frequencies used for transmission of broadband data communications are identical to those used by cable television. Both use the same amplifying and passive devices, and essentially operate at the same RF levels. The coexistence of data and television signals on the same coaxial cable can occur without revision to either technology, but there are a few points that must be considered.

The two types of broadband data communications, point-to-point and local area networks, require different RF spectrum considerations. Communication frequencies for point-to-point may be selected to fit almost anywhere in the spectrum. The only requirement is that, for most applications, the plant must be bidirectional. This means that a sub-split cable television system may incorporate point-to-point data communications by selecting data modems with the appropriate frequencies. Mid-split and high-split systems have the same opportunity.

On the other hand, local area networks typically only operate in mid-split and high-split configurations. Frequencies used by the network interface units (NIUs) are assigned to transmit upstream to the headend, be translated to a different frequency, and then be re-transmitted back into the network. This would not be a problem in sub-split systems if it were not for the fact that manufacturers of broadband LANs have selected both upstream and downstream frequencies that coincide with primary cable television channels and the translation of frequencies requires the use of a mid-split or high-split system. This is graphically displayed in Figure 2. Even worse is the fact that the boundaries of the 6 MHz channel assignments used by LANs overlap the channel assignments used by cable television. If a local area network is used, the two 6 MHz channels occupied actually eliminate three television channels.

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Obviously, the use of local area networks on a sub-split subscriber system is not possible without retuning the NIUs and the headend translator. This is not to say however that LANs do not have a place in cable television. Many of the cable television systems constructed since 1980 have additional cable plant other than that useful among subscribers. Most common are the institutional networks that were designed as mid-split or high-split systems. Rarely is the full capacity of these systems being utilized. This provides a vast potential for cable television operators in the area of data communication, both point-to-point and local area networks.

There is one additional consideration in the use of local area networks in a cable television system. Most LANs using the token passing access method are restricted by the distance that NIUs can be placed from the headend translator. This distance is approximately seven miles. As the token is passed around the network, a specific time is allocated for response. If the response is not made in this time, the system thinks that the token is lost and will reconfigure and generate a new token. After a given number of tries, with no response, most intelligent networks will recognize that a given NIU is not there and will drop it from the token passing sequence. You can see how long response delays could easily bring the entire system down. Distances in excess of seven miles can introduce these types of delays. Of course, timing circuits may be modified to overcome the default timing; however, this will slow down the entire network and must be considered carefully before proceeding.

As with any bidirectional communication, in cable television systems noise buildup is a major consideration. The funnel effect resulting from combining many distribution legs onto the trunk could prove to be a problem even though data signals do not suffer from a given noise level nearly as much as do television signals.

If it is anticipated that noise buildup will pose a problem, there are at least three possible actions that could be taken to reduce the effect.

- If a local area network is to be used, a translator may be used at the headend that not only translates the frequencies but also reconstitutes the signal. Instead of merely heterodyning incoming signals to the new frequency, the incoming signals are demodulated back to baseband and then are remodulated at the new frequency before being broadcast out on the system. While at baseband, error checking with selective retransmission can be performed. The new MAP standard for factory communications specifies a remodulator instead of a simple channel translator.

- RF modems usually have a continuous output onto the cable whether or not there is data information to be sent, causing a continuous source of noise. Modems may be used that only place a signal onto the cable when there is data to be transmitted, thereby reducing the amount of time noise sources are connected to the system. This type of polled or half-duplex communication will be covered later.

- Although much more complicated and therefore more costly, switching the trunk bridges also reduces the noise buildup by essentially disconnecting distribution legs. This solution, however, prevents the use of LANs requiring constant access to the medium and dictates that all data communication be on a polled basis.

The contribution of data communications to the distortion component of the cable television system is certainly of importance. The exact contribution, however, depends on many factors such as bandwidth, RF levels, the duration that carriers are present and the duration of modulation. It is beyond the scope of this article to delve into the mathematics of this distortion, but it is a subject that must be considered before placing a heavy load of data onto a system.

Also not to be forgotten are the FCC rules regarding the use of frequencies in the aeronautical band. Usually data communications may be successfully achieved at RF levels matching those used for the audio portion of a television signal, which generally fall below the level of consideration by the FCC. However, this is not always the case, especially when using LAN technology. As well, be sure that even if the data is carried at audio levels the signal path does not proceed through high-level trunking and/or distribution where even audio levels can be raised to 45 dBmV.

Data on broadband systems

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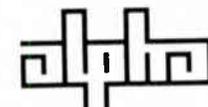
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Figure 7: Polled communication with multi-drop RF modems (non-translated)

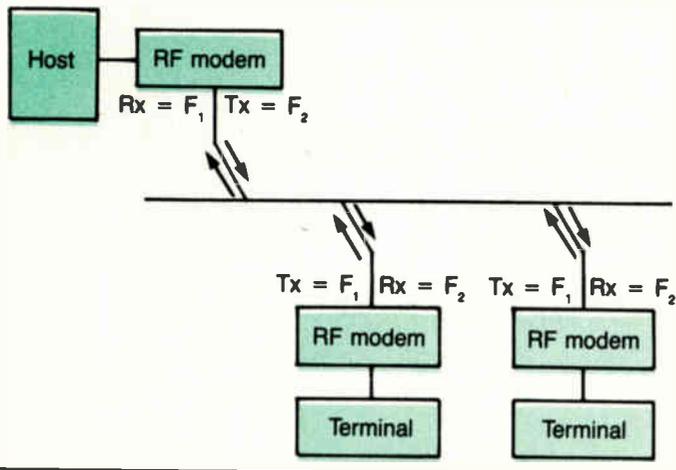
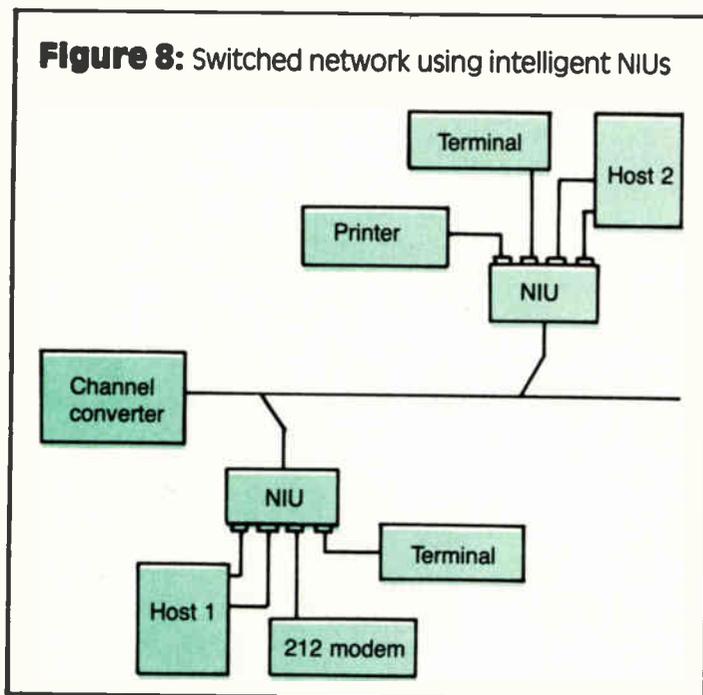


Figure 8: Switched network using intelligent NIUs



tion will fall into one of two broad categories. Either simple RF modems will be used to set up dedicated pathways or intelligent network interface units will be used to set up temporary switched virtual circuits. In the latter case, any point to any point communication and many other valuable features can be achieved.

Figure 3 shows a simple point-to-point full-duplex link between a terminal and host computer port using RF modems. In this case either no channel converter is used in the network or the modems operate in an untranslated part of the spectrum. Because taps and amplifiers are directional with respect to their bandpass characteristics, we always have to keep in mind that remote modems will transmit toward the headend (return path) at a low frequency, and the headend modems will transmit (forward path) on a high frequency. Naturally the modems are paired so that the transmit frequency of one is the receive frequency of the other. This arrangement uses only a single pair of frequencies to achieve full-duplex communication. Typically up to 75 links of this sort running at 9.6 kbps can be established within the spectrum of two 6 MHz CATV channels. Higher speed modems eat up more bandwidth so that at 100 kbps it is possible to establish eight links, and at T1 rates

(1.544 MBPS) only four links can occupy the channel pair.

In the same way that multiplexers and high-speed modems are used on leased telephone circuits to reduce the number of modems and circuits involved, Figure 4 shows how a high-speed RF modem and multiplexer (mux) can be used to provide connectivity between a large cluster of terminals and their respective host ports. A T1 channel can support up to 128 asynchronous data terminals operating at 9.6 kbps.

If the host and terminals are both located down stream from the headend, a pair of identical remote RF modems can be used to provide a half-duplex link as shown in Figure 5. In this case the receive frequency needs to be the transmit frequency plus the offset of the channel converter, which is typically 192.25 MHz (high-split) or 156.25 MHz (mid-split). The communication needs to be half-duplex because both modems are sending on the same frequency and would interfere if they transmitted simultaneously.

Full-duplex communication with both the host and terminal using remote modems requires two frequency pairs as shown in Figure 6. Here the transmit frequency f_1 plus the offset becomes the received frequency f_1 of the other modem, and the transmit frequency f_2 plus the offset becomes the receive frequency f_2 . Therefore, a full-duplex link is achieved but the price is paid by having to use two frequency pairs instead of one. This means that only half the number of modem pairs can occupy a given channel pair.

The multi-drop configuration of Figure 7 is very efficient in terms of bandwidth utilization and number of modems involved, but requires that the host and terminals support the polled multi-drop protocol. This means that all terminals have to be able to recognize the address sent with each poll and respond only when told to.

Figure 8 depicts a switched network using intelligent NIUs. This type of network is called "switched" because the NIUs can establish virtual circuits between any two ports as opposed to a switched CATV network that uses addressable bridger amplifiers to turn on and off branches of the network. This type of network typically occupies an entire channel pair and uses token passing to control traffic on the cable. The NIUs take their turn sending high-speed data packets. They typically transmit on the cable at 2.5 MBPS. With this type of intelligent network many nice features such as speed conversion, error checking and retransmission of data packets, multisystem access, dial-up modem pooling and other forms of resource sharing can be achieved.

Bit error rate testing

There are many tasks involved in the design, testing and tuning of a broadband cable plant, but the bottom line from a data communications point of view is transporting a bit stream from one place on the network to another at the right speed. If you will recall the simple definition of data communication that we gave in Part I, we are simply moving bits of information from one place to another. How it happens really doesn't matter to most network users.

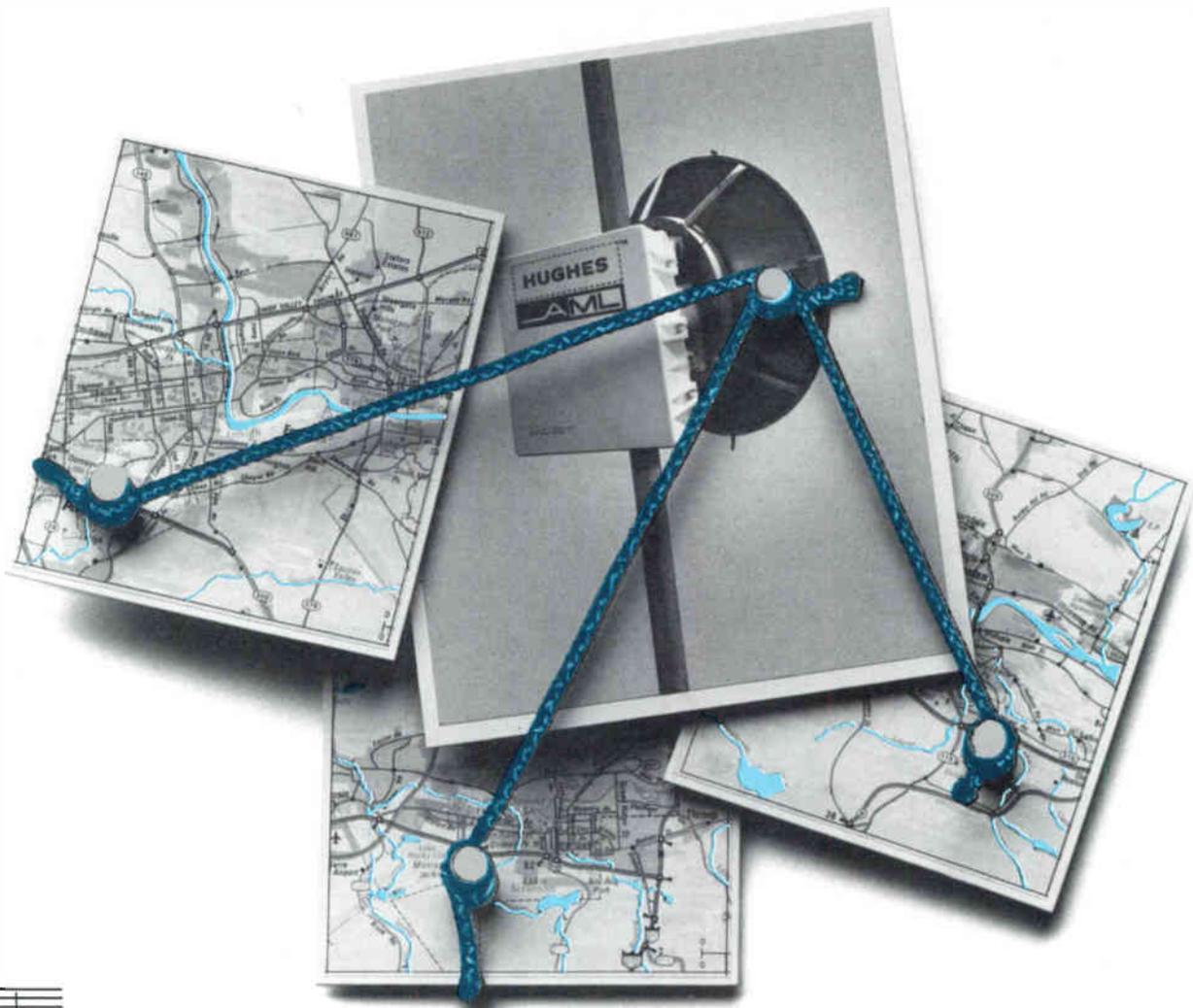
Bit error rate testing (BERT) is the process of pumping a random bit stream into the network and seeing if it arrives where it should unaltered. To isolate problems, various segments of the network might be tested separately or a loop back of the data might be done at certain points, but if an end-to-end test shows no errors we are happy. Most BERTs can generate random patterns of various lengths and have the option of block error rate testing (BLERT).

There are many companies who make very fine digital test equipment. Some of them include: International Data Sciences Inc., (401) 333-6200; Tektronix, (800) 547-1512; Digilog, (215) 628-4530; Telecommunications Techniques Corp., (301) 258-5011; Phoenix Microsystems, (205) 881-2173; Digitech Industries, (203) 438-3731; Atlantic Research Corp., (703) 644-9190; Navtel, (416) 669-9918; and Halcyon, (408) 293-9970.

Summary

This month we have given a broad coverage to LANs, contrasted various types of cable networks, looked at some considerations necessary to network planning and we have talked in general terms about applications. Next month we will look at some current products and trends, and illustrate some of the concepts we have been discussing with a few specific case studies.

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Security goes outside via addressable trap system

By Martin Eggerts
Blonder-Tongue Laboratories Inc.

Addressable traps, taps, converters; wall-mounted, set-top, off-premises. What is behind these contemporary technologies? What are the market forces that spawned and are driving them? To answer these questions, let us take a look at the CATV environment.

The ultimate goal of a CATV operation, like any other business in our free enterprise system, is to generate revenues and realize a profit. To accomplish this, CATV really supplies two essentially distinct services. One is the traditional service now known as "basic," which provides quality reception of regular broadcast TV signals, both local and distant, better and more varied than a viewer could hope to receive with an off-air antenna. The other service provided by CATV is premium programming or pay TV—entertainment that the customer is willing to pay a premium fee for.

A variety of premium formats (such as movies, sports, news, health, etc.) have now evolved and these services are offered in a bewildering combination of channels, tiers and subscription rates to suit everybody's taste and pocketbook. It is, of course, incumbent upon the CATV operator to do everything in his power to see that every customer pays for the particular service he receives and theft of serv-

'Whereas the denial of basic service can be accomplished by broadband devices . . . premium service security requires channelized technology'

ice is kept at a minimum. Theft of "basic" service, while annoying, is a relatively simple question of "yes-no," connect or disconnect, and is dealt with in this fashion. Theft of premium services is a different matter altogether and the solution to this problem has occupied the innovative energy of the CATV industry for better than a decade. Whereas the denial of basic service can be accomplished by broadband devices, such as addressable taps, premium service security requires channelized technology, such as traps, converters and filters.

The evolution of security

Early attempts at tackling signal security

resulted in the "invention" of the mid-band. This soft security was adequate in the beginning but easy availability of converters and increased penetration of cable-ready TVs has rendered it obsolete. Then came traps, both negative and positive. Negative traps remove pay channels (distributed clear) to all non-premium subscribers; the signal cannot be recovered without removing the trap, but they suffer from frequency drift and require a large capital outlay in low pay penetration areas. Positive traps that insert a "jamming" carrier in the premium channels, which is then removed by a trap at the subscriber's location, degrade picture quality and illegal ones are easily obtained. Both trapping systems have limits as to the number of adjacent channels and pay services that can be carried, but still remain the most widely used security method.

Next, RF scrambling of the signal (in the form of various sync suppression schemes) at the headend was employed. This necessitated a set-top converter/descrambler in each customer's home and consequently yet another drain on the operator's revenue was introduced—equipment theft. To combat this, decoders were uniquely programmed using burned-in chips and other devices, but it required a truck roll to change authorization levels, an expensive proposition in a high-churn situation.

This is when addressability was introduced. Each subscriber's decoder has a unique address and his authorization levels can be changed remotely from the office. But a decoder is still in the subscriber's home, subject to tampering, theft and substitution of easily available illegal RF decoders. Changing the scrambling from RF to baseband and using more sophisticated encryption schemes made the technical chore of illegal decoding more difficult, but it added the penalties of cost and complexity to the disadvantages of theft, vandalism and difficulty of access for maintenance, inherent in an in-home device.

The logical next step was to remove the set-top converter/decoder from inside the home and place it outside at the cable plant, "off-premises." But the typical circuitry of a set-top converter had grown so complex by now that this approach could not withstand the battering of an outdoor environment, and attempts at ruggedized redesign have been ambiguous at best. Furthermore, all converter-based security systems are only capable of delivering one channel at a time, a definite hindrance in the marketplace of predominantly multi-TV set households and widespread VCR usage.

Clearly a new approach to the problem is needed. An ideal addressable off-premises pay TV system that meets the needs of the CATV marketplace in a reliable and cost-effective manner should meet the following

Figure 1: The Guardsman off-premise system

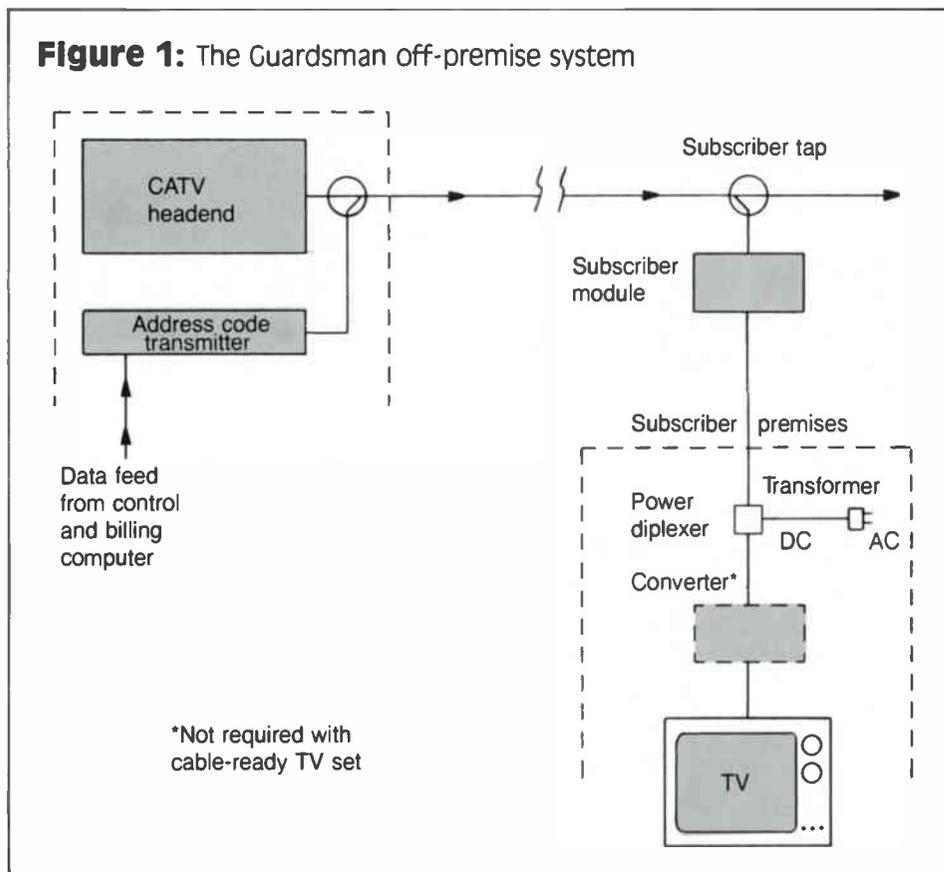
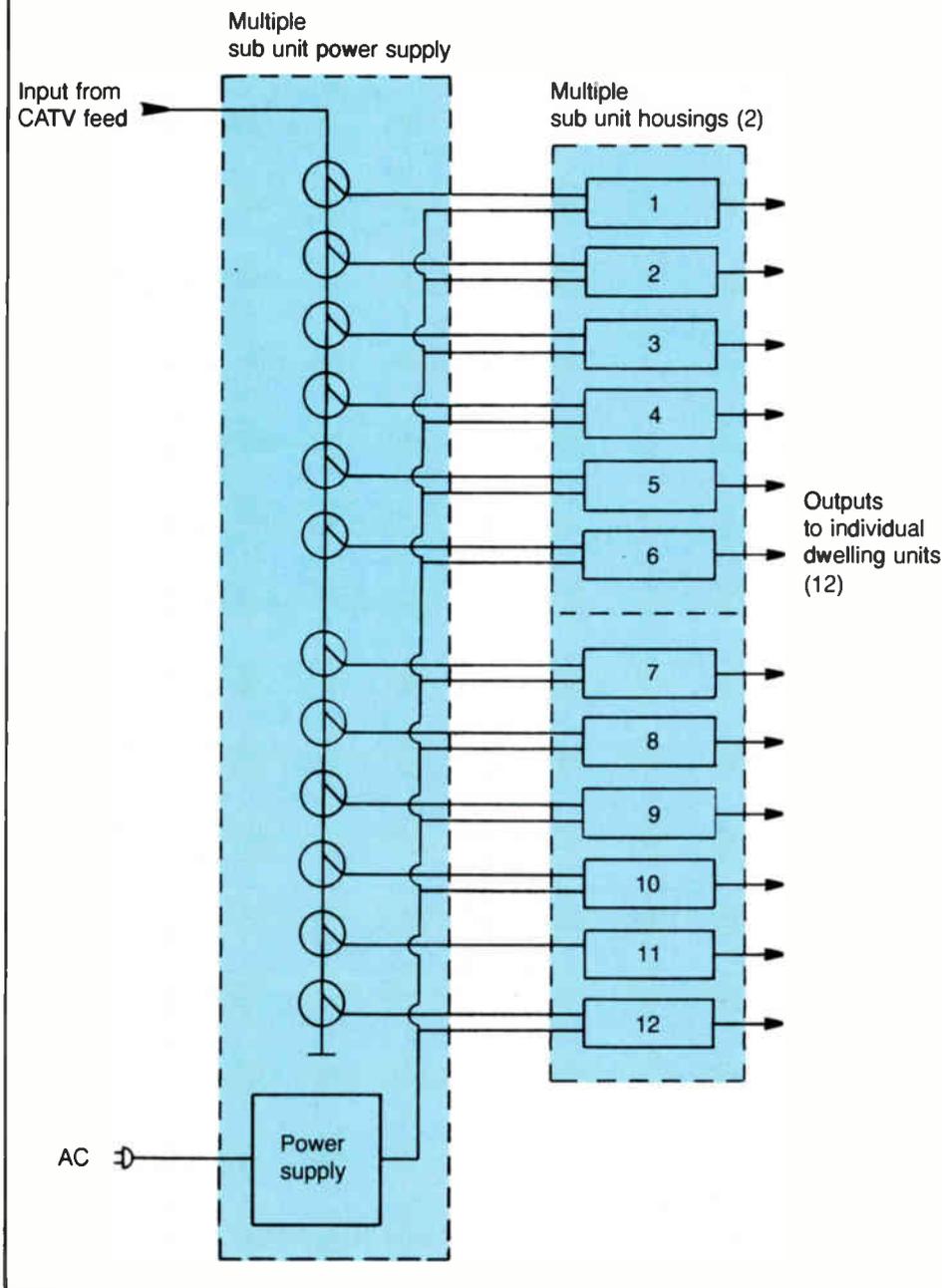


Figure 2: Multiple dwelling unit with 12 sub modules



mountable sheet-metal housing accommodates up to six sub units (each equivalent to an outdoor subscriber module) to serve six subscribers via home-run drops. A companion power supply, also rack-mountable, is available to power either six or 12 sub modules (one or two housing sets of six each) at the same location, thus negating the need for plug-in power supplies in each dwelling unit. In this case there is no equipment at all in the subscriber's premises, a situation well-suited to a more transient customer base.

Since the Guardsman system carries premium service in the mid-band (optional "block" tier in the super-band), all cable-ready TV sets and existing CATV converters will enable reception of authorized channels. Alternately, an inexpensive optional mid- to high-band block converter is available for a 12-

channel system seeking to add pay services. Because the subscriber drops carry all the authorized pay channels (plus basic service), no additional drops are required for multi-set pay households. If power-passing splitters are employed, multi-set households can be split at the building entry for convenience rather than at the primary TV receiver.

Incidentally, because the secure channels do not conflict with aeronautical frequencies, smaller (12-channel) system operators can add up to six premium offerings without incurring the onerous frequency offset, leakage monitoring and cumulative reporting requirements of FCC Docket 21006.

Changes in existing CATV plant layout or tapoff values are not required since the subscriber modules feature essentially unity gain and can operate reliably over a wide input

level range. Addressing data to the modules is transmitted just below Channel 2, well within the normal passband of virtually all cable TV systems. Requirements at the CATV headend are minimal. Besides the essential equipment needed to originate the premium programming itself (such as satellite receivers and modulators), the only item to be interfaced is the address code transmitter, a 1¾-inch high rack-mounted unit (which can be located apart from the headend). The address code transmitter sends addressing data in-band at CATV compatible levels, so two-way capability or other transmission modifications are not required. As an additional feature, the unit has the provision (secured by key-lock) for execution of a "global" command (systemwide authorization) for each pay channel to be used in emergency situations.

An address and billing computer handles all channel authorization changes, customer data and status entries, as well as all billing functions. This computer can be located at the CATV system business office or several systems can be connected to a central computer via telephone modems. The proprietary software incorporated is "user-friendly" and requires no extensive operator training. Configuration has been kept simple and flexible so that special requirements such as interfacing with existing billing computers can be easily accommodated.

Unique among addressable systems, both set-top and off-premises, the Guardsman also can be installed as a non-addressable, but programmable system, with the capability of being field-upgraded to a fully addressable one at a later date. In this mode, pay service authorizations are made by changing plug-in jumpers in the subscriber module. Operation is similar to a trap system, but provides up to six adjacent premium channels with suitable signal security. The non-addressable provision enables the addition of pay services gradually and economically and also allows a particular problem area (such as an SMATV system) to be provided with better security than the rest of the CATV system, when immediate changeover to full addressability is not contemplated. Conversion to a Guardsman system is accomplished without interruption of existing service. The non-addressable modules can easily be upgraded by field-replacing the programming jumpers with an addressable printed circuit board.

As stated at the outset, economic realities dictate that any CATV plant must attain and maintain an acceptable level of profit. A major factor in achieving this goal is equipment reliability, the bottom line of any CATV pay TV security system. This is especially true in an off-premises system subject to the vagaries of weather and changing seasons. In order to confirm the reliability of the outdoor subscriber modules, numerous operating units have been installed and ongoing field tests are being performed in a number of diverse locations, among them Florida, Minnesota, Alaska, New Jersey and Southern California. Reports indicate that the Guardsman system reliability has been outstanding.

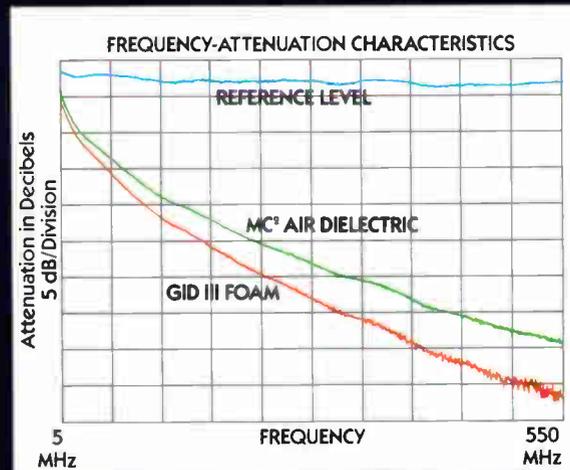
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The improved tap: A shopping primer

By Tom Saylor

Manager, RF/Video Engineering
Comcast Cablevision of Maryland

Proper etiquette suggests that mundane topics like CATV passives should not be broached in mixed company. There are, after all, more stimulating subjects to discuss—the world egg market, for instance.

Those who hold this attitude have not recently perused tap manufacturers' present-day offerings. Today's generation of taps embody the mechanical and electrical characteristics they deserve, with lifespan and bandwidth both increased. Most of the improvements were long overdue, particularly in the mechanical arena. Troublesome traits have been eliminated in these advanced hybrid passives. If you dare, think back to the heyday of the pressure tap to gauge progress in this area!

The selection of a vendor from the dozen or so contenders depends largely on personal preference coupled with price, availability and features. While this article is not intended to be a summary of "what's available from whom," it

will detail key features to be considered, both mechanical and electrical.

Modest but not lowly

So what can be said about the mechanics of the lowly tap that hasn't already been said? Plenty! First of all, let's dispel the notion that the tap is "lowly." This modest device is a critical link in the chain to the subscriber and is often the source of much consternation to the system techs—hardly a matter of lowly stature. Let's look at some significant mechanical highlights.

Exterior finish is high on the list. Bare aluminum alloys oxidize rapidly, especially when exposed to salt or pollution-laden air. Manufacturers are applying various protective coatings to their products, notably baked epoxy and enamel paints. Often several mils thick, these coatings extend product lifespan considerably. Check to see what type of finish is applied and what environmental exposure testing has been done by the vendor.

A common mechanical failure has been the breaking off of tap ports from the plate by

'Today's generation of taps embody the mechanical and electrical characteristics they deserve, with lifespan and bandwidth both increased'

attempting to remove seized connectors. This might have been prevented by the liberal use of silicone grease. Even with that precautionary measure, the thing was probably initially prone to breakage. As a result, reinforced tap port shoulders are becoming the norm; look for this key attribute. Additionally, some plates have potentially handy features like cast-in port numbers and values.

Resistance to water invasion also has finally been given the attention it demands. Most system techs have trouble recalling how many showers they've been treated to upon removing a suspect tap plate. Self-sealing membranes are now included over tap ports as well as improved weather gasketing between housing and plate.

Of course, some physical features affect electrical performance. Integral RF gasketing is highly regarded in the leakage-sensitive climate of today. A useful advancement is the inclusion of stops that prevent entry fitting stingers from directly touching each other. Look for improvements in the troublesome internal plate-to-housing RF/AC connectors. At least one vendor designed this connector to accept a push-on F, allowing direct line level readings or signal bypass (using a jumper) when exchanging plates. The same vendor keeps AC off the plate entirely by locating the filter network in the housing. This also would keep downstream electronics powered during plate changeouts; potentially moot unless the RF also can be jumped through. Stinger-seizing mechanisms have evolved as well. Some assemblies pivot, positioning the seizing screw for aerial or pedestal use. Others make fast from the bottom, accepting fittings from either angle without adjustment.

Higher quality now prevalent

Electrically speaking, little practical difference exists between competitors' specifications. Key values of return loss, insertion loss, isolation, and current-passing ampacity are usually consistent within a narrow range, as well as highly stable. Extended bandwidths have cleaned up the physical layout of plate components, and higher quality is prevalent among components, substrate and workmanship alike. However, samples of each unit under consideration should be bench tested to guarantee compliance to published specs. This can be done using commonly available equipment and is a great way to involve system techs in the evaluation process. ■

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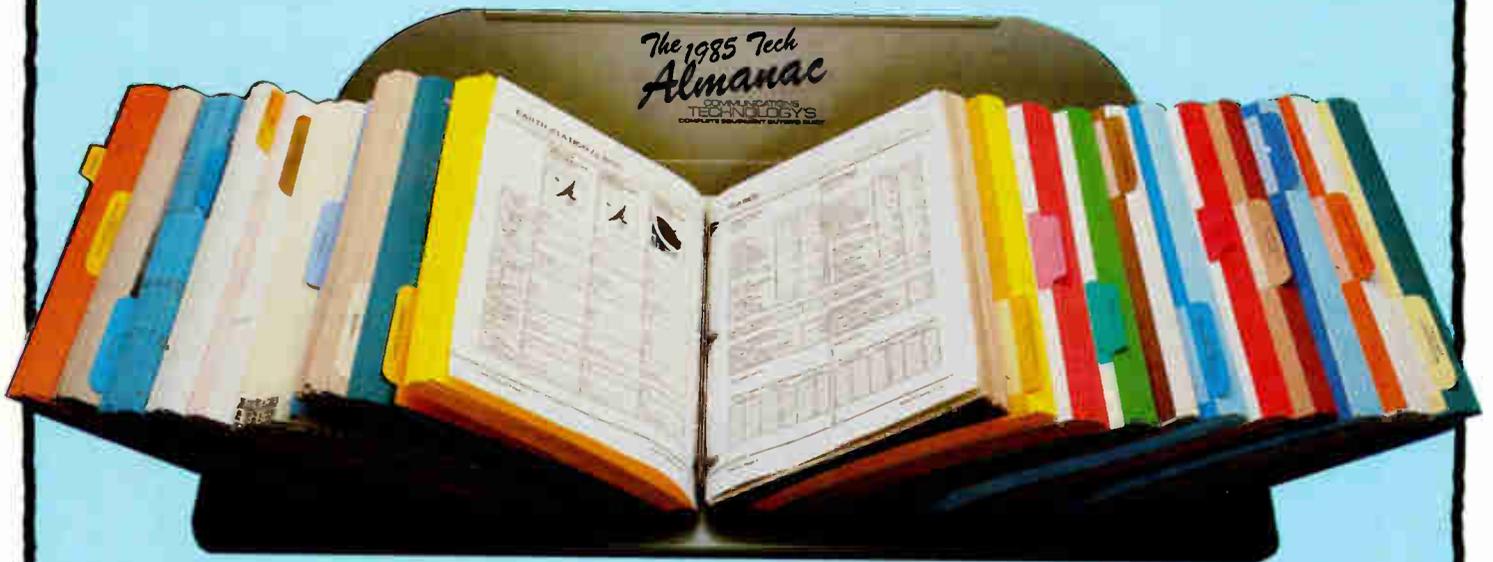
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Reader Service Number 26.

What about 550 MHz?

By Robert W. Santora

CATV Industry Consultant

What about it? Will the impact of 550 MHz technology be severe, minimal or average? I would suggest that the impact will be average to minimal because the severe technical and financial impact already occurred when we went from a comfortable 300 MHz to the initially apprehensive 400 MHz technology. We were comfortable because second order beat in 300 MHz was our major concern and we were able to subdue the interference with rather swift expertise.

When the demand by the cable operators for more than 35 channels in a single cable came upon us as a result of the one-upmanship during the industry's franchise binge, the R&D departments of suppliers went into an overtime status to meet the challenge. Those of us who committed to building a 400 MHz system in late 1979 and early 1980 recall the worry and anticipation we experienced as the system was being built as to whether 400 MHz would work. The new technology received bad press from many consulting sources in the industry as well as from some system operators. Those who were building 400 MHz systems swallowed hard.

Everyone talked about that evil composite triple beat and that if you cannot measure "enhancement" then it cannot be useful. All of this is to say that early on we built up an intrinsic fear of 400 MHz, a rather substantial change in industry technology.

The reason, looking back, for the extensive opposition to 400 MHz was something on the order of the cart before the horse. We wanted more channels, we committed to more channels and then all of a sudden we were faced with a technology that gave us more channels; one we did not know too much about but still had to run with.

It's interesting to note how deep the opposition to 400 MHz was back then. My company, like many other cable companies, was involved at the time in a franchise bid for a rather substantial size property. We lost the award

because we had proposed 400 MHz against a 300 MHz bid. The hired CATV advisory committee to the county council recommended against 400 MHz because of the ravenous composite triple beat fear and because it was thought that you could probably cascade only about 15 amplifiers with 400 MHz.

As the early '80s passed, the very talented R&D departments of our industry's manufacturers displayed their excellence by producing equipment that in fact passed 400 MHz and with the system specifications generally required by the operators. In a short time, 400 MHz was the buzz word and soon thereafter became the new industry standard. In addition to being that new technology, 400 MHz was a catalyst for more progressive industry thinking to combat the fulfillment of those everlasting system operator demands of "more for less."

As the 400 MHz seige settled in, manufacturers were soon able to supply a 400 MHz amplifier at about the same cost of a 300 MHz one, and as a result, 400 MHz amplifiers were offered for 300 to 400 MHz systems or for whatever spacing was desired. It didn't stop there, however, for rumbles of 440 MHz and 450 MHz equipment were soon to be heard.

To meet the industry's appetite for more channels, the manufacturers found themselves in a continuous catch-up mode. They simply could not continue this designing or redesigning, retooling, etc., for the now frequent demands for relatively minimal increases in channel capacity to meet a one-upmanship requirement of a system operator with a new franchise application. As a result, that progressive thinking came into play and a couple of years ago most manufacturers decided to try to get ahead of the demands by designing and producing passives that would pass 550 MHz to 600 MHz and more.

The early development of the 600 MHz passive became a very important stepping stone into the present and future 550 MHz era. Now, 550 to 600 MHz passives are being delivered by suppliers on a daily basis. Even if you order a 400 MHz passive you will more than likely

'The reason, looking back, for the extensive opposition to 400 MHz was something on the order of the cart before the horse'

receive a 500 to 600 MHz piece.

Unlike our initial experiences with 400 MHz equipment, 550 to 600 MHz systems will be easier to handle for a number of reasons. A substantial portion of our industry's technical force has been able to work with 400 MHz and higher during the past three or four years and now feel more confident about the higher frequencies. Manufacturers, in addition to presently furnishing 550 MHz passives, are also manufacturing 550 MHz amplifiers. With all of this under their belt, the manufacturers can now concentrate more on the electronics compatibility to satisfy a particular system criteria.

In the early 400 MHz days, coaxial cable would cost a premium to purchase. Now, manufacturers sweep their cable to 550 MHz and offer it as a standard everyday product. As well, connectors with 550 MHz will soon be readily available. In just about every aspect of the equipment and material side of cable, the industry has prepared itself for the 550 to 1,000 MHz era. (Just kidding about the 1,000.) We have experienced and learned from the problems associated with 400 MHz and single sync suppression scrambling. Systems employing 550 MHz will usher in the more frequent use of tri-modal and/or baseband scrambling.

On the operations side, there too we have learned from working with the "more" of 400 MHz that more pays and more channels are not necessarily better. We also learned that the more we provide on a system, the more someone is out there trying to beat you out of it by pirate boxes and the like.

Overall, the operations side of cable is no longer ready to just promote "more," but rather to promote and offer "more" only if it is better. And along with the "more," operators are striving to provide better service regardless of whether they are a 6 MHz or a 550 MHz system. The 550+ MHz bandwidth will certainly be used up someday by the operator, but with more wisdom.

It is indeed a credit to everyone in our industry that today we can talk about 550 MHz, pay-per-view and interactive services without blinking an eye when not too long ago we all focused on whether a push-pull amplifier would solve our technical problems in going from 12 to 21 channels. Yes, the stage is set for 550+ MHz, but...wait, maybe instead of promoting a new technology, we should promote a different or new industry slogan such as "basic is better" (a basic subscriber, after all, is better than no subscribers). ■

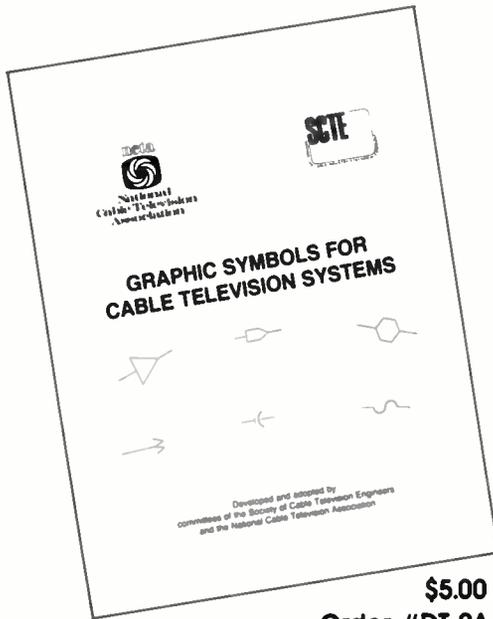
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Early detection of return loss defects

By Noble Pepper

Process Engineer, Trilogy Communications Inc

A coaxial cable intended for use in a CATV system must exhibit exceptional transmission characteristics that are not required in short distance applications. The cable must maintain these characteristics for long periods of time during exposure to any condition nature can bring about. In less demanding applications the cable must only transmit a low frequency, limited bandwidth signal while preventing gross signal egress or ingress. This transmission will usually span a distance of no more than a few hundred feet. In CATV applications, on the other hand, the cable must carry, over a distance of thousands of feet, signals covering a band from a few hertz to several hundred megahertz. In this transmission, losses and distortions must be kept to an absolute minimum and egress and ingress must be virtually nonexistent.

This article will focus on one type of signal distortion, that being the product of a time delayed replica of the desired signal. This type of distortion can be produced by reflections in the cable.

Return loss calculations and causes

Ensuring a low reflection coefficient over a

wide range of frequencies in cables of the lengths required can be very difficult. The reflection coefficient is known in CATV terminology as return loss. Before considering the effects and causes of return loss we will need some definitions. First is the impedance (Z). The impedance of a coaxial cable is given by the equation:

$$Z = \sqrt{\mu/e} \times 1/(2 \times \pi) \times \ln (R/r)$$

where:

e is the permittivity of the dielectric material
u is the permeability of the dielectric material
r is the radius of the inner conductor
R is the inner radius of the outer conductor
ln is the natural logarithm

A change in impedance causes a reflection to occur. The ratio (ρ) between the incident and the reflected signals can be found with the equation:

$$\rho = (Z_1 - Z_2) / (Z_1 + Z_2)$$

where:

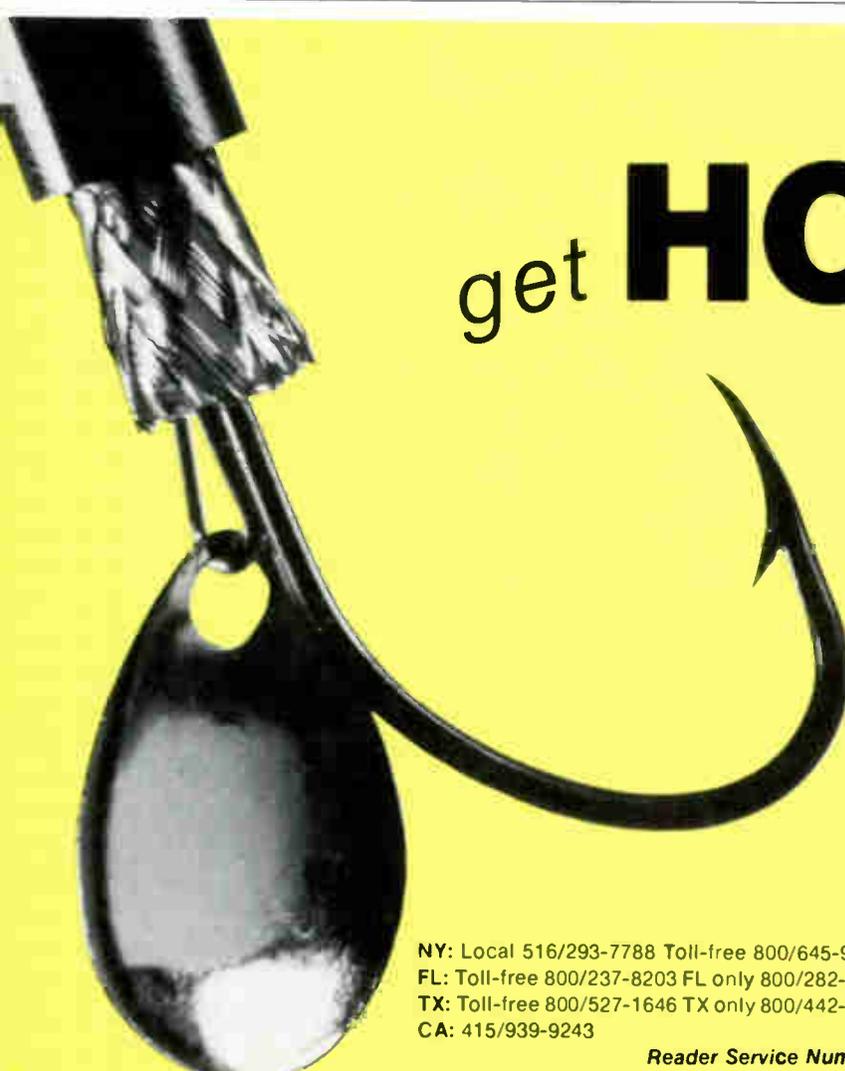
Z₁ is the impedance on one side of the change
Z₂ is the impedance on the opposite side

Often this parameter is expressed in decibels and is then called return loss:

$$RL = 20 \times \log \rho$$

Now with these preliminaries established, we can look at the causes and measurable effects of return loss. The customary measurements performed in the CATV environment separate impedance irregularities (return loss) into two categories: those seen at one location on the cable, and those seen at one signal frequency. To find a reflection that occurs at only one location, we transmit a pulse into the cable and then we look for any signal that resembles our input pulse. By measuring the time between our transmission and the subsequent reception, we can estimate the distance to the reflection. If we also measure the amplitudes of the input and received signal we can estimate the severity of the irregularity that reflected the signal.

When a reflection at an isolated frequency is of interest, we transmit a sine wave at that frequency and measure the reflected signal of the same frequency. By using a swept oscillator and a bridge network we can perform this measurement over a wide range of frequencies with reasonable speed. By comparing the



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REGENCY Cable Products

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signal reflected by the cable and the signal reflected by either an open circuit or a short circuit, we can determine the severity of the phenomenon that caused the reflection.

Simply measuring these characteristics is of little value if we aspire to produce a high-quality cable. We also must find the cause of the reflection and prevent further occurrences. The cause of a reflection at one location is readily determined if the location is known. By removing the faulty section and measuring its dimensions and dielectric properties, we discover the cause. But once again we have only found the defect after its production; our objective as cable manufacturers is to find the problem beforehand.

Troubleshooting from the start

The dimensions of the inner and outer conductors can be measured with great accuracy with readily available instrumentation. Gauges are available that can determine the electrical properties of the dielectric with similar accuracy. The quantity of information gathered by performing these measurements every few inches along a cable length of several thousand feet is quite large and defies analysis by conventional means, but with the assistance of a computer we can obtain more easily interpreted results. Combining these measurements with the first two of the formulas presented earlier will produce a prediction of the reflection coefficient along the length of a cable to be assembled at a later time. We can now calculate the return loss, which will be seen at the input of a cable made with these materials. If it meets our requirements we will proceed with the manufacturing process. If not we will have minimized waste at a later time.

This information is of great value in predicting the response to a pulse input, but is not easily applied to a band of signal frequencies. A technique often used in microwave engineering is that of matching through a tapered transmission line. The computations performed calculate the frequency response of a transmission line with an impedance that may

change at any point along the line. This technique is certainly applicable, but it does involve an integral of a complex function that includes the derivative of the Napierian (or natural) logarithm of the impedance.

It is now that the concept of the Fourier transformation comes in handy. We can apply it to the time domain information and convert it to the frequency domain. It is known that the frequency response of any system is equal to the Fourier transform of the time response to a unit impulse (a pulse of infinite height and zero width such that the height multiplied by the width is equal to one). The production of a unit impulse signal is not necessary as long as we only desire to use it for computation. Now we need only compute the response of the cable to a unit impulse and perform the Fourier transformation.

We have now outlined a method for the calculation of return loss characteristics from measurements performed on the materials that will be used to fabricate a length of cable. The actual measurement and computation will be of limited accuracy, and we must now specify the accuracy we will have to obtain in order to guarantee that our results are valid.

Specialized equipment is available to perform a Fourier transform at extremely high speeds. We shall make use of one and allow the computer to perform more mundane tasks such as logging material control numbers and printing identification tickets. The use of an FFT (fast Fourier transform) analyzer to perform our time to frequency transformation will set the interval at which we will have to repeat our measurement. The Nyquist criterion dictates that to identify a signal of a given frequency we must sample the signal at twice that frequency. Due to a finite roll off in anti-aliasing filters, the sampling rate in most FFT analyzers must be 2.56 times the highest frequency of interest. The current upper rated frequency of 550 MHz yields a sampling interval of approximately three inches.

Previous work indicates that material measurements must be made with resolution on

the order of millionths of inches. Standard non-contact gauging equipment in use in aluminum rolling mills can meet the resolution requirements but cannot respond to variations quickly enough to allow sampling at the required rate. The equipment to measure the plastics must find variations on the order of one millionth of a picofarad per meter in the capacitance of the dielectric. Once again standard gauging equipment meets the resolution requirements but fails in response speed. In each of these cases compromises must be made. For aluminum gauging, specialized equipment utilizing a floating differential measuring device in actual contact with the material is necessary. The machinery used to produce a dielectric consisting of plastic spacers and an outer plastic sleeve contains only components that rotate at a speed that is in the lower end of the frequency range. Special gauges, with less than ideal stability characteristics, can satisfactorily measure the variations most likely to be produced by this equipment. The stability deficiencies are not critical in this application where short-term variations are the important factor.

Maintaining reliability

The scheduling required to ensure the combination of certain lots of materials into the same length of cable would prevent timely delivery to the customers; therefore, the characteristics of each material are evaluated assuming the other components of the cable to be perfect. This also allows the materials to be inspected promptly after their receipt and before processing, thus allowing individual suppliers to be held responsible for the quality of their product.

Certainly, a quality control program of this nature demands high-quality instrumentation and a dedication to its use by the cable manufacturer. Material vendors must be chosen with care to ensure they supply material of the quality required. As well, the processes of the cable manufacturer himself must be carefully monitored and maintained. ■

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Similar to last year's show, traffic was light and featured quality, not quantity. Attendance was a bit less, about 7,600 attendees, and the number of exhibitors were down—192 this year compared to 217 exhibitors last year. But as Tom Polis, vice president of RT/Katek Construction Group stated, "The traffic seemed to be slow but they were buyers, not tire kickers."

Perhaps the most notable events at this year's show revolved around pay-per-view programming and agreements with MSOs for implementing that technology. World Video Library and United Cable in Denver have reached an agreement to identify a site to launch WVL's Home Video Club service and "The Impulser" during the first quarter of 1986.

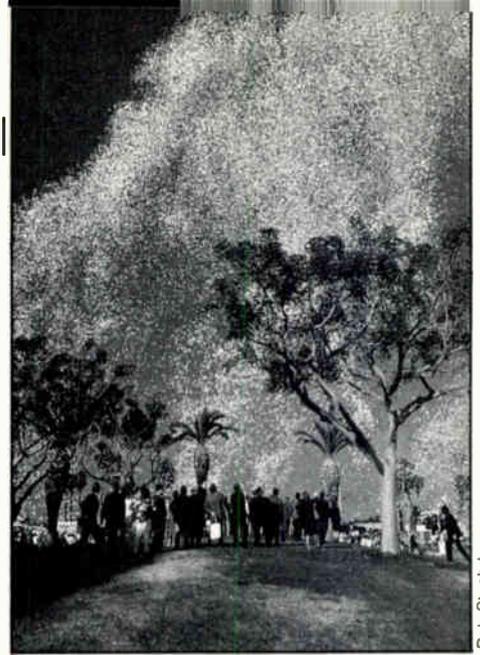
Results of a three-month impulse pay-per-view field test, completed recently in Group

W's Roseville, Minn., cable system, shows success in generating PPV purchases. The Group W system ran the pay-per-view trial using Jerrold Starcom 450 two-way addressable converters with Starvue impulse pay-per-view transmitters.

Centel Cable Television is planning to use Zenith Electronics Corp.'s impulse pay-per-view system for one-way addressable cable TV systems. Centel plans to install "Phonevision" in its Traverse City, Mich., system in 1986. In October 1985, Viacom Cable and Pacific Bell installed Phonevision in Viacom's systems in Dublin and San Ramon, Calif.

Also in abundance were video switchers designed to entice the consumer into easily utilizing his cable, VCR and TV. If anything was new in these emerging technologies, it was the intent to solve hookups of infrared hand-held units for these devices. And, most importantly, the multiple system owners were paying attention.

On a more technical front, those visiting Oak's booth witnessed the first public demon-



Rob Stuehrk

stration of a decoder and television set working through the proposed EIA interface using a Sony TV set modified to EIA specifications. Fiber-optic advances were not to be left out. Pirelli's booth featured a "working" 12½-mile fiber-optic system.

This year's Western Show also featured a myriad of advances in converters, off-premise devices and bandwidth equipment. The following round-up of products will provide an insight to what was highlighted by the various companies if you couldn't attend the show.

● **Alpha Technologies** announced its new UP series of uninterruptible CATV standby power supplies. These standby power supplies provide continuous uninterruptible power, which will allow cable networks to carry high-speed data transmissions. The uninterruptible power feature of the UP series is made possible by a circuit design that eliminates the break in power to a cable network. First deliveries of the UP series are expected this month.

For more information, contact Alpha Technologies, 1305 Fraser St. Suite D-5, Bellingham, Wash. 98226, (206) 647-2360.

● The **AM Cable Industries Inc. Network Technologies Division** introduced a new set of products designed for the rapidly growing broadband local area network market. The product family, called the TMC-8000 (technical monitor and control) series, consists of a set of easily attached devices that monitor the technical "health" of a broadband cable network. They also aid in the identification, location and correction of cable system maladies.

Features of the TMC-8000 system include the ability to measure any point on the cable at any frequency, and to programmably avoid bands used for active services—measuring up to, above, and if necessary, between active channels. In addition to a variety of standard monitoring functions, the TMC system also allows point-multiplexed control of on-off functions remotely through a built-in eight-in/eight-out interface accessory.

Network Technologies also introduced the

TP-450/2, a 20 dB coupler designed to provide test access to broadband networks. Designed for the GM-sponsored MAP (manufacturing automation protocol) program, the TP-450/2 is suited for the factory automation network market, and is applicable to other broadband networks as well.

The unit gives accurate readings of signal levels in both the upstream and downstream directions on a bi-directional broadband network. When utilized in distribution lines, the tap provides a means of isolating problems and allows sweep insertion/extraction on network segments.

The TP-450/2 features an accuracy of ±0.25 dB, compact packaging, and a housing of die-cast iridite-protected aluminum with stainless steel hardware. It also features neoprene tap dielectric inserts to provide additional protection in industrial environments. Housing entry and exit connections are standard broadband 5/8 x 24 TPI with shrink boot provisions.

For more information, contact AM Cable Industries Inc., Network Technologies Division, P.O. Box 505, 1 AM Dr., Quakertown, Pa. 18951, (215) 256-1354.

● The **Arvis Division of Adams-Russell Co. Inc.** introduced a pay-per-view system, the Arvis 8000 series. With the system, scheduling, playing and logging of movies can be done with a minimal amount of intervention. A typical system has between four and eight ¾-inch tape decks. With an eight deck sys-

tem, assuming two decks per movie, the system is capable of running three different movies, with two decks dedicated to promotional spots, fillers or longer movies.

Commercials can be aired by combining this system with any Arvis 7000 commercial insertion equipment. To air commercials, cue tones are placed on the unused audio track of each movie tape at desired intervals. When these tones are read, the Arvis system is triggered to play commercials in random access of any length and the movie is interrupted. At the end of the specific commercial break, the movie is pre-rolled and switched back on.

For further information, contact Adams-Russell, 1370 Main St., Waltham, Mass. 02154, (617) 894-8540.

● **Blonder-Tongue** introduced its new SAVP SAW filtered aural/visual processor at the show. The SAVP is a heterodyne processor used to put off-air broadcast VHF and UHF channels onto CATV, SMATV, and MATV systems. Standard SAVP output channels are VHF (2-13), mid-band (A-I), and super-band (J-W). A notch trap is used for adjustment of the aural carrier level permitting the transmission of BTSC (MTS) standard composite stereo signals. Dual SAW filters are used to provide a high degree (typically 70 dB) of adjacent channel rejection. The SAVP has external IF loop-thru, which permits the insertion of scrambling equipment for highly secure premium programming applications. Field replaceable heterodyne converter boards make

it possible for qualified service personnel to change input and/or output channels of the SAVP quickly and simply, according to the firm.

Among other products Blonder-Tongue displayed were the Guardsman multiple dwelling unit and Guardsman off-premise cable pay TV system. The multiple dwelling unit is an indoor configuration of the Guardsman off-premise addressable system. The device provides an economical and secure means of scrambling premium (pay) channels in any CATV or SMATV system.

For more information, contact Blonder-

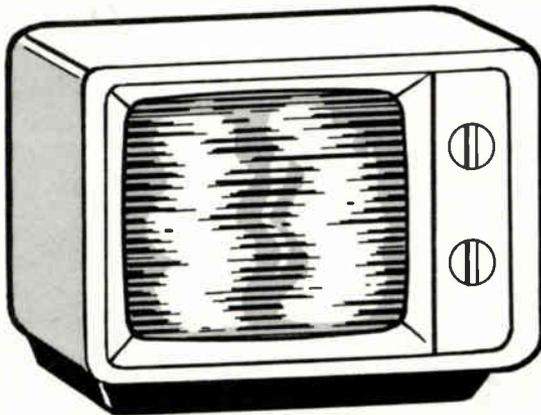


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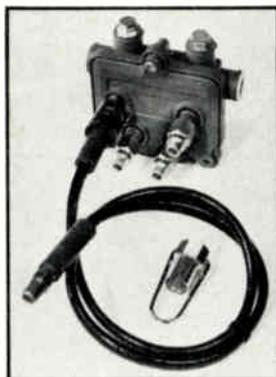
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• **Dialogic Communications Corp. (DCC)** has developed a cable industry application package for its TeleClerk 25M voice response system, which they displayed. The system interfaces with any telephone system and most billing system computers. The system performs combined inbound and outbound functions of the customer service representative including pay-per-view orders, billing inquiries, service appointment confirmation, collections and service upgrades/downgrades. It features an instantaneous, real human voice stored on a fixed disk.

Recent field tests at Viacom's Nashville, Tenn., operation indicate that the TeleClerk may handle 80 percent of the CSR functions within a typical operation.

For more information, contact Dialogic Communications, 1106 Harpeth Industrial Court, P.O. Box 8, Franklin, Tenn. 37064, (615) 790-2882.

• **General Instrument's Jerrold Division** introduced several additions to the Starcom VI family of converters, digital plain models DQ4 and DQ5, at the show. Features include operation to 450 MHz and 66 channels in Model DQ4, or 550 MHz and 82 channels in Model DQ5; favorite and last channel recall for all channels; parental control capability; automatic fine tuning; and accelerated scanning with two-stage channel selection. In addition, the digital plain converter models can pass the BTSC stereo signal directly to a subscriber's stereo TV. For those subscribers who do not have a stereo TV, Jerrold's Starsound, in conjunction with the Starcom family, will provide stereo sound to the subscriber's stereo system or externally powered speakers.

Jerrold also announced that volume control with muting has been added to the two-way upgradable Starcom VI RF addressable converter. Model DP5 allows subscribers to control a TV set's audio level from either the set-top converter or a handheld remote unit.

At the Western Show, Jerrold demonstrated its new headend phaselock output converter. The model C4APC frequency agile phaselock converter is an "all channel" output converter. It operates in the harmonically related carrier (HRC) format and uses standard intermediate frequency (IF) signal inputs from any headend modulator or processor.

The headend converter operates from 50 to 550 MHz, providing cable operators with the flexibility to expand their headend system operations. According to the company, the converter also is well-suited as a universal spare unit for all HRC channels and is compatible for use with all current modulators offering an IF loop-thru.

For more information, contact Jerrold Division, General Instrument Corp., 2200 Byberry Rd., Hatboro, Pa. 19040, (215) 674-4800.

• **General Instrument/Tocom Division** introduced its own new converter at the show this year. The Tocom Model 5503-VIP permits unattended, time-controlled VCR recording of multiple TV programs. A timer, similar to those

Reader Service Number 35.

used in modern VCR units, allows subscribers to program the 5503-VIP to turn on and tune to specific channels at preset times and dates. Up to four events may be programmed over a seven-day period or favorite programs may be recorded daily.

The 5503-VIP offers an optional unit that permits simultaneous recording and viewing of cable channels: the Tocom VCR-Mate module. The 5503-VIP may be upgraded for impulse pay-per-view programming with a telephone dialer module. Utilizing store and forward technology already tested in the Jerrold Starfone product line, the converter helps eliminate peak load handling problems.

Also available is an optional stereo adapter, which provides left and right baseband audio output for connection to subscriber stereo equipment. For stereo-ready televisions, the 5503-VIP passes stereo to BTSC-capable TVs without need of an adapter. The volume is controlled on either stereo pass-through or the stereo decoder by the Tocom remote control unit.

Tocom also announced a new addressable control system option. The new Tocom remote hub controller, available with the Tocom Micro-ACS addressable control system, continuously maintains all local addressing in its data base at the remote site. Updates to the controller data base are transmitted by the Micro-ACS, which is located at the primary cable system's headend office. The operator may send the subscriber updates, which are entered on the Micro-ACS, to the controller via a dial-up telephone link. Communication between the controller and the Micro-ACS is provided over a standard telephone network.

In addition to the remote hub controller option, the Micro-ACS, which is based on the IBM PC-AT computer line, will feature impulse pay-per-view control of the Tocom 5503-VIP baseband addressable converter and IPPV module. The unit can now be expanded to support up to 250,000 subscriber addresses and features channel mapping, complete management reports, billing computer interface and backup utilities.

For more information, contact Tocom Division, General Instrument Corp., P.O. Box 47066, Dallas, Texas 75247, (214) 438-7691.

● **Kanematsu-Gosho (U.S.A.) Inc.** premiered a second generation Sprucer two-way addressable converter system. The new model, Sprucer 300, will be available in June and contains a number of refinements over the earlier Sprucer converter. Chief among them is the FAST (forced automatic select tuning) feature, designed to allow the cable operator to select the channel that the subscribers' sets will be tuned to when turned on. According to the firm, when the pay-per-view preview channel is selected, subscriber awareness is increased dramatically.

Another feature of the new 550 MHz converter is an increased IPPV capacity to 900 events per channel. The remote-control unit (RCU) is larger for subscriber convenience and includes software control of the IR circuit,

which allows the cable operator to turn off the RCU.

For more information, contact Kanematsu-Gosho Inc., 400 Cottontail Lane, Somerset, N.J. 08873, (201) 271-7300.

● **Lectro Products Inc.**, a subsidiary of Burnup & Sims Cable Products Group, announced the introduction of a headend standby power unit. Designated the RM1403, the unit has a 400 watt capacity and has less than 10 millisecond transfer time. The unit is designed to protect character generators, microcomputers, etc., against momentary or prolonged power outages.

For more information, contact Burnup &

Sims Cable Products Group, Lectro Products, 420 Athena Dr., Athens, Ga. 30601, (404) 482-7612.

● **Lemco Tool Corp.** displayed its new coring/stripping tool, the Corstrip. The tool features an adjustable center conductor stop for more accurate conductor lengths; a tapered stripping blade; stripping blade reverses; a guide sleeve; a dual edge, fluted coring blade; and an inspection window that keeps the center conductor in view for progress checks.

For more information, contact Lemco Tool Corp., R.D. #2, Box 330 A, Cogan Station, Pa. 17728, (800) 233-8713 or (717) 494-0620.

PRODUCT

CWY
electronics

BULLETIN

Durable Equipment Rack—\$85

CWY's Model RR72 equipment rack costs up to 25% less than competitive racks and it's UPS shippable for even greater savings. The RR72 is constructed of tough 11-gauge formed steel with a grey baked enamel finish and assembles quickly and easily. This equipment rack features 70 inches of panel space with 40 rail spaces. For \$85, the RR72 represents total value. And there's more: CWY offers a complete line of accessories which add even more support and convenience to the RR72 rack.

Model RR/S7 Shelf

This shelf assembly is ideal for mounting equipment that does not have an attached rack mount panel. It requires only 4 rack spaces (7 inches) of panel space, and mounts to any EIA/RETMA standard spacing rack. **\$24.95**

Model RR/A19 Series Blank Panels

Oblong mounting holes allow slight adjustment for exact fit. Constructed of 1/8" aluminum. Available in 12 sizes to fit 1-12 blank rail spaces. **\$4.50 to \$25.00**

Model PUP19 Punched Panel

Provides for orderly, effective patch panel for headend requirements. Contains 24 "D" type 3/8" numbered holes for mounting of "F" and "BNC" connectors. **\$9.50**

Model RR/10-32 Rack Screws

Screws are 10-32 x 3/4" binder head, nickel plated for neat appearance. And they don't require the use of a washer. **\$4.20/100**

Model RR/RSB Equipment Support Bracket

Adds rear support to rack-mounted equipment. Allows air flow between and through equipment while also relieving stress and torque. Assists in insertion and removal of equipment by providing support. **\$10.50**

Model RR/RB Roll Base

Relocation of the headend rack is a snap with the RR/RB roll base, which bolts securely to the rack. Support weight rated at 500 pounds, the roll base is shipped assembled complete with locking casters. Outrigger-style supports assist in stabilizing the headend rack. **\$39.55**

Model RR48 Headend Rack

All the features of the Model RR72, in a more compact size. The RR48 headend rack provides 45.5" of rail space (26 rail spaces). **\$75.00**

CWY maintains a complete inventory of top quality products for cable applications. For further information or application assistance regarding these and other products available from CWY, write or call toll-free today.

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● **M/A-COM** highlighted its popular VideoCipher II system. With scrambling technology evolved from VideoCipher I, the system uses the Data Encryption Standard (DES) algorithm of the National Bureau of Standards.

The multi-level control structure of the VideoCipher II allows descramblers to be grouped into common program categories, or tiers (up to 56 independent tiers of programming). The system transmits two digital audio channels during the horizontal blanking interval. Before transmission, each digital sample is added to a random binary sequence generated by the DES algorithm and combined with error coding bits. According to the company, this provides the highest possible security because any pirate descrambler may have to search all 72,057,590,000,000,000 possible key combinations by trial and error to get the right one.

For more information, contact M/A-COM, 3033 Science Park Rd., San Diego, Calif. 92121, (800) 626-6640 or in California, (619) 457-2340.

● **Magnavox CATV Systems Inc.** announced the release of a new line of distribution slope equalizers. The new "8" series is available in three models for use in sub- and mid-split systems: 8-DSE-33, 8-DSE-108, and 8-DSE-174. A major benefit of the new models is that they take a standard plug-in equalizer, making them variable rather than fixed.

Magnavox also announced the addition of a new product to its line of cable electronics: the 110 V powered amplifier with full return capabilities. Because it is compact (8" x 6¼" x 4¾") and requires standard 110/220 VAC powering, according to the company, this unit is easily installed indoors. It provides amplification out to 600 MHz. The new amplifier is designed for apartment houses, hotels, schools, hospitals, stores and local area networks.

For more information, contact Magnavox CATV Systems Inc., 100 Fairgrounds Dr., Manlius, N.Y. 13104, (315) 682-9105.

● **Nexus** featured several of its new products at the Western Show this year. Its UV-5 crystal-controlled UHF-VHF converter, used to convert UHF off-air television signals to the VHF band, features ultra low loss filters and low-noise amplifiers, resulting in an excellent signal-to-noise ratio, according to the company. Input frequency range is from Channel 14 to Channel 83, output from 2 to 13.

Nexus' new commercial satellite receiver, the SR-5, also appeared at the show. With an RF input frequency of 900 to 1,450 MHz, the noise figure is 12 dB and the tuning 24 channels. Options include a 70 MHz IF loop and VideoCipher interface.

For more information, contact Nexus Engineering Corp., 4181 McConnel Dr., Burnaby, British Columbia, Canada, V5A3J7, (604) 420-5322.



Pico's new parental control device.

● **Pico Products** introduced its new parental control device. This unit uses a key lock trap, which, when activated by the key, "locks out" single, dual, or tiers of channels to give adults the ability to exercise parental guidance.

The trap allows cable operators to meet new FCC regulations on providing parental control and to generate revenues by marketing these devices to premium channel subscribers. Each unit comes with an installation diagram that allows subscribers to do the hook-up themselves. Pico will provide advertising materials that can be included in a cable subscriber's monthly bill for promotion of the key lock trap.

Also, the announcement was made that R.F. St. Louis Associates, an Essex Falls, N.J., design consulting firm, in conjunction with engineers from the Pico Products CATV division, has completed the design phase of the OTAS II subscriber control system. This improvement



Joe Elliot Sadel

Sadelco

25th Anniversary Special Announcement



Harry L. Sadel

Mr. Harry L. Sadel, President of Sadelco, Inc., announces the appointment of his son, Mr. Joe Elliot Sadel, Director of R & D for Sadelco, Inc., on the 25th Anniversary of the founding of the company.

Mr. Joe Elliot Sadel received his engineering degree in 1977 from Cal. Poly. University.

After graduation, he worked in the computer field for Anderson-Jacobsen. In recent years he was a consultant to

several high-technology companies in the computer field.

Joe Elliot Sadel is working on the application of micro-processor and chip technology for use in signal level meters. As a result of his work, he has developed several new products for future use by Sadelco, Inc.

With the addition of Joe Elliot Sadel to the company, "Sadelco will continue to go into new and exciting Directions," stated Harry L. Sadel.

Sadelco 25TH Anniversary

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The first pioneers headed west with a spirit of adventure and achievement. Eager to take risks. Determined to blaze new trails. Always ready to face new challenges and find new opportunities. They couldn't have guessed that a small Trinity River trading post would one day be the thriving, thrilling city of Dallas. They never dreamed of anything like cable television.

Today, that pioneer spirit has led the cable industry to success. Cable's frontiers are always expanding, demanding that we blaze new trails daily. Our people are always exploring, never settling. They know that staking a good claim is only the start. That's why cable pioneers will go west to Big D this spring to exchange new ideas at cable's biggest, busiest trading post.

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DESTINATION

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of the OTAS I uses surface-mounted components to provide twice the number of scrambled channels in an outdoor terminal one-third the size of the OTAS I terminal.

Pico's new HR-1000 satellite receiver was also displayed. The HR-1000 offers a number of customer benefits, including audio tuning control, skew control, and a unique AFC system for operation in a high terrestrial interference environment. The infrared hand-held remote-control unit performs all receiver functions. The remote-control provides users with power on/off, channel selection, volume control, audio/stereo control and even selection of the target satellite, with its compatible programmable actuator control. The HR-1000 is descrambler-ready and has RCA outputs for

easy video monitor and stereo connections.

For more information, contact Pico Products Inc., 103 Commerce Blvd., Liverpool, N.Y. 13088, (315) 451-7700.

• Demonstrating its commitment toward standardizing cable's various converter scrambling modes, **Pioneer Communications Inc.** exhibited its BA-5000 addressable converter, which now offers compatibility with Oak, Jerrold and Hamlin scrambling modes.

"Multi-vendor compatibility is probably one of the least discussed improvements in this year's generation of converters," explains Larry Shredl, Pioneer's national sales manager. "With problems such as idle inventory and theft-of-service, today's cable operators

simply cannot afford the expense and headache of being locked into one source of supply."

The BA-5000 also offers an integrated VCR timer, in-home diagnostics for trouble shooting, and an optional add-on for impulse-pay-per-view capabilities.

For more information, contact Pioneer Communications of America Inc., 2200 Dividend Dr., Columbus, Ohio 43228, (614) 876-0771.

• **Raychem Corp.** has developed a new connector system that was displayed at the show. The EZF connector system addresses the problems of F-connectors—RF leakage and moisture penetration—which are among the leading causes of maintenance problems for cable operators. The system provides RF shielding of 100 dB at 300 MHz after thermal cycling and salt spray exposure, and an environmental shield at both the cable jacket and port thread interfaces. Only two connector types are needed, one for RG-59 cable and one for RG-6.

For more information, contact Raychem Corp., Telecommunications Division, 300 Constitution Dr., Menlo Park, Calif. 94025, (415) 361-CATV.

• **Regency Cable Products** introduced several new converters at the Western Show. The Regency Classic converter series consists of two models: the RE-1 basic plain converter with optional remote, and the RE-2 full-featured plain converter with optional remote control and other features. The Classic converters are available for single or dual cable configuration. They offer low heat dissipation and small physical size.

The newly restyled 66-channel addressable RC32 converter features downloadable, non-volatile memory technology, advanced parental control and diagnostic features. The RC32 line consists of a family of one-way addressable converters with dual-mode random scrambling, optional audio scrambling and a new optional full-feature hand-held wireless remote control.

Jerold data stream compatibility and an optional five-year warranty are special features of the new Regency LC-32 home converter. The new unit is available with a channel capacity of 66 channels (450 MHz) and 83 channels (550 MHz).

A new rack-mounted headend scrambler that incorporates addressability and audio jamming features was also introduced. The new HES003 headend scrambler's audio jamming module allows the cable operator to jam the audio, as well as scramble the video on unauthorized channels.

The HES003, when used in conjunction with Regency's non-volatile intelligent data controller (NIDC) and addressable control software, can be remotely switched from the office control computer.

Also featured at the show was the NIDC itself, a unit that interfaces with a tiering or billing computer to an addressable converter and a local override control and audit listing



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Reader Service Number 39.



Regency's local override control and audit listing (LOCAL) for emergency override audits.

(LOCAL), which aids in emergency overrides.

Designed to act as a modem, the NIDC takes decoder address and tiering authorization information from the control computer via a Regency RS232 serial data link. The tiering authorization is stored in stable static CMOS memory and formatted by the NIDC's microcomputer to the Regency addressable format and modulated on a frequency synthesized FSK carrier.

The LOCAL system consists of a video display data terminal and a serial dot matrix printer. In conjunction with the NIDC, the system provides the cable operator with the ability to override the billing or tiering computer in an emergency to audit transactions where the NIDC and computer are co-sited.

For more information, contact Regency Cable Products, P.O. Box 116, East Syracuse, N.Y. 13057-0116, (315) 437-4405.

• **RMS Electronics Inc.** announced that it can now guarantee -120 dB RFI on a select group of its non-power passing passive devices.

RMS is now offering this guarantee on its models CA-1090/M (T-type) and CA-2090/M (right angle) "uni-directional" directional couplers, as well as its CA-2002/SM (two-way) and CA-2003/SM (three-way) silver-plated hybrid splitters and CA-1040/SM silver-plated FM splitter. The -120 dB RFI specification will be available in other hybrid splitter and directional coupler models in the near future. These devices are all patent pending.

For more information, contact RMS Electronics Inc., 50 Antin Pl., Bronx, N.Y. 10462, (212) 892-1000.

• **Scientific-Atlanta** introduced a variety of new products at the Western Show.

These included a new line of plenum-rated coaxial cable for use in structures where fire codes are in effect. The products are constructed with the fluoropolymer material Teflon FEP and have been tested and listed by UL for fire and smoke characteristics of the National Electrical Code (NEC) Article 725, paragraph 2B. They are available in a variety of sizes for various applications: for broadband data LANs and video networks there are 75 ohm RG-59 type, dual RG-59 type, RG-6 type and RG-11 type cables; 50 ohm RF-58 type is Ethernet baseband network compatible; and for other computer-based communications, 9

ohm RG-62 type plenum cable is available.

A new line of 600 MHz taps and passives was introduced with features that improve performance for CATV distribution systems operating in unfavorable climatic conditions. The new products complement the company's existing line of series SAT two-, four- and eight-way taps; series SAS two- and three-way splitters; series SADC directional couplers and series SAIF power inserters. All of the products are available in coated and uncoated versions and come standard with RF gasketing.

All of the coated products feature brass F ports with tin plating to prevent the formation of galvanic corrosion between the drop cable connector and the F port on the tap. The new coating finish is of the "baked powder" variety.

S-A introduced a new satellite receiver, the Model 9630. The receiver is both C- and Ku-band compatible and is designed for use in CATV headends as well as SMATV applications. The Model 9630 operates at an input frequency of 950-1450 MHz and features frequency synthesized tuning, AFC and a rear panel IF loop. It offers standard 24-channel format, but also features 20 programmable channel frequencies for Ku-band or non-standard C-band spacing.

Also introduced by S-A was the Model 6680 receiver. The new receiver is the second generation of the Series 6650 receiver. New features and design concepts incorporated in the Model 6680 include an improved RF converter for lower input return loss and phase noise.

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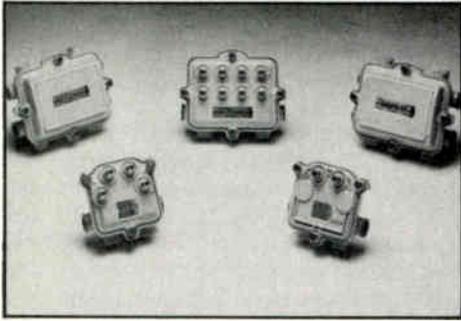
Phone (214) 271-3651

Reader Service Number 40.

COMMUNICATIONS TECHNOLOGY

JANUARY 1986

61



S-A's 600 MHz taps and passives.

The new video demodulator is designed for increased performance in the presence of today's multiple subcarrier transmissions and demodulating high-speed data with the utmost accuracy, according to the firm. A tunable audio subcarrier demodulator has been added to the receiver to provide immediate retuning to a desired subcarrier service.

S-A announced the new Model 8526 digital set-top terminal, an advanced programmable unit designed to operate in 550 MHz cable television systems. The unit complements the company's Model 8525 digital set-top terminal, which was introduced earlier this year for operation in systems up to 450 MHz.

S-A also announced the new Model 8550-275 programmable remote control, which is used to program the Series 8550 set-top terminals to work in conjunction with video cassette recorders. The unit parallels a VCR's ability to record cable services by pre-programming Series 8500 set-top terminals for unattended operation.

Lastly, S-A introduced the new Model 6825 indoor distribution amplifier for use in CATV and SMATV multiple dwelling unit applications. The product is available in four gain versions: 15, 22, 30 and 32 dB.

The amplifier can be mounted directly to a building's wall and receives its power from a standard 115 VAC wall outlet. S-A has incorporated many of the features found in its line of distribution amplifiers, such as discrete pads and equalizers, which minimize the time required for setup and adjustment.

For more information, contact Scientific-Atlanta Inc., 1 Technology Parkway, Box 105600, Atlanta, Ga. 30348, (404) 441-4000.

● **Signal Vision** unveiled several new products at this year's show. Among them is a new, directional tap offering high electrical and mechanical standards, small packaging and economical pricing. The tap has a 500 MHz bandwidth, brass F ports, urethane finish and a new RFI gasket.

Also featured was "The Thread Protectors." This rubber sleeve seals the area where the female and male F fittings meet and stops water and chemicals from corroding the two fittings together. According to the company, when used with its Model SV-800-SS weather boot, the F fitting is totally encapsulated and secure from weather.

In conjunction with Apache Plastics, Signal Vision introduced a new line of cable-in-conduit, which will be manufactured on the

West Coast. The conduit is manufactured from black, virgin, high-density polyethylene resin designated as Type III, Grade 3, Class C, in accordance with ASTM-D 1248 specifications. All brands of cable can be extruded into the conduit for immediate delivery.

As well, Signal Vision celebrated its 10th anniversary at the show.

For more information, contact Signal Vision, 22732-B Granite Way, Laguna Hills, Calif. 92653, (714) 586-3196.

● **The Society of Cable Television Engineers** announced the availability of the new updated publication, "Graphic Symbols for Cable Television Systems." This revision of current graphic symbols in the cable television industry was prepared by joint committees of SCTE and the National Cable Television Association, and supersedes all previously issued publications by the SCTE and NCTA relating to CATV system drawings and diagrams. Featured in this latest publication are functional symbols for 23 CATV system devices including underground designations, amplifiers, power devices, coaxial cables, and DOD fiber-optic symbols.

For more information, contact the Society of Cable Television Engineers, P.O. Box 2389, West Chester, Pa. 19382, (215) 363-6888.

● **Studioline Cable Stereo** announced a comprehensive package designed to put cable operators into the business of stereo. This package includes Studioline Cable Stereo, the nine-format music service, plus the company's Stereo-Track stereo delivery system for cable.

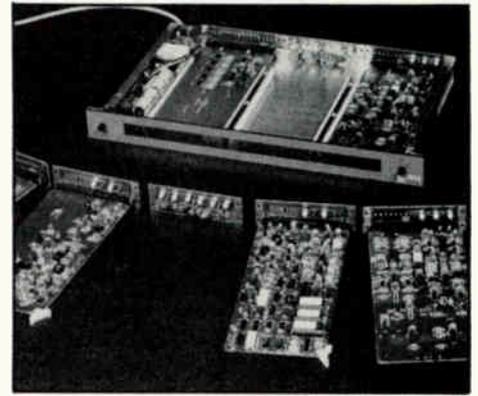
The centerpiece of the system is the 69-channel Stereo-Track II decoder. This unit, which is manufactured by the Tokyo-based Weston Corp., is addressable, tierable and features auto-tracking for all video services. It delivers a digital quality signal (88 dB S/N) into the home and is compatible with any off-air or cable service stereo transmission format. A warranty and service center is currently being set up by Weston in Austin, Texas.

For more information, contact Studioline, 11490 Commerce Park Dr., Reston, Va. 22091, (703) 648-3200.

● **Telecrafter Products Corp.** introduced the Fastac clip gun to the cable industry. This drop cable installation tool facilitates one-handed, automated fastening of wire or cable to any wooden surface. Also, it is virtually impossible to crush, cut, or crimp the cable being installed, according to the company.

The Model RB-2 Fastac clip gun fits all wire and cable up to 5/16" diameter (by inserting the appropriate clip). RB-2 cable clips are sized for RG-59 quad (available now), RG-59 standard, RG-6 standard, and RG-6 quad (available in February). The Fastac clip gun has an adjustable drive force and a modular construction that allows disassembly and reassembly with the aid of a screwdriver.

For additional information, contact Telecrafter Products Corp., 200 Union Blvd., Suite 411, Lakewood, Colo. 80228, (303) 986-7700.



Texscan's Adapta line of studio and headend equipment.

● **Texscan MSI/Compuvid** unveiled the SpectraGen SG-e economy character generator that provides basic features at an economical price, according to the firm. A character generator with full RS-170A color compatibility, the SG-e accommodates up to 150 pages of text using CMOS non-volatile memory to prevent memory loss during power failures. Also, the unit provides multiple display formats, multichannel capability, remote capability and optional off-line editing.

The company also introduced the PB-1 video cassette playback system, which can insert the programs from up to 14 video cassette machines into a local origination or satellite channel. The PB-1 can be scheduled by a SpectraGen SG-3 or SG-4 character generator, a ComSerter commercial insertion unit, or a computer 8 bit parallel port. SpectraGen and ComSerter can schedule the playback of video cassette programs for a week or more in advance.

Lastly, Texscan introduced the Adapta line of modular studio and headend equipment. Housed in a single EIA rack unit high chassis, the Adapta rack can contain and power up to three audio, video, or radio frequency circuit modules.

The growing list of available modules includes an audio distribution amplifier, a video and pulse distribution amplifier, an audio/video switcher, and a satellite subcarrier data demodulator. Each module includes a circuit board and connection panel assembly for easy interface to other equipment in a television studio or cable television headend.

For more information, contact Texscan Corp., MSI/Compuvid, 3855 S. 500 West, Suite 5, Salt Lake City, Utah 84115, (801) 262-8475.

● **Times Fiber Communications Inc.** introduced a new product line of TFC connectors. The T900 line of connectors is available in all sizes and types to fit Times Fiber's advanced TX low-loss semiflex cables, T4 Plus and other standard industry cables.

The company also introduced two new products to augment the Mini-Hub II system. SUI II is a new subscriber terminal that allows pay-per-view programming and premium service to be ordered and charged to major credit cards. Especially suited for resort areas, SIU II provides a method to sell additional

If you've had to bear the expense of replacing your entire mainstation every time you needed to add new features, that's too bad.

Too bad you didn't choose Magnavox originally. We've understood the economics of upgradability ever since we built our first mainstation. We designed it to set-up fast, easy and economically; and inserted compatible, plug-in modular components ever since.

Today, cable operators using Magnavox look very smart because our new Power Doubling™ and Feedforward fit into the original housing to do wonders to reduce noise and distortion. Our new Parallel Power Doubling™ retrofits nicely so it can push profitable signals into more subs homes, too.

The point being, it's never too late to begin with, or rebuild with, Magnavox.

For more cost-effective data please call our Marketing Department toll-free for our upgrade update.



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"TH" housing. Durable and still in use today.

1976

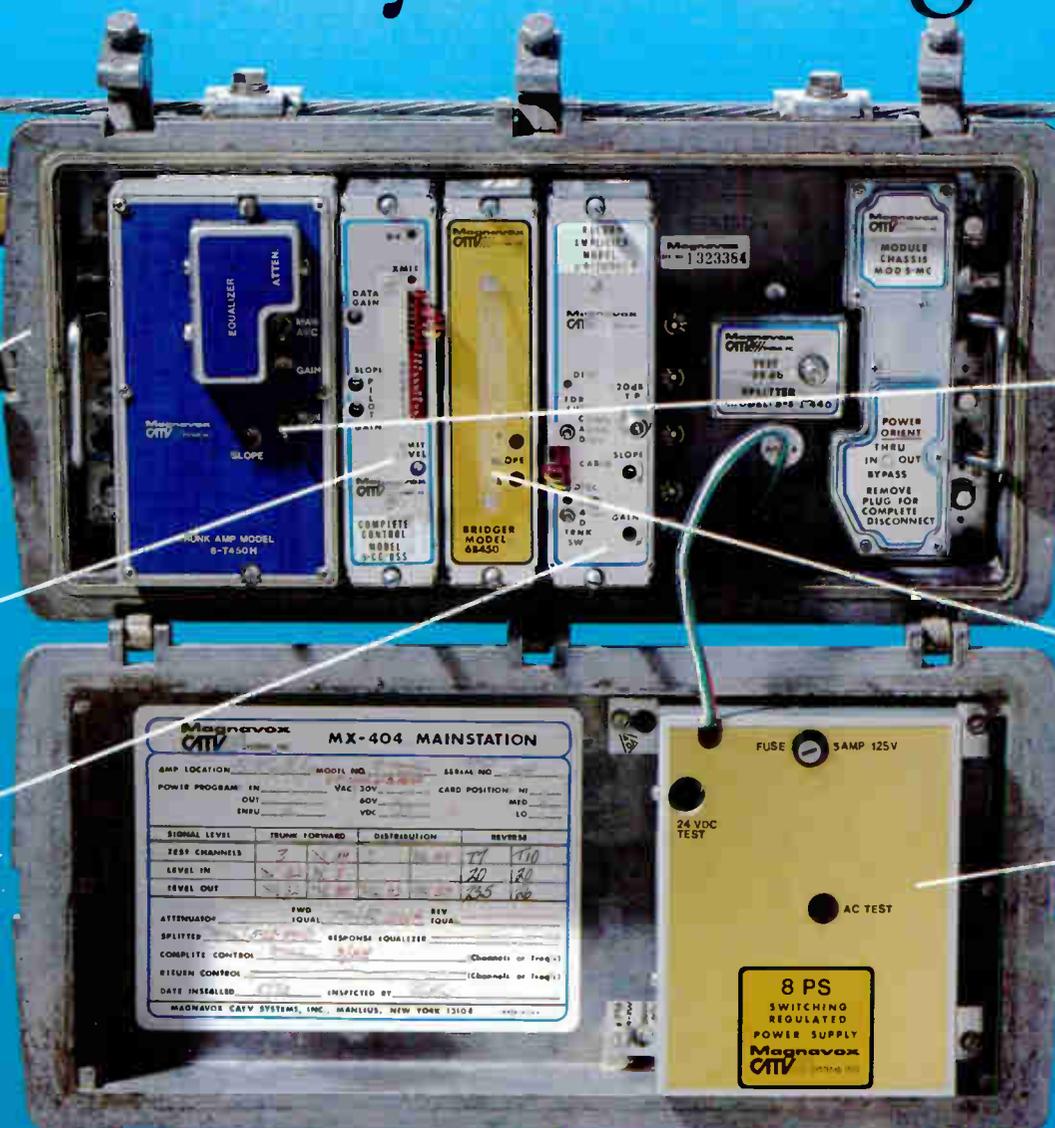
System Sentry Status Monitoring

1980

Bridger & Trunk Switching. 6 dB switchable pads for ingress localization.

1980

440/450 MHz technology. A Magnavox first.



1984

Feed-forward with Power Doubling. We're first again.

1983

Single chip Power Doubling. Another Magnavox first.

1983

Switching Regulated Power Supply. Increases efficiency at least 25%.

MAGNAVOX CATV MX-404 MAINSTATION			
AMP LOCATION	MODEL NO.	SERIAL NO.	
POWER PROGRAM IN	VAC 30V	CARD POSITION HI	MED
OUT	80V	LO	
ENBU	VDC		
SIGNAL LEVEL	TRUNK FORWARD	DISTRIBUTION	REVERSE
TEST CHANNELS	7	11	110
LEVEL IN	20	180	
LEVEL OUT	230	100	
ATTENUATOR	FWD	REV	
SPLITTER	EQUAL	LOCAL	
COMPLETE CONTROL	RESPONSE LOCALIZED	(Channels or Freq.)	
REVERSE CONTROL	(Channels or Freq.)		
DATE INSTALLED	INSPECTED BY		
MAGNAVOX CATV SYSTEMS, INC. MANLIUS, NEW YORK 13104			

cable programming to vacationers. SIU II will be field tested by a major MSO early this year in a seaside resort. As well, a telephone order processing system answers cable operator's needs by providing a cost-effective system to offer pay-per-view programming in a one-way cable plant. This optional feature of the Mini-Hub II system doesn't require two-way addressable equipment, making it affordable for smaller hotels/motels.

For more information, contact Times Fiber Communications, 358 Hall Ave., Wallingford, Conn. 06492, (203) 265-8500.

• **Toner Cable Equipment Inc.** featured Avcom's PSA-35 spectrum analyzer at its Western Show booth. The new portable analyzer is lightweight (17 lbs.) and battery operated, thereby making it appropriate for field test situations. It can measure wideband signals as well as troubleshoot system problems by observing output signals from LNAs, BDCs, line amps and splitters, and other RF signal components. The unit can identify and resolve terrestrial interference problems by displaying offending signals on its screen.

The frequency coverage of the unit is from less than 10 MHz to over 1,500 MHz; from less than 3.7 GHz to over 4.2 GHz in six bands. Additionally, there is a built-in DC block and power for LNAs.

For more information, contact Toner Cable Equipment Inc., 969 Horsham Rd., Horsham, Pa. 19044, (215) 675-2053.

• At the **Westinghouse** booth, the focus was on two Westinghouse/Sanyo products: the VCM 2001 video control module, a VCR interface; and the SM2000 Series stereo module for stereo sound.

The VCM 2001 is designed to work with any combination of cable converters and standard or cable-ready TVs. The unit requires simple, one-time wiring, has clearly displayed instructions on the front panel, and is easy to use, according to the firm.

The SM2000 Series are multi-mode FM receivers that will work whenever there's a drop cable, according to the company, and use the concept of an infrared buss in conjunction with a remote-control unit. All of the modules feature a non-volatile memory with a cross-reference matrix that relates the TV channel entered by the user to the corresponding FM frequency.

Featured from Westinghouse Electric was its CableTraQ, an automated customer survey service, tested within the Group W cable network. Customers are interviewed by telephone researchers who enter responses directly into the CableTraQ computer, which generates reports that include comparisons to national averages, an action index, summaries of service categories and recommendations for action.

For more information on the SM2000 Series or the VCM 2001, contact W & S Systems Co., Westinghouse Building, Rm. 1880, 11 Stanwix St., Pittsburgh, Pa. 15222, (800) 323-9935. For information on CableTraQ, contact West-

inghouse Electric, P.O. Box 3912, Pittsburgh, Pa., 15230, (412) 374-7192.

• **Zenith Electronics Corp.** displayed a new generation of its Z-TAC tiered addressable cable television decoders that are fully compatible with multichannel television sound (MTS).

According to the company, the system provides increased security from pay TV piracy, full remote-control features and the ability to provide stereo TV programming. The Z-TAC decoders pass through MTS signals to a stereo TV set or separate stereo system without affecting any other features.

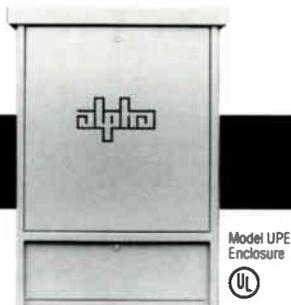
The company also emphasized its new VCR interface for subscribers who want more use from their VCRs.

The VCR interface allows consumers to simultaneously record a pay channel and watch a network channel, without complicated connections or A/B switches. The unit works with any VCR and with any type of cable converter system, according to the firm, and can be installed simply by the subscriber.

Another subscriber product from Zenith is the TAC-Timer. The device is a remote-control transmitter that can be used to program the Z-TAC decoder to change channels automatically when the subscriber is away from home, for recording programs unattended.

For more information, contact Zenith Electronics Corp., 1000 Milwaukee Ave., Glenview, Ill. 60025, (312) 391-8181.

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Reader Service Number 42.

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Reader Service Number 43.

James Emerson has resigned from **AM Cable TV Industries Inc.** to pursue other business interests. Emerson was general sales manager for AM's E-COM Products Division. Emerson remains on the NCTA Engineering Committee and is running for a third term on the Society of Cable Television Engineers' board of directors. Contact: 345 Thrush Dr., Gilbertville, Pa. 19525, (215) 367-2981.

At its recent annual meeting, **C-COR Electronics Inc.** elected officers. They are: **Richard Perry**, president; **J. Joseph Howe**, senior vice president, finance and treasurer; **Stanford Cook**, vice president, manufacturing; **William Christoffers**, secretary; and **Thomas Teeter**, assistant secretary.

Following those elections, the board of directors of C-COR met, instituting two changes. **Barbara Palmer** resigned as a board member and was elected director emerita. **Eli Lipcon** was elected to fill that vacancy. He is manager, Marketing Partnerships Worldwide, Digital Equipment Corp. **James Palmer**, former chairman for C-COR, will serve the company as consultant and director.

Other board members for 1986 are **Richard Perry**, **Joseph Bates**, **William Christoffers**, **Floyd Fischer**, **I.N. Rendall Harper Jr.**, **Dr. Philip Walker Jr.** and **John Wilkinson**. In addition to Palmer, directors emeriti are **Gordon Kissinger** and **Dr. Marsh White**.

In other news from C-COR, as part of its plan to restructure its sales and marketing program, the company has appointed **Thomas Mathai** as vice president, sales and marketing. Prior to joining C-COR, Mathai was vice president of office message services with Western Union Corp. Contact: 60 Decibel Rd., State College, Pa. 16801, (814) 238-2461.

James Holder has been named vice president of operations for **Mountain Cable Industries**. Holder has been manufacturing manager at Mountain Cable for the past year. Contact: 16026 W. 5th Ave., Golden, Colo. 80401, (303) 279-2825.



Schaffer

Donald Schaffer has recently been named general manager of **Fort Wood Cable TV Co.**, a subsidiary of Cable America Corp. In his new position, Schaffer will be responsible for managing all of Cable America Corp.'s systems in Missouri. Schaffer joins Ft. Wood Cable from Fort Leonard Wood army base, where he served as (civilian) communications manager. Contact: 4350 E. Camelback Rd., #120F, Phoenix, Ariz. 85018, (602) 952-0471.

At the **Federal Communications Commission**, **Raymond Strassburger**, special counsel to the chairman for congressional affairs, has resigned to become assistant vice president and attorney, federal relations for U.S. West Inc.

Strassburger will be replaced by **John Kamp**. Kamp, whose title will be legal assistant to the chief, Mass Media Bureau, joined the FCC in 1980. He previously served as an attorney in the Policy and Rules Division of the Broadcast Bureau and its successor unit, the Mass Media Bureau. Contact: 1919 M St. N.W., Washington, D.C. 20554, (202) 632-7260.

Tau-tron Inc., a unit of General Signal, announced the appointment of **Jeffrey Adams** as regional sales engineer. An application engineer with Tau-tron since 1983, Adams will now be responsible for the sales development of Tau-tron's products to telephone companies and common carriers. Contact: 10 Lyberty Way, Westford, Mass. 01886, (617) 692-5100.

Tulsa-based **Satellite Syndicated Systems Inc.** (SSS) has opened corporate offices in both New York City and Los Angeles. **Jim Trecek**, newly appointed senior vice president for SSS, will head the New York office and will be responsible for Eastern region affiliate sales, programming support and advertising sales. Additionally, Trecek will oversee international programming support from Europe, Canada, Africa and Great Britain. Trecek joined SSS in 1984 as vice president, Star Ship Stereo promotions.

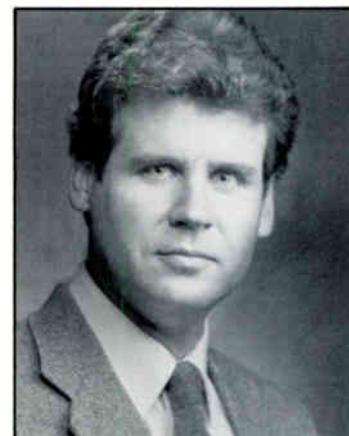
James Karolik will be Western regional vice president, having similar responsibilities to those of Trecek. In the international programming arena, Karolik will oversee all Asian countries, Mexico, South America, Australia and New Zealand. Before joining SSS, Karolik was director of advertising sales and local origination programming for the northeast region at Group W. Cable. Contact: P.O. Box 702160, Tulsa, Okla. 74170, (918) 481-0881.

Kent Lewis has joined **Commercial Cable Inc.** as national sales manager. Lewis will be involved in sales for both Commercial Cable Inc. and Commercial Communications Inc. He was previously regional sales manager for Eagle Comtronics. Contact: 7353 Lee Highway, Chattanooga, Tenn. 37421, (800) 367-5742 or (615) 894-2580.

B.E. Duval Co. has announced the appointment of **Glenn Duval** as sales manager. Duval Co. will celebrate its 19th year of service to the cable industry in 1986. Contact: 29619 Western Ave., Rancho Palos Verdes, Calif. 90732, (213) 833-0951.

Walt Roth has become production manager at **MicroWave Technology Inc.** Roth, a 12-year electronics industry veteran, will report to the president, Tom Baruch, and will have responsibility for the company's GaAs FET amplifier and amplifier module test and assembly operations. Roth last worked at Avantek, where he was production manager of power amplifiers. Contact: 4268 Solar Way, Fremont, Calif. 94538, (415) 651-6700.

Jim Brown has been named to the newly created position of sales manager for satellite systems at **R.L. Drake Co.** Before joining Drake, Brown worked for 15 years for the Frigidaire Division of White Consolidated in Dayton, Ohio. Contact: P.O. Box 112, Miamisburg, Ohio 45342, (513) 866-2421.



Dieu

Pioneer Communications announced the addition of **Ivan Dieu** to its sales staff as an account executive for the company's Western region. Dieu will be responsible for Alaska, California, Colorado, Hawaii, Idaho, Montana, Nevada, Oregon, Utah, Washington and Wyoming. His sales office will be in Sacramento, Calif. Dieu was previously employed with Oak Communications as an account executive in the Western region. Contact: 2200 Dividend Dr., Columbus, Ohio 43228, (614) 876-0771.

Statstar has added **Gregory Decker** to its sales team. Decker, most recently with Charmant Eyewear Inc. of Great Neck, N.Y., has over 12 years in sales. Contact: 1395 Marietta Parkway, Building 700, Marietta, Ga. 30067, (404) 425-9385.

William Fennell has been appointed controller of the distribution and special markets division of **Philips ECG Inc.**, a subsidiary of North American Philips Corp. Fennell had been director of operations analysis for GTE Communications Products, Stamford, Conn. Contact: 100 First Ave., Waltham, Mass 02254, (617) 890-6107.

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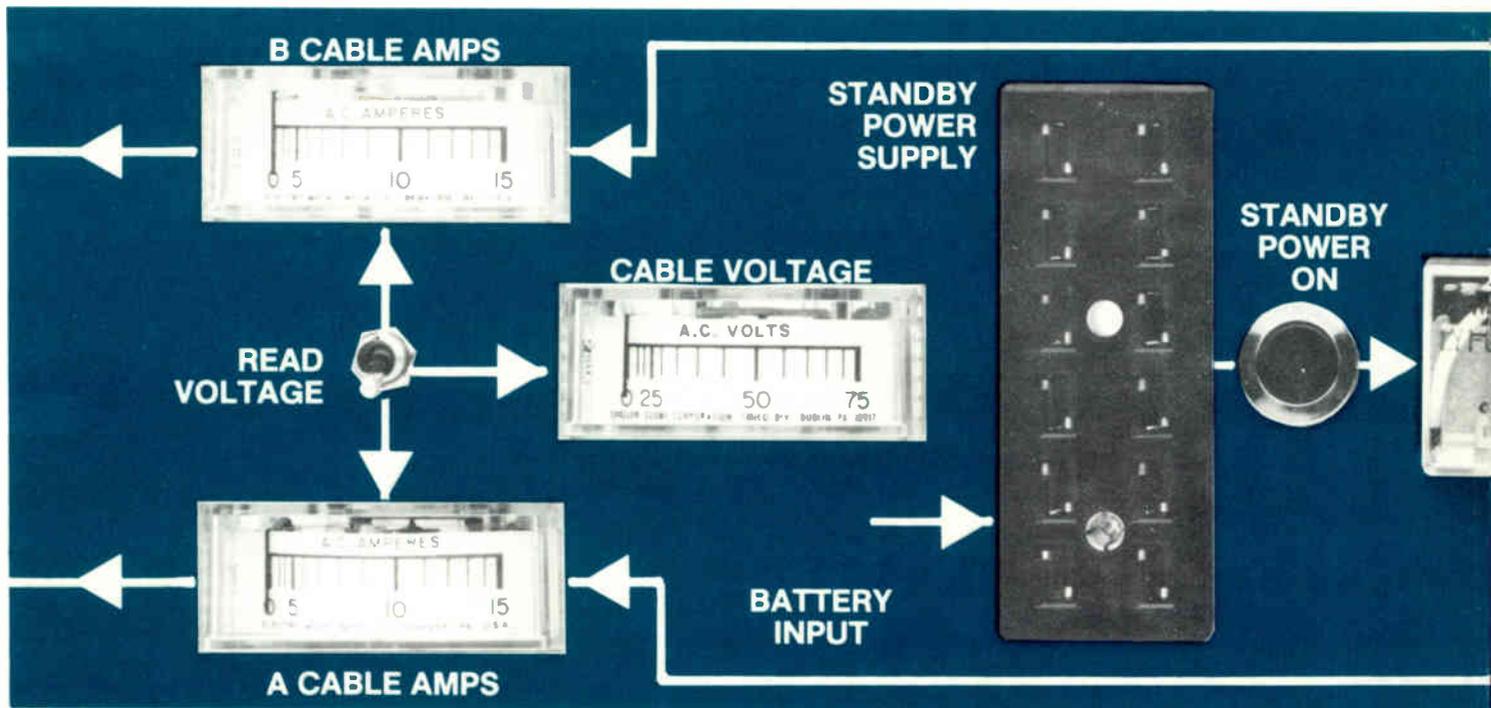
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Introducing the SP 1450 dual cable and SP 720 single cable systems. The Data Transmission Power Supplies. Reliable. Durable. Low priced. The most carefully engineered standby systems ever developed. Promising standby power that's fast, effective, and extremely reliable.



Unique features make maintenance easy.

While highly sophisticated, the Data Transmission power supplies have been designed for inexpensive and quick maintenance.

For example, to facilitate ease of installation and service, the normal power and standby power modules plug into a keyed instrument panel. This panel also indicates power sources plus flow and power to each cable.

What's more, the standby power module has optional self diagnostics with colored LED's so you can tell at a glance the status of every element in the system. This means that non-technical people can make repairs quickly and easily on-site.

For ease of installation and service, both power supplies have handles for easy removal.

Patented battery charger.

The battery charger is a unique, patented design, particularly advantageous in hotter climates where it will more than double battery life while reducing maintenance by 50% or more.

Supplies are independent for greater reliability.

No component in either the normal Data Transmission supply, or the standby supply, can cause a power interruption or a failure in the other. Each supply is completely

independent. With no common ferro-resonant transformers, capacitors, or other components that can disable both supplies simultaneously.

A system designed exactly the way you want it.

Our supplies are available with 60 volt power to the cable. In 720VA (12 amps) rating for single cable, to 1450VA (two 12 amp circuits) for dual cable.

The modular construction allows you to upgrade the basic single cable supplies to dual cable units, or dual battery units for longer emergency operation.

All it takes is just a few minutes to change from single to dual cable. Simply replace the plug-in power supply units and add a battery box. It's that easy. Plus, we have stackable battery compartments to house additional batteries. Which means there is virtually no limit to the number of batteries you can add.

Over 20 years of power supply experience.

In 1971 our chief engineer designed and manufactured the very first normal/standby power supplies for the cable TV industry. He also designed the emergency lighting industry's first solid state battery charger which tripled lead acid battery life while reducing maintenance time.

All of which means that while Data Transmission Devices is a relatively young company, the depth of our knowledge in this industry is unsurpassed.

The models SP 720 and SP 1450.

The front panels are of "dead front construction" so that all live parts are covered when the system is operating, including the underside of the electrical chassis, to prevent electric shock.

The line diagram and pilot lamp color indicate the source and use of power. So that even non-English speaking technicians can easily determine if the system is working. After he repairs a malfunction, the technician can also determine if the system is working by simply pushing the "Test Standby Power" Switch (optional).

The instrument panel is held in place with four stainless steel screws, and all other connections are made with push-on terminals so that replacement is simple and quick. In fact, all you need is a screwdriver to replace an entire system's operating parts. Plus, the batteries are located on roll-out trays for ease of installation and service.

Smart Timer.

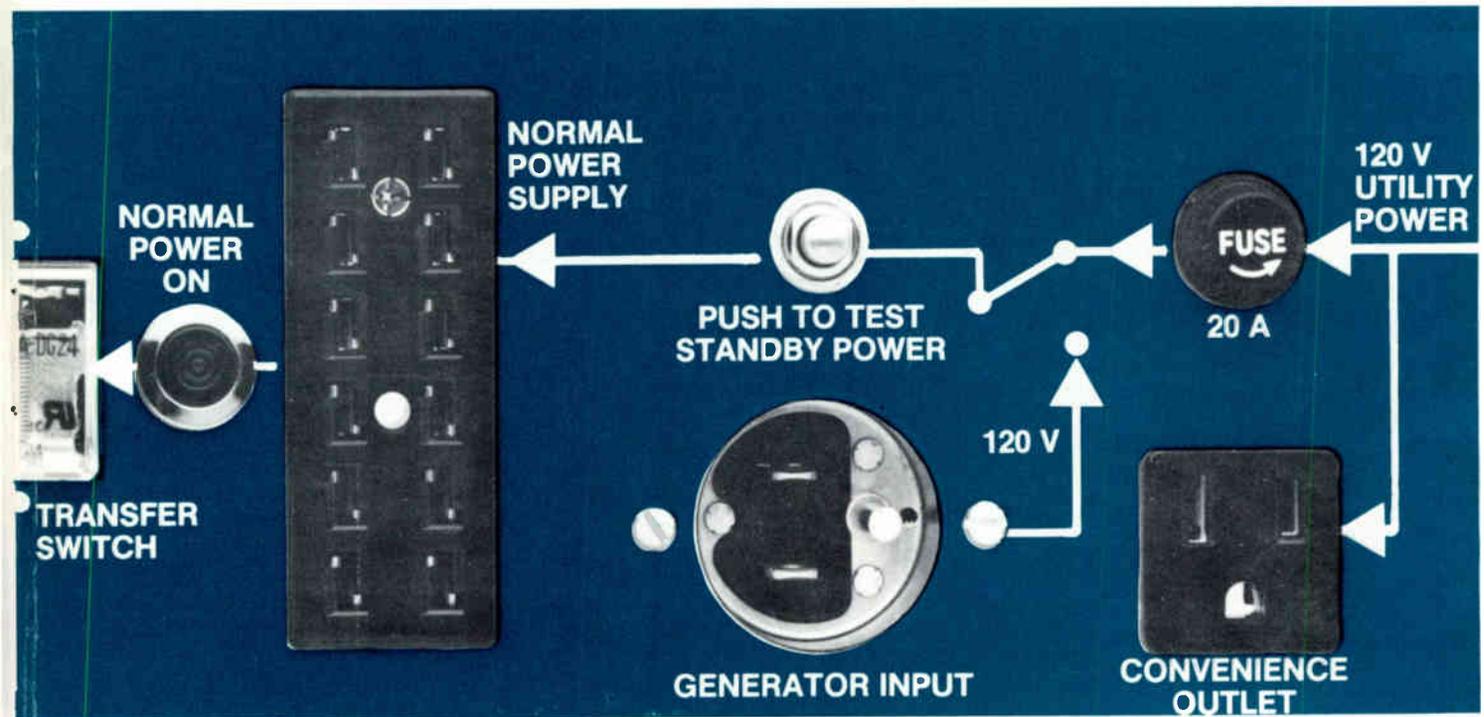
The D.T.D. systems are equipped with a Smart Timer so that when there is a failure of utility power, the supply transfers the cable load from the ferro-resonant normal power transformer to the inverter in 10 milliseconds.

When normal power is restored, the timer circuit monitors the line voltage. When it has remained stable for 10 continuous seconds, it transfers the cable back to the normal power supply. If there is a distortion or interruption, the timer automatically resets itself. Complete, easy to read instructions for the system maintenance and testing are attached to the inside of the front door.

The batteries.

By locating the batteries in the lower half of the supply, they stay cool. This is due to a constant flow of fresh air from the bottom of the cabinet to the vents in the top. So that even in hot, still, weather conditions, the batteries are cooled and their life extended.

For dual cable conversion, or for extended running time, batteries can be easily



SHOWN ACTUAL SIZE



Model SP720 with options STS, VR, VA, SD, SG, CO, TP (see back page).

stacked on the bottom of the cabinet. To convert from single to dual cable operation, simply change the normal and standby power supplies from the 720 to the 1450 model, attach the extra battery module, add batteries, and the conversion is complete.

Battery charger.

This is the culmination of 25 years experience in battery and charger research and design fields. Covered by a variety of patents, it is not available in competitors equipment.

The charger is fully automatic and self-compensating for use with both lead antimony and lead calcium batteries. With wet, gelled, or starved electrolyte systems of over 50 ampere hour capacity.

Temperature compensated, the charger is a variable charger rate type, which responds to the battery state of charge indicated by battery charging current, specific gravity, and temperature. It automatically adjusts



Model SP1450 with options STS, VR, VAA, SD, SG, CO, TP (see back page).

the battery terminal voltage upwards following a discharge. Once fully charged, the current acceptance rate decreases, signaling the charger to reduce the terminal voltage to a maintenance level. This enhances battery life, particularly in hot weather.

The inverter.

This is a pulse width modulated square wave type with an optional constant voltage output over the full battery voltage range and load range. Plus it has overload and shortcircuit protection.

All inverter, logic and control functions are programmed into a single custom made integrated circuit. Through ingenious programming, the inverter maintains a constant voltage to the cable over the full

range of battery voltages and load currents.

When presented with an overload, it increases the current supplied and reduces the voltage while clearing the overload. If the load continues to increase, it will reduce the current. And if presented with a shortcircuit, go into load test mode, pulsing the load several times per second until the short clears. Then it will revert to normal operation.

If the battery runs down due to an extended power failure, the inverter will automatically shut itself off, preventing damage to the batteries and cable.

The control card.

The PC control card socket and connector are gold plated to eliminate corrosion, and are mounted vertically, to prevent moisture and dirt accumulation and consequent loss of connection in freezing weather. The inverter electronics and self diagnostics (optional) are on a single plug-in card.

Smaller is better.

The single cabinet power supply is only 24" high, 16¼" wide, and 17½" deep. The dual supply is just 12" taller. Both supplies have universal mounting, either with a single bolt per bracket (one top, one bottom), or with strapping.

Line fuse.

It provides protection in the event of failure in the ferroresonant circuit. And can also be used to remove power from the equipment.

Where stainless steel is in order.

We have stainless steel cabinets which can be had on special order. These are especially important in areas where corrosion is a problem.

CALENDAR

January

Jan. 12-13: Idaho Cable Television Association legislative convention, Owyhee Plaza, Boise Idaho. Contact Jean Westin, (208) 336-9121.

Jan. 13-14: Satellite Communications Show, Halloran House, New York. Contact (212) 233-1080.

Jan. 14-15: Jerrold technical seminar, Los Angeles. Contact Beth Schaefer, (215) 674-4800.

Jan. 15-17: Magnavox CATV training seminar, Torrance, Calif. Contact Amy Costello, (800) 448-5171; in New York, (800) 522-7464.

Jan. 20-22: Magnavox CATV training seminar, Torrance, Calif. Contact Amy Costello, (800) 448-5171; in New York, (800) 522-7464.

Jan. 21: SCTE/Magnavox satellite tele-seminar program on amplifiers at 5 p.m. EST over Galaxy I, transponder 1. Contact SCTE, (215) 363-6888.

Jan. 21-23: C-COR Electronics technical seminar, Oakland Airport Hilton Hotel, Oakland, Calif.

Contact Debra Cree, (800) 233-2267.

Jan. 27-28: Washington State Cable Communications Association annual convention, Sheraton Hotel, Tacoma, Wash. Contact Bruce Frickelton, (206) 627-6981.

Jan. 29: SCTE Rocky Mountain Chapter meeting on grounding and bonding. Contact Joe Williams, (303) 978-9770.

Jan. 29: SCTE South Lake Meeting Group, BCT/E exam. Contact Scott Weber, (219) 464-2288.

February

Feb. 4-5: Arizona Cable Television Association annual convention, Hilton Hotel, Phoenix, Ariz. Contact ACTA, (602) 257-9338.

Feb. 5-7: Magnavox CATV training seminar, San Bruno, Calif. Contact Amy Costello, (800) 448-5171; in New York, (800) 522-7464.

Feb. 10-11: Magnavox CATV training seminar, San Bruno, Calif. Contact Amy Costello, (800) 448-

5171; in New York, (800) 522-7464.

Feb. 11-13: Jerrold training seminar, Tampa, Fla. Contact Beth Schaefer, (215) 674-4800.

Feb. 12-14: Georgia Cable Television Association 18th annual convention, Omni International Hotel, Atlanta. Contact (404) 252-4371.

Feb. 13: New York State Cable Association pay-per-view seminar, Albany, N.Y. Contact Gwenn Bellcourt, (518) 463-6676.

Feb. 13-14: Phillips Publishing third annual "Bypassing the Local Telephone Exchange" seminar, Marriott Crystal Gateway Hotel, Arlington, Va. Contact (301) 340-2100.

Feb. 19-21: SPACE Show, Convention Center, Las Vegas, Nev. Contact (800) 654-9276.

March

March 3-5: School of Lightning Protection Technology Inc. seminar, Orlando Airport Marriott, Orlando, Fla. Contact (815) 943-4005.

Planning ahead

March 15-18: National Cable Television Association annual convention, Dallas.

May 13-15: Canadian Cable Television Association annual convention and cablexpo, Vancouver.

June 12-15: Society of Cable Television Engineers' Cable-Tec Expo '86, Phoenix (Ariz.) Convention Center.

March 10-12: Arizona State University course on fiber-optic communications, Arizona State University, Tempe, Ariz. Contact (602) 965-1740.

March 15: NCTA Minority Business Symposium in conjunction with the national convention in Dallas. Contact (202) 775-3629.

March 15-18: National Cable Television Association and Texas Cable Television Association combined convention, Dallas Convention Center. Contact (202) 775-3606.

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Like many cable operators, Bob Zequeira found his system the victim of extensive cable theft. Cable thieves were connecting their own service by gaining illegal entry into the cable enclosures. Selkirk Communications' only recourse was to find a high security enclosure capable of restricting unauthorized entry.

But security wasn't Selkirk's only problem. The harsh South Florida coastal environment was another factor to be dealt with, since constant exposure to salt air can be highly corrosive.

Their choice for security and durability; Utility Products' Super Safe. "We chose the Super Safe because of its unique locking mechanism. We had already established the box would last for many, many years," said Bob.

Corrosion-resistance has been a major factor in the purchase of cable enclosures since Selkirk established its system seven years ago. "We have used your apartment box for many years. We realized it was a very good product because of its finish. We tested it and installed it in buildings and areas where the salt concentration is the heaviest. We found it to last without any problems."

Super Safe, like all Utility Products' enclosures, features heavy-gauge, mill galvanized steel coated with a corrosion resistant nine step finishing process. It's interlocking cap and variety of locking mechanisms fortify the security of the unit.

So if security and durability are important in your system, rely on proven quality; Utility Products pedestals and enclosures. Built to last.

For further product information, phone or write us.

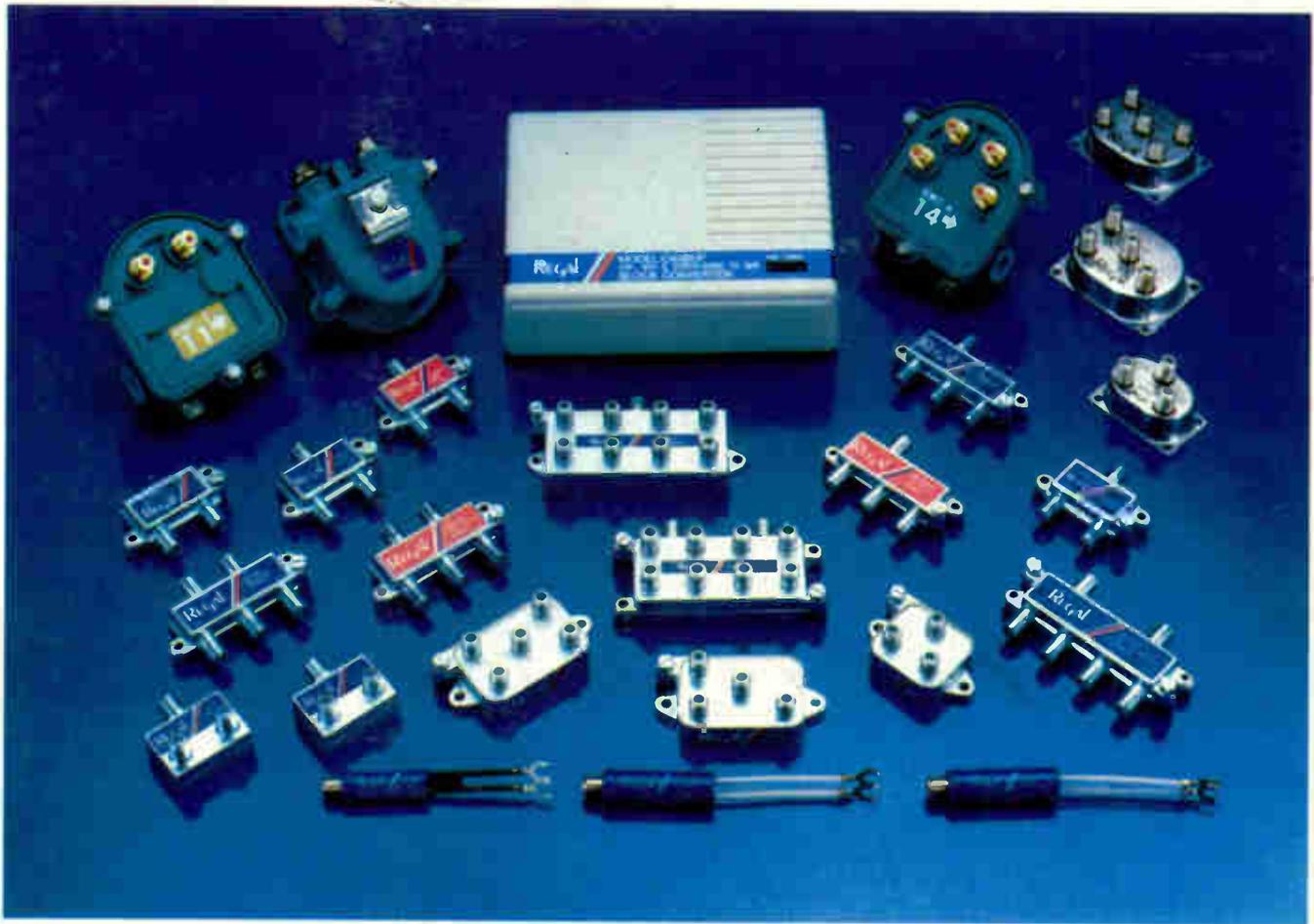
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Reader Service Number 53.

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